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TECHNICAL CORRIGENDUM 4

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Information technology — Text and office systems — Document Printing Application (DPA) —

Part 1:
Abstract service definition and procedures

TECHNICAL CORRIGENDUM 4

Technologies de l'information — Bureautique — Application impression de documents (DPA) —

Partie 1: Définition de service abstrait et procédures

RECTIFICATIF TECHNIQUE 4

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Page 30

Subclause 6.4.5.1

Replace the text of paragraphs f) subset-of, g) superset-of, and h) non-null-set-intersection with the following text:

f) **subset-of**, it evaluates to TRUE if and only if all of the assertion value is present in, or lies within, the attribute value.

This matching rule applies both to multi-valued attributes and to single-valued attributes that specify:

(1) ranges,

(2) two-dimensional areas,

(3) sequences of a single type.

In the case of multi-valued attributes, the assertion evaluates to TRUE if and only if each of the assertion value members is present in the attribute value set.

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For attributes.that specify a range (or two-dimensional area), the assertion evaluates to TRUE if and only if the assertion rangelarea lies within the attribute value rangelarea. For examples, see 9.1.5.16, IntegerRange and integerRangeSyntax, and 9.1.5.47, Area and areaSyntax.

In the case of single-valued sequence types (other than range or area types), the assertion evaluates to TRUE if and only if each of the assertion value members is present in the attribute value sequence, and the assertion value members are in the same sequence as the attribute value members.

g) **superset-of**, it evaluates to TRUE if and only if all of the attribute value is present in, or lies completely within, the assertion value.

This matching rule applies both to multi-valued attributes and to single-valued attributes that specify:

(1) ranges,

(2) two-dimensional areas,

(3) sequences of a single type.

In the case of multi-valued attributes, the assertion evaluates to TRUE if and only if each of the attribute value members is present in the assertion value set.

For attributes.that specify a range (or two-dimensional area), the assertion evaluates to TRUE if and only if the attribute rangelarea lies within the assertion value rangelarea. For examples, see 9.1.5.16, IntegerRange and integerRangeSyntax, and 9.1.5.47, Area and areaSyntax.

In the case of single-valued sequence types (other than range or area types), the assertion evaluates to TRUE if and only if each of the attribute value members is present in the assertion value sequence, and the attribute value members are in the same sequence as the assertion value members.

h) **non-null-set-intersection**, it evaluates to TRUE if and only if at least one of the assertion members is present in the attribute value.

This matching rule applies to multi-valued attributes, and to single-valued attributes that specify sequences of a single type.

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Subclause 8.2.1

In the second paragraph following the ASN.1, replace the current text:

This International Standard assumes that printers and other server components are reset or returned to appropriate states prior to processing each job. The **reset-printer** attribute permits the client to suspend the reset of the printer after particular documents, if desired for down-line loading of fonts, forms, PDL prologues, etc.

with the following text:

This part of ISO/IEC 10175 stipulates that printers and other server components are reset or returned to appropriate states prior to processing each job. However, between documents of the same job, resetting of the printer or interpreter depends upon the type of document format and/or the value of the **reset-printer** attribute. For page-independent document formats, the printer and interpreter should reset their states automatically at the end of printing each document. For other document formats, the **reset-printer** attribute permits the client to suspend the reset of the printer after particular documents, if desired for down-line loading of fonts, forms, PDL prologues, etc.

Page 50

Subclause 8.2.2.1

Delete the sixth paragraph from the bottom of the page, which reads as follows:

If the client lists a required attribute (i.e. an attribute element of the **PrintArgument**) in either the **job-non-compulsory-attributes** or **non-compulsory-attributes** attribute, the server shall completely ignore this particular value of the attribute.

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Page 129

Subclause 9.2.8.2

Following the table in 9.2.8.2, add the following text and table:

The following table indicates in which states the **job-state-reasons** are valid. The event that sets a particular **job-state-reason** may occur in a different state from the state in which the **job-state-reason** is reported; in such cases, the **job-state-reason** usually indicates why the job has transitioned to its current state.

Descriptive Name	Job States							
	held	pending	processing	paused	interrupted	terminating	retained	completed
documents-needed	X							
job-hold-set	X							
job-print-after-specified	X							
required-resources-not-ready	X							
successful completion							X	X
completed-with-warnings							X	X
completed-with-errors							X	X
cancelled-by-user						X	X	X
cancelled-by-operator						X	X	X
aborted-by-system						X	X	X
logfile-pending						X	X	
logfile-transferring						X	X	
cancelled-by-shutdown						X	X	X
printer-unavailable		X				X	X	X
wrong-printer		X				X	X	X
bad-job						X	X	X
job-interrupted-by-printer-failure	X			X				
cascaded			X				X	X
deleted-by-administrator						X	X	X
discard-time-arrived						X	X	X
pre-processing-failed	X		X	X		X	X	X
post-processing-failed						X	X	X
submission-interrupted						X	X	X
max-job-fault-count-exceeded						X	X	X
job-outgoing			X					
device-stopped-partly			X	X				
device-stopped				X				
job-interpreting			X					
job-printing			X					
service-off-line	X							
job-canceled-at-device						X	X	X
job-resubmitted by user	X	X		X			X	
job-resubmitted by-operator	X	X		X			X	
job-resubmission-completed	X	X		X			X	

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Page 136

Subclause 9.2.8.25

At the end of the 9.2.8.25, add the following note:

NOTE - the value of **processing-time** only includes those periods when the job is actually being processed in some way; **processing-time** does *not* include time periods during which the job has been paused or held while awaiting some operator action, for example. Upon completion of the job, the value of this attribute should represent the total amount of processing time actually consumed by the job.

Page 156

Subclause 9.3.2.16.1

Replace 9.3.2.16 and the first paragraph in 9.3.2.16.1, which read:

9.3.2.16 Imposition attributes

This group of attributes identify and/or specify the imposition operations performed on each page. An imposition operation consists of 3 steps performed in the order given below and specified by six attributes. The steps are:

a) **number-up**: the number of source page-images to make up a target page image. This operation may be complex.

b) **binding-edge-shift**: the amount to shift the target page image away from the binding edge, based on **plex** and **binding edge.**

c) **page-image-shift**: the final amount to shift in the x and y direction without regard to **plex**.

As introduced in 6.3.13, imposition functions affect the placement, orientation and scaling of page images on the selected media. Examples include applying binding margins, placing two page images on a side of the medium, and simple pamphlet.

9.3.2.16.1 Number-up

This attribute specifies the number of source page-images to impose upon a single instance of a selected medium. The attribute can be specified either by a number directly or by naming an imposition object which specifies some particular number-up imposition.

with the following text:

9.3.2.16 Imposition attributes

This group of attributes identify and/or specify the imposition operations performed to construct each page of the output document. As introduced in 6.3.13, imposition functions affect the placement, orientation and scaling of page images on the selected media. Examples include applying binding margins and placing two page images on a surface of the medium to produce a simple pamphlet.

Imposition operations are specified by the six attributes defined in this subclause. Imposition attributes are classified in three groups, which are applied in a fixed sequence, regardless of the order in which the attributes appear in a print request. These three groups are described below, listed in the order of their application:

a) *number-up*: determines the number, scaling and placement of source page-images to make up a target page image. The **number-up** attribute may specify a simple number-up operation operation, or it may identify a predefined imposition function, which may be complex.

b) *binding-edge-shift:* determines the amount to shift the target page image away from the binding edge, based on **plex** and **binding edge.**

c) *page-image-shift:* determines the final amount to shift in the x and y direction without regard to **plex**.

9.3.2.16.1 Number-up

This attribute specifies an imposition function to impose upon each surface of a selected medium to be imaged in a document. The operation can be specified either by supplying a number directly or by naming an imposition object which specifies some particular imposition function.

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Page 172

Subclause 9.3.4.2

In the table at the top of page 172, replace the "landscape" and "reverse-landscape" entries:

landscape	id-val-content-orientation-landscape	The page orientation such that the sides are shorter than the top when the page is held in the intended human readable orientation. Landscape is defined to be a rotation of the page by +90 degrees with respect to the medium (i.e. anti-clockwise) from the portrait orientation NOTE – The +90 direction was chosen because simple finishing on the long edge is the same edge whether portrait or landscape.
reverse-portrait	id-val-content-orientation-reverse-portrait	The page orientation defined to be a rotation of 180 degrees with respect to portrait
reverse-landscape	id-val-content-orientation-reverse-landscape	The page orientation defined to be a rotation of 180 degrees with respect to landscape. Landscape is defined to be a rotation of the page by -90 degrees with respect to the medium (i.e. clockwise) from the portrait orientation NOTE – **Reverse-landscape** was added because some applications rotate landscape -90 degrees from portrait, rather than +90 degrees.

with the entries:

landscape	id-val-content-orientation-landscape	The page orientation such that the sides are shorter than the top when the page is held in the intended human readable orientation. Landscape is defined to be a rotation of the page image by +90 degrees with respect to the medium (i.e. anti-clockwise) from the portrait orientation NOTE 1 – The +90 direction was chosen because simple finishing on the long edge is the same edge whether portrait or landscape. NOTE 2 – If the page image is to be printed on a medium that has landscape orientation, the landscape page image is not rotated before printing.
reverse-portrait	id-val-content-orientation-reverse-portrait	The page orientation defined to be a rotation of 180 degrees with respect to portrait
reverse-landscape	id-val-content-orientation-reverse-landscape	The page orientation defined to be a rotation of 180 degrees with respect to landscape. Reverse-landscape is defined to be a rotation of the page image by -90 degrees with respect to the medium (i.e. clockwise) from the portrait orientation NOTE 3 – Reverse-landscape was added because some applications rotate landscape -90 degrees from portrait, rather than +90 degrees. NOTE 4 – If the page image is to be printed on a medium that has landscape orientation, the reverse-landscape page image is not rotated before printing.

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Page 265

Subclause 9.15

Replace paragraphs two through five on page 265:

Commonly used imposition functions may be defined by a systems-administrator, and installed in a server as imposition-objects. An imposition-object instance consists of a named collection of attributes of the imposition object-class that specifies its effect.

The **number-up** document attribute identifies, at most, a single number-up operation which shall be applied once per impression (or result-surface) if the attribute is present and not 0. Otherwise, no number-up operation is applied.

Standard convenience imposition functions may be associated with imposition objects. These imposition functions can then be requested in a print-request by supplying their identifiers via the **number-up** document attribute.

Each defined imposition object shall include at least an imposition-identifier attribute containing the object identifier or simple-name by which it is referenced. Other imposition object attributes may be included as needed to properly describe and specify the effect that shall result when the imposition object is applied.

with the following three paragraphs of text:

Commonly used imposition functions may be defined by a systems-administrator, and installed in a server as imposition-objects. After an imposition function has been installed, it can then be specified in a print-request by supplying its identifier via the **number-up** document attribute.

The **number-up** document attribute identifies, at most, a single imposition-object, or simple number-up operation, which shall be applied once per impression (or result-surface) if the attribute is present and not 0. Otherwise, no number-up operation is applied.

An imposition-object instance consists of a named collection of attributes of the imposition object-class that specifies its effect. Each defined imposition-object shall include at least an imposition-identifier attribute containing the object identifier or simple-name by which it is referenced. Other imposition-object attributes may be included as needed to properly describe and specify the effect that shall result when the imposition-object is applied.

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INTERNATIONAL STANDARD ISO/IEC 10175-1:1996
TECHNICAL CORRIGENDUM 3

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Information technology — Text and office systems — Document Printing Application (DPA) —

Part 1:
Abstract service definition and procedures

TECHNICAL CORRIGENDUM 3

Technologies de l'information — Bureautique — Application impression de documents (DPA) —

Partie 1: Définition de service abstrait et procédures

RECTIFICATIF TECHNIQUE 3

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Page 41

Subclause 8.1.1

Delete the following two lines from subclause 8.1.1:

From Management Information Model (ISO/IEC 10165-4)

AttributeId

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Page 44

Subclause 8.1.2

Insert new subclause 8.1.2.5 on page 44:

8.1.2.5 Requested-attributes

This attribute enables a client to specify a list of attibutes that are to be returned from a DPA abstract-operation; the specified attributes will be included with the status attributes that are normally returned in the abstract-operation result. This is useful in those cases where a user needs information that is not normally returned by a particular server or abstract-operation.

Attributes that are specified in **requested-attributes**, but which are not supported by the server, or for which a value is not available, will be returned with an empty value.

If this attribute is not specified in the abstract-operation argument, the server will return the status attributes that are normally returned in the abstract-operation result. If this attribute is specified in the list-object-attributes-argument, it will be ignored.

```
requested-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX AttributeId
        MATCHES FOR EQUALITY
        MULTI VALUE
        ::= id-att-requested-attributes
```

Page 44

Subclause 8.1.3

In the table in 8.1.3, replace the line:

```
ub-octet-string          INTEGER ::= 255
```

with the line:

```
ub-octet-string          INTEGER ::= 4095
```

Page 86

Subclause 9.1.5.9

Replace the heading line of 9.1.5.9:

```
9.1.5.9. Delta time and deltaSyntax
```

with:

```
9.1.5.9. DeltaTime and deltaTimeSyntax
```

Page 97

Subclause 9.1.5.51

Replace the first paragraph and syntax production:

Attribute value types that can specify a value as either a Cardinal or an OID (that normally names a Cardinal) employ this generic data type and syntax in this definition.

```
CardinalOrOid ::= CHOICE {
       cardinal-value     [0] Cardinal,
       oid-value          [1] OBJECT IDENTIFIER }
```

By:

Attribute value types that can specify a value as either an OID (that normally names a Cardinal or pair of Cardinals) or as a single Cardinal or pair of Cardinals employ this generic data type and syntax in this definition.

```
CardinalOrOid ::= CHOICE {
       cardinal-value     [0] Cardinal,
       oid-value          [1] OBJECT IDENTIFIER
       2-dimension-value  {
            first-value       [0] Cardinal
            second-value      [1] Cardinal   }  }
```


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Subclause 9.1.5.52

Replace the first paragraph and syntax production:

Attribute value types that can specify a value as a Cardinal and also have an OID that acts as alias for the Cardinal employ this generic data type and syntax in this definition.

```
OidCardinalMap ::= SEQUENCE {
      oid-name          [0] OBJECT IDENTIFIER OPTIONAL,
      cardinal-value    [1] Cardinal }
```

By:

Attribute value types that can specify a value as a Cardinal or pair of Cardinals and also have an OID that acts as alias for the Cardinal (or pair of Cardinals) employ this generic data type and syntax in this definition.

```
OidCardinalMap ::= SEQUENCE {
      oid-name          [0] OBJECT IDENTIFIER OPTIONAL,
      first-value       [1] Cardinal,
      second-value      [2] Cardinal  OPTIONAL }
```

Page 105

Subclause 9.2.1.2

Replace subclause 9.2.1.2 with the following:

9.2.1.2 Job-identifiers-on-printers

The **Job-identifiers-on-printers** attribute is intended to replace the earlier attribute **job-identifier-on-printer**, which is now deprecated. The new form of the attribute permits a job to be split across multiple printers, without losing the identity of the job on each separate printer. The earlier version of the attribute only provided for a single job-identifier to be passed, so if the job was split among multiple printers, the identities of the subjobs could be lost or ambiguous.

9.2.1.2.1 Job-identifiers-on-printers attribute

This attribute can contain a unique job-identifier for this job on each assigned printer or next server downstream, and it shall be assigned by that printer or server.

```
JobIdentifierOnPrinter  ::= SEQUENCE {
                                  printer-name    [0] SimpleName,
                                  job-identifier  [1] JobIdentifier }

jobIdentifierOnPrinterSyntax  ATTRIBUTE-SYNTAX
      JobIdentifierOnPrinter
      MATCHES FOR EQUALITY  SET-COMPARISON  SET-INTERSECTION
      ::= id-syn-job-identifier-on-printer

job-identifiers-on-printers ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobIdentifierOnPrinterSyntax
        MULTI VALUE
        ::= id-att-job-identifiers-on-printers
```

The value of the **job-identifiers-on-printers** attribute shall contain the job-identifier that the printer or the next server downstream generates at the time the server submits the job to the printer or the next server downstream. If the printer or the next server downstream does not generate its own job identifier, the server shall leave the job-identifier value unspecified (i.e., the job-identifier element shall contain a null string).

If the job is split among two or more printers, the value of **job-identifiers-on-printers** shall contain a job-identifier for each of the assigned printers. If a printer does not generate its own job identifier, the server shall place a null string in place of a job-identifier for that printer.

NOTE – This attribute is intended for jobs submitted to other servers, such as a gateway to a legacy server, or to printers which have their own internal queue and assign their own job identifiers.

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9.2.1.2.2 Job-identifier-on-printer attribute [Deprecated]

[Temporary Note: This attribute is now deprecated, but should be supported for a limited time to enable interoperability with older DPA client and server implementations.]

This attribute provides the job-identifier for this job to uniquely identify it on the printer or next server downstream, and it shall be assigned by that printer or server.

```
job-identifier-on-printer ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier-on-printer
```

The value of the **job-identifier-on-printer** attribute shall be the job-identifier that the printer or the next server downstream generates at the time the server submits the job to the printer or the next server downstream. If the printer or the next server downstream does not generate its own job identifier, the server shall leave the value of this attribute unspecified.

NOTE – This attribute is intended for jobs submitted to other servers, such as a gateway to a legacy server, or to printers which have their own internal queue and assign their own job identifiers.

Page 119

Subclause 9.2.4.12

Replace the second entry:

submit-only	id-val-job-validate-submit-only	Server to determine whether or not the job would be completed without errors or warnings; no printing is requested

with the following table entries:

submit-only	id-val-job-validate-submit-only	Server to determine whether or not the job would be completed; print request parameters are to be checked but not the print datastream; no printing is requested
validate-datastream	id-val-job-validate-datastream	Server to determine whether or not the job would be completed; print datastream is to be checked but not the print request parameters; no printing is requested
validate-both	id-val-job-validate-both	Server to determine whether or not the job would be completed; both the print request parameters and the print datastream are to be checked; no printing is requested

Page 125

Subclause 9.2.8.1

Revise the first sentence to read:

This attribute identifies the current state of the job (pending, processing, held, etc.).

Page 126

Revise the table entry for "printing" as follows (using strikeout character formatting as shown):

printing	id-val-job-state-printing	The server has completed processing the job and the output device is currently printing the job on at least one printer. That is, a print engine is either printing pages of the job, or failing in its attempt to print pages of the job because of some wait state, such as, start-wait, end-wait, needs-attention, etc. The complete job state includes the detailed status represented in the printers' printer-state attribute(s). NOTE - a system may not always be able to determine when a job is actually being printed; therefore, printing is considered a substate of the processing state, and implementation of the printing substate is optional.

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Revise the table entry for "paused" to read as follows:

paused	id-val-job-state-paused	The job has been paused as a result of a PauseJob operation, or a printer failure has caused the server to pause the job until an operator can deal with the problem.

Page 128

Replace Figure 9-1 on page 128 with the following figure:

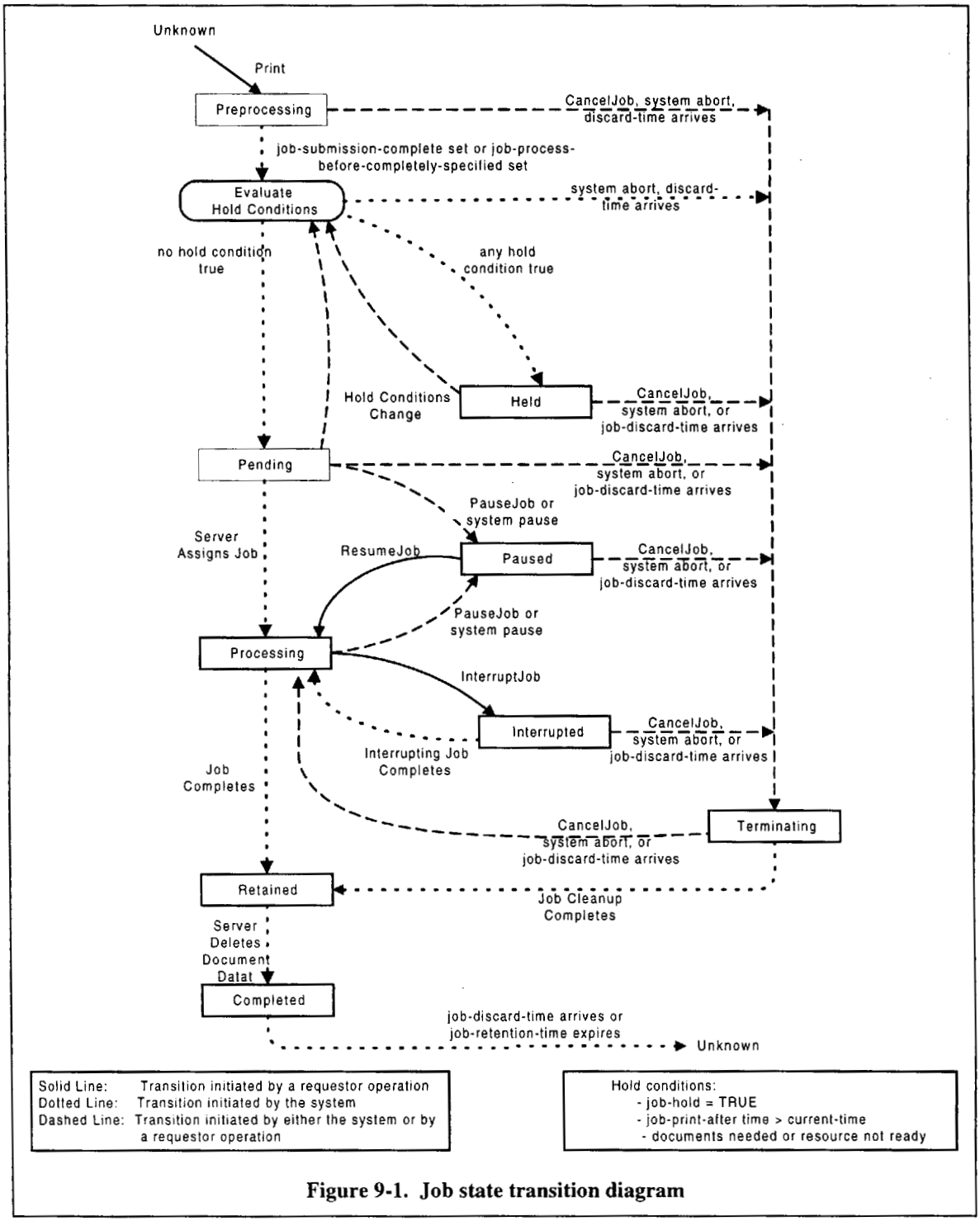

Figure 9-1. Job state transition diagram

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Page 135

Subclause 9.2.8.18

Replace the line:

WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax

with the line:

WITH ATTRIBUTE-SYNTAX newJobIdentifierSyntax

Page 138

Subclause 9.2.8

On page 138, preceding subclause 9.2.9, insert the new subclause 9.2.8.30:

9.2.8.30 Job-state-message

Attribute values of this type shall contain human readable text information about a job's state. This message is used primarily when a job has been completed with errors or has been aborted.

```
job-state-message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX errorMessageSyntax
        SINGLE VALUE
        ::= id-att-job-state-message
```

Page 152

Subclause 9.3.2.8

Replace the first paragraph with the following text:

This attribute identifies a resolution that the server shall use as the resolution default for (the pages of) the document where the document itself does not specify a resolution. The resolution may be specified either by one or two integer values in dots per inch (dpi), or it may name a resolution with an OID. When two integers are specified, the **first-value** represents the resolution across the feed direction of the printer, while the **second-value** represents the resolution along the feed direction.

Page 166

Subclause 9.3.2.22

Replace the text after the syntax production with the following:

A value of **1** for **copy-count** shall generate a single human perceptible copy of the electronic document. If a value of **0** is supplied, then no print output shall be produced. This is useful when resubmitting a multi-document job if one or more documents are to be omitted from the job output.

Pages 184-185

Subclause 9.4.8

In 9.4.8, just before the final paragraph, add the following paragraph:

Some printers may support resolutions that are not *square*, i.e., the values are different along the printer's two principal axes. In this case, both cardinal values are given; the **first-value** represents the resolution across the feed direction of the printer, and the **second-value** represents the resolution along the feed direction.

Page 220

Subclause 9.6.4

At the end of 9.6.4, on page 220, insert the following note:

NOTE - this attribute is now deprecated because the medium-type values defined do not form an orthogonal list; i.e., a particular type of medium may possess more than one of the defined medium-type values. The multi-valued attribute named **medium-properties** should be implemented instead of the **medium-type** attribute. However, the medium-type values defined in this clause may be used with the new attribute **medium-properties**.

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Page 226

Subclause 9.6

*Create and insert a new subclause to define the **medium-properties** attribute:*

9.6.19 Medium-properties

This attribute identifies the type of this medium. (e.g. stationery, envelope, transparency, etc.)

```
medium-properties ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MATCHES FOR  EQUALITY  SET-COMPARISON
        MULTI VALUE
        ::= id-att-medium-properties
```

Standard values for this attribute are defined in 9.6.4.

NOTE - this attribute should be used instead of the attribute **medium-type** which is now deprecated.

Page 269

Subclause 9.17

Replace the last sentence of clause 9.17 paragraph 1:

Attributes listed in section 9.2.6 (Access and Accounting) and 9.2.8 (Job-status) are not valid attributes for an initial-value-job object.

with the sentence:

Attributes listed in 9.2.8 (Job-status) are not valid attributes for an initial-value-job object.

Page 270

Subclause 9.18

Replace the second sentence of clause 9.18, paragraph 1:

All attributes listed in clause 9.3.1, 9.3.2 (except **initial-value-document**), 9.3.3 (except document-content and **transfer-method**), and 9.3.4 are valid attributes for an initial-value-job object.

with the sentence:

All attributes listed in clause 9.3.1, 9.3.2 (except **initial-value-document**), 9.3.3 (except **document-content**), and 9.3.4 are valid attributes for an initial-value-document object; however, note that not all possible values of these attributes are valid in an initial-value-document.

Page 282

Annex A

Following the entry for id-syn-ignored-attribute, assign a new OID value to the new attribute syntax:

```
id-syn-job-identifier-on-printer        ID ::= { id-syn  64 }
```

Page 284

Following the entry:

```
id-att-default-delivery-addresses       ID ::= { id-oc-operation  3 }
```

assign the new attribute OID to the operation class:

```
id-att-requested-attributes             ID ::= { id-oc-operation  6 }
```

Page 287

Following the entry for id-att-current-page-order, assign new OID values as follows:

```
id-att-job-identifiers-on-printers          ID ::= { id-oc-job  245 }

id-att-job-state-message                    ID ::=  { id-oc-job  246 }
```


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Page 292

At the end of the list of medium object attributes, add the following attribute identifier definition:

```
id-att-medium-properties                ID ::=  { id-oc-medium  25 }
```

Page 301

Following the entry:

```
id-val-job-validate-submit-only         ID ::=  { id-vc-job-validate  1 }
```

assign the two new OIDs to the job-validate class:

```
id-val-job-validate-datastream          ID ::=  { id-vc-job-validate  2 }
id-val-job-validate-both                ID ::=  { id-vc-job-validate  3 }
```

Pages 336 and 341

Annex C

Insert the OIDs into the list of imports, in alphabetical order:

```
id-att-job-identifiers-on-printers,
        . . .
id-syn-job-identifier-on-printer,
```

Page 337

Insert the attribute identifier **id-att-medium-properties** *into the list of imports following the identifier* **id-att-medium-identifier**.

Page 339

Insert the attribute-identifier into the list of imports, in the proper alphabetical order:

```
id-att-requested-attributes,
```

Page 341

Following the line:

```
id-syn-job-password,
```

insert the OID import line:

```
id-att-job-state-message,
```

Page 345

Replace the line:

```
--*** 9.1.5.9. Delta time and deltaSyntax
```

with:

```
--*** 9.1.5.9. DeltaTime and deltaTimeSyntax
```

Pages 352-353

Replace the definition of the ***CardinalOrOid*** *datatype with the following:*

```
CardinalOrOid ::= CHOICE {
       cardinal-value     [0] Cardinal,
       oid-value          [1] OBJECT IDENTIFIER
       2-dimension-value   {
            first-value        [0] Cardinal
            second-value       [1] Cardinal   }  }
```


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Page 353

Replace the syntax definition of ***OidCardinalMap*** *with the following production:*

```
OidCardinalMap ::= SEQUENCE {
      oid-name          [0] OBJECT IDENTIFIER OPTIONAL,
      first-value       [1] Cardinal,
      second-value      [2] Cardinal  OPTIONAL }
```

Page 355

Insert the new attribute syntax definition following the syntax definition of the default-delivery-addresses attribute:

```
requested-attributes ATTRIBUTE
      WITH ATTRIBUTE-SYNTAX AttributeId
      MATCHES FOR EQUALITY
      MULTI VALUE
      ::= id-att-requested-attributes
```

Page 357

Insert the new attribute and attribute syntax definitions;

Replace the line:

```
--*** 9.2.1.2. Job-identifier-on-printer
```

with the following:

```
--*** 9.2.1.2.1. Job-identifiers-on-printers

JobIdentifierOnPrinter  ::= SEQUENCE {
                                    printer-name    [0] SimpleName,
                                    job-identifier [1] JobIdentifier }

jobIdentifierOnPrinterSyntax  ATTRIBUTE-SYNTAX
      JobIdentifierOnPrinter
      MATCHES FOR EQUALITY  SET-COMPARISON  SET-INTERSECTION
      ::= id-syn-job-identifier-on-printer

job-identifiers-on-printers ATTRIBUTE
      WITH ATTRIBUTE-SYNTAX jobIdentifierOnPrinterSyntax
      MULTI VALUE
      ::= id-att-job-identifiers-on-printers

--*** 9.2.1.2.2. Job-identifier-on-printer
  -- this attribute is deprecated; use job-identifiers-on-printers instead;
```

Page 367

Replace the line:

WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax

with the line:

WITH ATTRIBUTE-SYNTAX newJobIdentifierSyntax

Page 368

At the bottom of page 368, insert the following attribute definition:

```
--*** 9.2.8.30. job-state-message
job-state-message ATTRIBUTE
       WITH ATTRIBUTE-SYNTAX errorMessageSyntax
       SINGLE VALUE
       ::= id-att-job-state-message
```


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Page 398

Indicate that the attribute medium-type is now deprecated:

```
--*** 9.6.4 Medium-type    [NOTE - this attribute is now deprecated;]
--                         [ use medium-properties instead; see 9.6.19]
```

Page 400

Following the syntax definition of the attribute **medium-holes-diameter**, *add the syntax definition for the* **medium-properties** *attribute:*

```
--*** 9.6.19     Medium-properties
medium-properties ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MATCHES FOR EQUALITY SET-COMPARISON
        MULTI VALUE
        ::= id-att-medium-properties
```

Page 411

Annex D

Replace the line:

```
ub-octet-string          INTEGER ::= 255
```

with the line:

```
ub-octet-string          INTEGER ::= 4095
```

Page 452

Annex G

Replace the table entry for 'printer-state-of-printers-assigned':

printer-state-of-printers-assigned	job		job-state	job-states-supported		

with the table entry:

printer-state-of-printers-assigned	job		printer-state	printer-states-supported		

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INTERNATIONAL STANDARD ISO/IEC 10175-1:1996
TECHNICAL CORRIGENDUM 2

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Information technology — Text and office systems — Document Printing Application (DPA) —

Part 1:
Abstract service definition and procedures

TECHNICAL CORRIGENDUM 2

Technologies de l'information — Bureautique — Application impression de documents (DPA) —

Partie 1: Définition de service abstrait et procédures

RECTIFICATIF TECHNIQUE 2

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Page 99

Subclause 9.1.5

Add the new subclause:

9.1.5.56 OctetString and OctetStringSyntax

Attribute value types that encode ordered sequences of octets (i.e., 8-bit bytes) employ this generic syntax or data type in their definitions.

```
OctetString  ::= OCTET STRING (SIZE(0..ub-octet-string))

octetStringSyntax ATTRIBUTE-SYNTAX
        OctetString
        MATCHES FOR EQUALITY  SUBSTRINGS
        ::= id-syn-octet-string
```

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Page 108

Subclause 9.2.1.12

Insert a new paragraph prior to last paragraph in 9.2.1.12:

If the client specifies the **initial-value-job** attribute with a value of **none** (i.e., id-val-generic-none) the server shall *not* use any initial-value-job object to construct the job object during print-job submission.

Page 129

Subclause 9.2.8.2

Revise the first paragraph of 9.2.8.2 as follows:

This attribute identifies the reason or reasons that the job is in the current state, and may supply additional information about the status of the job. The server shall indicate the particular reason(s) by setting the value of the job-state-reasons attribute. When the job is not in a state for which one of the job-state-reasons applies, the server shall set the value of the job-state-reasons attribute to the empty set.

At the end of the table on page 129, add the following table entries:

cancelled-by-shutdown	id-val-reasons-cancelled-by-shutdown	The job was cancelled because the server shut down before completing the job.
printer-unavailable	id-val-reasons-printer-unavailable	This job was aborted by the system because the printer is currently unable to accept jobs This reason is used in conjunction with the reason aborted-by-system.
wrong-printer	id-val-reasons-wrong-printer	This job was aborted by the system because the printer is unable to handle this particular job. This reason is used in conjunction with the reason aborted-by-system.
bad-job	id-val-reasons-bad-job	This job was aborted by the system because this job has a major problem. This reason is used in conjunction with the reason aborted-by-system.
job-interrupted-by-printer-failure	id-val-reasons-job-interrupted-by-printer-failure	The printer failed while the job was printing. The server is keeping the job in the paused state until an operator can determine what to do with the job.
cascaded	id-val-reasons-cascaded	The server has transmitted all of the job's job and document attributes and data to another server.
deleted-by-administrator	id-val-reasons-deleted-by-administrator	The administrator has deleted the job.
discard-time-arrived	id-val-reasons-discard-time-arrived	The job has been deleted due to the fact that the time specified by the job's job-discard-time attribute has arrived.
pre-processing-failed	id-val-reasons-pre-processing-failed	A pre-processing action failed while preparing the job for processing; the job may or not be progressed to the processing state, depending on the nature of the failure and other job parameters.
post-processing-failed	id-val-reasons-post-processing-failed	A post-processing action failed while trying to log accounting attributes for the job; the job has been placed into the retained state for a system-defined period of time, to enable the administrator to examine it, resubmit it, etc.
submission-interrupted	id-val-reasons-submission-interrupted	The job was not completely submitted for some reason (i.e., the value of the **job-submission-complete** element was **FALSE** in the last print-request received from the client for the job); the possible causes include: (1) the server has crashed before the job was closed by the client, (2) the server or the document transfer method has crashed in some non-recoverable way before the document data was entirely transferred to the server, (3) the client crashed or failed to close the job before the time-out period.

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max-job-fault-count-exceeded	id-val-reasons-max-job-fault-count-exceeded	The job has faulted several times and has exceeded the administratively defined fault-count limit.
job-outgoing	id-val-reasons-job-outgoing	The server is transmitting the job to the output device.
device-stopped-partly	id-val-reasons-device-stopped-partly	One or more, but not all, of the devices to which the job is assigned are stopped. If all of the devices are stopped (or the only device is stopped), the device-stopped reason shall be used.
device-stopped	id-val-reasons-device-stopped	The device(s) to which the job is assigned is (are all) stopped.
job-interpreting	id-val-reasons-job-interpreting	The device to which the job is assigned is interpreting the document data.
job-printing	id-val-reasons-job-printing	The output device to which the job is assigned is marking media. This attribute is useful for servers and output devices which spend a great deal of time processing (1) when no marking is happening and then want to show that marking is now happening or (2) when the job is in the process of being cancelled or aborted while the job remains in the processing state, but the marking has not yet stopped so that impression or sheet counts are still increasing for the job.
service-offLine	id-val-reasons-service-offLine	The service or document transform is off-line and accepting no jobs. All pending jobs are put into the Held state. This situation could occur if the service's or document transform's input is impaired or broken.
job-canceled-at-device	id-val-reasons-job-canceled-at-device	The job was cancelled by an unidentified local user, i.e., a user at a console at the device.
job-resubmitted-by-user	id-val-reasons-job-resubmitted-by-use	The job was resubmitted at the request of the user.
job-resubmitted-by-operator	id-val-reasons- job-resubmitted-by-operator	The job was resubmitted at the request of the user, possibly in the process of moving a queue of jobs.
job-resubmission-completed	id-val-reasons- job-resubmission-completed	The job has been completely resubmitted; note that execution of the new job instance may not have finished yet.

Page 167

Subclause 9.3.2.24

Insert a new paragraph at end of 9.3.2.24:

If the client specifies the **initial-value-document** attribute with a value of **none** (i.e., id-val-generic-none) the server shall *not* use any initial-value-document object to construct the document object during print-job submission.

Page 180

Subclause 9.3.5

At the bottom of page 180, add the new subclause 9.3.5.6:

9.3.5.6 Document-state-message

Attribute values of this type shall contain human readable text information about a document's state. This message be used primarily when a document has been completed with errors or has been aborted.

```
document-state-message ATTRIBUTE
     WITH ATTRIBUTE-SYNTAX errorMessageSyntax
     SINGLE VALUE
     ::= id-att-document-state-message
```


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Page 219

Subclause 9.6.1

On page 219, at the end of 9.6.1, add the following text and table:

The following standard values are defined for postcard media:

jp-100x148-postcard	id-val-medium-jp-100x148-postcard	Specifies the Hagaki postcard medium
jp-148x200-postcard	id-val-medium-jp-148x200-postcard	Specifies the Oufuku-Hagaki postcard medium

Page 220

Subclause 9.6.4

On page 220, replace the last four rows of the table with the following:

tab-stock	id-val-medium-type-tab-stock	Media with tabs
multi-part-form	id-val-medium-type-multi-part-form	Form medium composed of multiple layers not pre-attached to one another; each sheet may be drawn separately from an input source
labels	id-val-medium-type-labels	Label-stock
multi-layer	id-val-medium-type-multi-layer	Form medium composed of multiple layers which are pre-attached to one another, e.g. for use with impact printers
drilled	id-val-medium-type-drilled	Media that is pre-drilled
coated	id-val-medium-type-coated	Media having a special coating
preprinted	id-val-medium-type-preprinted	Media that has printing on it prior to being loaded into the printer
recycled	id-val-medium-type-recycled	Media that has been manufactured using recycled material
cover	id-val-medium-type-cover-stock	Heavy-weight media intended for use as document covers
postcard	id-val-medium-type-postcard	Heavy-weight media intended for use as postal cards

Page 223

Subclause 9.6.5

On page 223, at the end of 9.6.5, add the following table:

jp-100x148-postcard	id-val-medium-size-jp-100x148-postcard	Specifies the Hagaki postcard size: 100mm x 148mm
jp-148x200-postcard	id-val-medium-size-jp-148x200-postcard	Specifies the Oufuku-Hagaki postcard size: 148mm x 200mm

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Page 224

Subclause 9.6.7

On page 224 add the following five lines to the end of the table at the top of the page:

ivory	id-val-medium-colour-ivory	Ivory colour
beige	id-val-medium-colour-beige	beige colour
red	id-val-medium-colour-red	red colour
grey	id-val-medium-colour-grey	grey colour
orange	id-val-medium-colour-orange	orange colour

Page 283

Annex A

Following the line "id-syn-name-or-oid-sequence", assign an OID value for ***octetStringSyntax:***

```
id-syn-octet-string              ID ::=  { id-syn  163 }
```

Page 288

At the end of the list headed "-- document-status --", assign the OID value to the new attribute:

```
id-att-document-state-message            ID ::=  { id-oc-document 22 }
```

Page 301

Following the entry for **id-val-reasons-logfile-transferring**, *assign OID values to the new attribute values:*

```
id-val-reasons-cancelled-by-shutdown          ID ::=  { id-vc-reasons 13 }
id-val-reasons-printer-unavailable            ID ::=  { id-vc-reasons 14 }
id-val-reasons-wrong-printer                  ID ::=  { id-vc-reasons 15 }
id-val-reasons-bad-job                        ID ::=  { id-vc-reasons 16 }
id-val-reasons-job-interrupted-by-printer-failure
                                              ID ::=  { id-vc-reasons 17 }
id-val-reasons-cascaded                       ID ::=  { id-vc-reasons 18 }
id-val-reasons-deleted-by-administrator       ID ::=  { id-vc-reasons 19 }
id-val-reasons-discard-time-arrived           ID ::=  { id-vc-reasons 21 }
id-val-reasons-pre-processing-failed          ID ::=  { id-vc-reasons 22 }
id-val-reasons-post-processing-failed         ID ::=  { id-vc-reasons 23 }
id-val-reasons-submission-interrupted         ID ::=  { id-vc-reasons 24 }
id-val-reasons-max-job-fault-count-exceeded   ID ::=  { id-vc-reasons 25 }
id-val-reasons-job-outgoing                   ID ::=  { id-vc-reasons 26 }
id-val-reasons-device-stopped-partly          ID ::=  { id-vc-reasons 27 }
id-val-reasons-device-stopped                 ID ::=  { id-vc-reasons 28 }
id-val-reasons-job-interpreting               ID ::=  { id-vc-reasons 29 }
id-val-reasons-job-printing                   ID ::=  { id-vc-reasons 30 }
id-val-reasons-service-offLine                ID ::=  { id-vc-reasons 31 }
id-val-reasons-job-canceled-at-device         ID ::=  { id-vc-reasons 32 }
id-val-reasons-job-resubmitted-by-user        ID ::=  { id-vc-reasons 33 }
id-val-reasons-job-resubmitted-by-operator    ID ::=  { id-vc-reasons 34 }
id-val-reasons-job-resubmission-completed     ID ::=  { id-vc-reasons 35 }
```

Page 305

Revise the five lines on page 305 at the bottom to read:

```
id-val-medium-executive-white                 ID ::=  { id-vc-medium 170 }
id-val-medium-folio-white                     ID ::=  { id-vc-medium 171 }
id-val-medium-invoice-white                   ID ::=  { id-vc-medium 172 }
id-val-medium-ledger-white                    ID ::=  { id-vc-medium 173 }
id-val-medium-quarto-white                    ID ::=  { id-vc-medium 174 }
```


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Page 306

Following the engineering media identifiers, add the lines:

```
-- postcard media --
  id-val-medium-jp-100x148-postcard          ID ::=  { id-vc-medium 270 }
  id-val-medium-jp-148x200-postcard          ID ::=  { id-vc-medium 271 }
```

At the bottom of page 306, assign OID values by adding the following six lines:

```
  id-val-medium-type-drilled            ID ::=  { id-vc-medium-type  101 }
  id-val-medium-type-coated             ID ::=  { id-vc-medium-type  102 }
  id-val-medium-type-preprinted         ID ::=  { id-vc-medium-type  103 }
  id-val-medium-type-recycled           ID ::=  { id-vc-medium-type  104 }
  id-val-medium-type-cover-stock        ID ::=  { id-vc-medium-type  105 }
  id-val-medium-type-postcard           ID ::=  { id-vc-medium-type  106 }
```

Page 308

Following the "additional miscellaneous media sizes", add the lines:

```
-- postcard sizes:
  id-val-medium-size-jp-100x148-postcard      ID ::= { id-vc-medium-size 110 }
  id-val-medium-size-jp-148x200-postcard      ID ::= { id-vc-medium-size 111 }
```

On page 308, assign OID values by adding the following five lines to the end of the list under the heading "medium-colour":

```
  id-val-medium-colour-ivory            ID ::=  { id-vc-medium-colour 8 }
  id-val-medium-colour-beige            ID ::=  { id-vc-medium-colour 9 }
  id-val-medium-colour-red              ID ::=  { id-vc-medium-colour 10 }
  id-val-medium-colour-grey             ID ::=  { id-vc-medium-colour 11 }
  id-val-medium-colour-orange           ID ::=  { id-vc-medium-colour 12 }
```

Page 340

Annex C

Following the line:

```
        id-syn-document-content,
```

insert the OID import line:

```
        id-att-document-state-message,
```

Page 341

Following the line "id-syn-object-identifier-sequence" import the OID name:

```
        id-syn-octet-string,
```

Page 354

Just before the line "-- 8.1.2 Operation Attributes", insert the syntax definitions for octet-string and octet-string-syntax:

```
    -- 9.1.5.56 OctetString and OctetStringSyntax
```


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```
OctetString  ::= OCTET STRING (SIZE(0..ub-octet-string))
octetStringSyntax ATTRIBUTE-SYNTAX
        OctetString
        MATCHES FOR EQUALITY  SUBSTRINGS
        ::= id-syn-octet-string
```

Page 380

Following the attribute definition for current-page-order, insert the following attribute definition:

```
--*** 9.3.5.6. Document-state-message
document-state-message ATTRIBUTE
     WITH ATTRIBUTE-SYNTAX errorMessageSyntax
     SINGLE VALUE
     ::= id-att-document-state-message
```


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INTERNATIONAL STANDARD ISO/IEC 10175-1:1996
TECHNICAL CORRIGENDUM 1
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Information technology — Text and office systems — Document Printing Application (DPA) —

Part 1:
Abstract service definition and procedures

TECHNICAL CORRIGENDUM 1

Technologies de l'information — Bureautique — Application impression de documents (DPA) —

Partie 1: Définition de service abstrait et procédures

RECTIFICATIF TECHNIQUE 1

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Page 74

Subclause 8.4.7

In the syntax definition of **ServiceProblem**, change:

```
unsupported-operation                (15) },
```

to:

```
unsupported-operation                (15),
clean-logical-printer-unsupported    (16) },
```

Page 75

At the end of 8.4.7, add the following item:

p) **clean-logical-printer-unsupported**: A client made a request to clean a logical-printer that the server considers to be a gateway rather than a container.

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Page 75

Subclause 8.4.8

In the syntax definition of **UpdateProblem**, change:

```
        cancellation-not-possible       (5) },
```

to:

```
        cancellation-not-possible       (5) ,
        resubmit-job-not-possible       (6) ,   -- new problem
        deletion-not-possible           (7)},   -- new problem
```

At the end of 8.4.8, add the following items:

e) **resubmit-job-not-possible:** A client made a request to resubmit a job that is currently printing.

f) **deletion-not-possible:** A client made a request to delete a server or physical-printer that contains jobs.

Page 78

Subclause 8.5.4

At the end of 8.5.4, add the following items:

j) **id-val-event-report-job-cancelled:** The server has completed cancelling the print-job.

k) **id-val-event-report-printer-cleaned:** The clean operation has been completed on the printer.

l) **id-val-event-report-server-cleaned:** The clean operation has been completed on the server.

m) **id-val-event-report-job-resubmitted:** The job has been resubmitted and accepted by the new server (which may be the same as, or different from, the original server).

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At the end of the list headed:

```
-- Operation Attributes
     id-att-priority                    ID ::= { id-oc-operation  0 }
```

add the following attribute-identifier values:

```
     id-att-reset                       ID ::= { id-oc-operation  4 }
     id-att-trace-enable                ID ::= { id-oc-operation  5 }
     id-att-backup                      ID ::= { id-oc-operation  7 }
```

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Change the lines:

```
-- DPA Attribute Value Classes --
   ---------------------------
```

to:

```
-- DPA Attribute and Operation Value Classes --
   ---------------------------
-- Operation value classes --
     id-vc-when                         ID ::=  { id-vc  109 }
     id-vc-reset                        ID ::=  { id-vc  116 }
```


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Change the lines:

```
-- DPA Attribute Value Identification --
   ---------------------------
```

to:

```
-- DPA Attribute and Operation Value Identification --
   ---------------------------
-- Operation parameter and attribute values --

  -- when --
     id-val-when-now                    ID ::=  { id-op-when  0 }
     id-val-when-after-current          ID ::=  { id-op-when  1 }
     id-val-when-after-all              ID ::=  { id-op-when  2 }

  -- reset --
     id-val-reset-power-cycle           ID ::=  { id-op-reset  0 }
     id-val-reset-to-nvram              ID ::=  { id-op-reset  1 }
     id-val-reset-to-factory-default    ID ::=  { id-op-reset  2 }
```

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At the end of the list headed:

```
-- conformance-level --
```

add two conformance level definitions:

```
--  Conformance levels 3 and 3M are specified in Part 3 of
--     this International Standard
     id-val-conformance-level-3          ID ::=  { id-vc-conformance-level  5 }
     id-val-conformance-level-3M         ID ::=  { id-vc-conformance-level  6 }
```

Text is also to be added to Annex E of this part of ISO/IEC 10175 to summarize conformance levels 3 and 3M, and provide a reference to ISO/IEC 10175-3 where more information can be found.

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At the end of the list headed:

```
-- Report event identifiers --
```

add four event report value definitions:

```
     id-val-event-report-job-cancelled          ID ::= { id-vc-event-report  9 }
     id-val-event-report-printer-cleaned        ID ::= { id-vc-event-report 10 }
     id-val-event-report-server-cleaned         ID ::= { id-vc-event-report 11 }
     id-val-event-report-job-resubmitted        ID ::= { id-vc-event-report 12 }
```

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Insert the following three attribute-identifiers in the list of imports in alphabetical order:

```
     id-att-reset
     id-att-trace-enable
     id-att-backup
```


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Following the syntax definition of the default-delivery-addresses attribute, add the following attribute syntax definitions:

```
--*** Part 3 - Control operation
--    Semantics of these attributes are specified in Part 3 of
--       this International Standard
reset           ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX  objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-reset

trace-enable   ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-trace-enable

backup          ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-backup
```


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INTERNATIONAL STANDARD

ISO/IEC 10175-1

First edition
1996-09-01

Information technology — Text and office systems — Document Printing Application (DPA) —

Part 1:
Abstract service definition and procedures

Technologies de l'information — Bureautique — Application impression de documents (DPA) —

Partie 1: Définition de service abstrait et procédures

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 10175-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 18, *Document processing and related communication*.

ISO/IEC 10175 consists of the following parts, under the general title *Information technology — Text and office systems — Document Printing Application (DPA)*:

— *Part 1: Abstract service definition and procedures*

— *Part 2: Protocol specification*

— *Part 3: Management abstract service definition and procedures*

Annexes A to E form an integral part of this part of ISO/IEC 10175. Annexes F to H are for information only.

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Information technology - Text and office systems - Document Printing Application (DPA) -

Part 1:
Abstract service definition and procedures

Section 1 - General

1 Scope

ISO/IEC 10175 consists of three parts:

Part 1: Abstract service definitions and procedures

Part 2: Protocol specification

Part 3: Management abstract service definition and procedures

This part of ISO/IEC 10175:

- specifies a client-server model of printing in accordance with the Distributed-office-applications Model (ISO/IEC 10031-1);
- specifies functions and services provided by Document Printing Application servers;
- specifies the Document Printing Application abstract service using the principles established by the Abstract Service Definition Conventions (ISO/IEC 10021-3);
- specifies the usage of other services.

The Document Printing Application is one component of a coordinated set of facilities and standards needed to satisfy the printing requirements of the modern distributed office. Together, the capabilities provided can enable users to create and produce high-quality office documents in a consistent and unambiguous manner within a distributed open systems environment.

Specifically, ISO/IEC 10175 addresses those aspects of document processing that enable users in a distributed open systems environment to send electronic documents to shared, possibly geographically-dispersed printers, and to cause the documents to be printed in accordance with the desires of those users. For the purposes of ISO/IEC 10175, it is assumed that such documents have been composed in a form that is compatible with the destination printing system prior to their introduction to the Document Printing Application.

Other Standards deal with related aspects of document processing, such as the creation and formatting of electronic documents, and the underlying protocols used to transport electronic documents to a printing system. ISO/IEC 10175 is aligned with these related Standards as appropriate, and shares some information in common with them. Clause 2 identifies those standards that are directly applicable to this one.

The Document Printing Application defined in ISO/IEC 10175 is consistent with the model, architectural framework and design principles of the Distributed Office Applications Model (ISO/IEC 10031-1). This Document Printing

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Application Standard defines services and specifies access protocols available within the application layer of the Open Systems Interconnection (OSI) Basic Reference Model (ISO/IEC 7498-1).

In addition, recognition has been given to the potential need for printing systems to be able to operate within and across diverse networking environments. In particular, the Document Printing Application has contributed to, and benefited from, related standardization activities in other venues such as the Internet Engineering Task Force (IETF), the Desktop Management Task Force, the POSIX project of the IEEE Computer Society, and X/Open.

The Document Printing Application constitutes the final phase of the document processing cycle, i.e., the queuing, preparation, rendering and finishing of the fully composed form of the document on marking engines and other image generation devices and ancillary equipment. This cycle includes other processes such as document creation and interchange through public and private networks.

ISO/IEC 10175 is oriented toward satisfying the following subset of the overall document processing functional requirements:

- an ability for multiple users to share access to distributed printers;
- an ability for users to convey information to a printing system to influence the scheduling and processing requirements of a print-job;
- a capability for users to monitor and manage the progress of their print-job;
- a capability for printing systems, and associated facilities, to protect against unauthorized printing of documents.

Accordingly, the abstract-service defined by ISO/IEC 10175 enables a user to convey document files to a document print-server, along with the parameters needed to express the user's desires regarding the scheduling and production of the ensuing print-job. In addition, the abstract-service permits a user to inquire about the status, capabilities and characteristics of a document print-server in order to choose from a variety of printing devices, depending on capabilities, formats, logistic convenience, cost, ownership and availability.

The abstract-service also allows users to inquire about jobs, modify the characteristics and progress of jobs, and obtain feedback about a job.

Many different document formats have been developed for printing purposes, and are in wide use. For this reason, the Document Printing Application has been developed with a view toward supporting arbitrary document formats in a transparent manner. That is, the specific content or format of an electronic document is independent of the access protocol defined by ISO/IEC 10175. The only requirement is that the destination printing system be capable of dealing with the format of the transmitted document, and possess the features and functionality needed to render the document successfully.

However, in spite of this generality of focus, ISO/IEC 10175 is particularly oriented toward alignment with the Standard Page Description Language (SPDL - ISO/IEC 10180). This will assure that DPA will include the features needed to assist in the transport and faithful rendering of SPDL documents.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10175. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 10175 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 216: 1975[1)], *Writing paper and certain classes of printed matter - Trimmed sizes - A and B series.*

1) Currently under revision

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ISO 269: 1985, *Correspondence envelopes - Designation and sizes.*

ISO 639: 1988[1)], *Code for the representation of names of languages.*

ISO/IEC 646: 1991, *Information technology - ISO 7-bit coded character set for information interchange.*

ISO/IEC 2022: 1994, *Information technology - Character code structure and extension techniques.*

ISO 2375: 1985, *Data processing - Procedure for registration of escape sequences.*

ISO 3166: 1993[1)], *Codes for the representation of names of countries.*

ISO/IEC 6429: 1992, *Information technology - Control functions for coded character sets.*

ISO/IEC 6937: 1994, *Information technology - Coded graphic character set for text communication - Latin alphabet.*

ISO/IEC 7350: 1991, *Information technology - Registration of repertoires of graphic characters from ISO/IEC 10367.*

ISO/IEC 7498-1: 1994, *Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model.*

ISO/IEC 7498-2: 1989, *Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture.*

ISO 8571-3: 1988, *Information processing systems - Open Systems Interconnection - File Transfer, Access and Management - Part 3: File Service Definition.*

ISO 8613-1: 1989, *Information processing - Text and office systems - Office Document Architecture (ODA) and interchange format - Part 1: Introduction and general principles.*

ISO/IEC 8822: 1994, *Information technology - Open Systems Interconnection -Presentation service definition.*

ISO/IEC 8824: 1990, *Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).*

ISO/IEC 8825: 1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*

ISO 8859-1: 1987, *Information processing - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1.*

ISO/IEC 9541-1: 1991, *Information technology - Font information interchange - Part 1: Architecture.*

ISO/IEC 9541-2: 1991, *Information technology - Font information interchange - Part 2: Interchange Format.*

ISO/IEC 9594-2: 1990, *Information technology - Open Systems Interconnection - The Directory - Part 2: Models.*

ISO/IEC 9594-3: 1990, *Information technology - Open Systems Interconnection - The Directory - Part 3: Abstract service definition.*

ISO/IEC 9945-1: 1996, *Information technology - Portable Operating System Interface (POSIX) - Part 1: System Application Program Interface (API) [C Language]* [ANSI/IEEE Std 1003.1].

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ISO/IEC 10021-3: 1990, *Information technology - Text Communication - Message-Oriented Text Interchange Systems (MOTIS)*
- Part 3: Abstract Service Definition Conventions.

ISO/IEC 10021-4: 1990, *Information technology - Text Communication - Message-Oriented Text Interchange Systems (MOTIS)*
- Part 4: Message Transfer System: Abstract Service Definition and Procedures.

ISO/IEC 10031-1: 1991, *Information technology - Text and office systems - Distributed-office-applications model*
- Part 1: General model.

ISO/IEC 10031-2: 1991, *Information technology - Text and office systems - Distributed-office-applications model*
- Part 2: Distinguished-object-reference and associated procedures.

ISO/IEC 10166-1: 1991, *Information technology - Text and office systems - Document filing and retrieval (DFR)*
- Part 1: Abstract service definition and procedures.

ISO/IEC 10180: 1995, *Information technology - Processing languages - Standard Page Description Language (SPDL).*

ISO/IEC 10367: 1991, *Information technology - Standardized coded graphic character sets for use in 8-bit codes.*

ISO/IEC 10538: 1991, *Information technology - Control functions for text communication.*

ISO/IEC 10646-1: 1993, *Information technology - Universal Multiple-Octet Coded Character Set (UCS)*
- Part 1: Architecture and Basic Multilingual Plane.

ISO/IEC 10740-1: 1993, *Information technology - Text and office systems - Referenced Data Transfer (RDT)*
- Part 1: Abstract service definition.

RFC 1759, *Printer MIB*, Proposed Internet Standard, R. Smith, F. Wright, T. Hastings, S. Zilles, J. Gyllenskog, March 1995.

3 Definitions

3.1 General terminology

3.1.1 OSI basic reference model definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 7498-1:

Application Layer
application-entity
application-service-element
Presentation Layer
protocol
service definition

3.1.2 OSI basic reference model Security part definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO 7498-2:

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access control
authentication
authorization
credentials
security policy

3.1.3 Presentation service definition

This part of ISO/IEC 10175 makes use of the following term defined in ISO/IEC 8822:

abstract syntax

3.1.4 Abstract syntax notation definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 8824:

ASN.1
external type
Generalized Time
macro
object identifier
UTC Time
PrintableString
VisibleString
T61String
octet string

3.1.5 Font information interchange definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 9541:

font
font reference
font resource
glyph
glyph image
glyph representation

3.1.6 Directory definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 9594:

attribute
attribute macro
attribute value
filter

3.1.7 Abstract service definition conventions definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 10021-3:

abstract bind
abstract error
abstract model
abstract operation
abstract service
abstract unbind
argument

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asymmetric
port
symmetric

3.1.8 Distributed-office-applications model - General model definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 10031-1:

accessee
accessor
distributed-office-application
distinguished-object-reference
privilege-attributes
referenced-object-access
security-attributes
security-object
security-subject

3.1.9 Distributed-office-applications model - DOR definitions

This part of ISO/IEC 10175 makes use of the following terms defined in ISO/IEC 10031-2:

produce-time
Quality of Service

3.2 Specific terminology

For the purposes of ISO/IEC 10175, the following definitions apply.

3.2.1 administrator, system administrator

A person with administrative responsibility for one or more components in a distributed system. Within ISO/IEC 10175, it is assumed that a system administrator has responsibility for a print-server(s), and may be authorized to invoke some operations, or to access certain information, not available to the normal user.

NOTE - The decision as to whether a system administrator will be accorded special privileges is a site and/or enterprise specific issue, not mandated by ISO/IEC 10175. The term administrator may be used as the generic equivalent of the formal designator "DP-Administrator"; however, the two are not strictly equivalent, and the formal designator should be used when necessary to refer specifically the actions and objects related to the DP-Administration port.

3.2.2 assured reproduction area

That area of a medium upon which a printing device is capable of rendering an image. The term may be applied either to the capability of a specific printer type to render an image on some arbitrary medium, or to the capacity of a specific medium to accept an image from some arbitrary printer, in a form acceptable to a user.

3.2.3 attribute

A characteristic of an object.

3.2.4 attribute type

A datatype defined by means of ASN.1 notation, used for defining and specifying the attributes of objects.

3.2.5 available

An object is said to be available when it is in either of the two states: *ready* or *on-request*. The term available is used when there is no distinction between ready and on-request.

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3.2.6 busy state

That state of an object instance indicating that it is temporarily inaccessible due to dynamic constraints such as resource locking or running out of a resource (memory, paper, toner, etc.).

3.2.7 composition and layout process

The software process that converts a revisable form document into a final form document, or adds final form information to the revisable form information already present in the document description.

3.2.8 compulsory attribute

An attribute is said to be compulsory if a server either 1) shall perform the associated action if the server and printer support the attribute and its values or 2) shall reject the job if the attribute or its values are unsupported by either the server or printer.

3.2.9 Control-Attribute-Package (CAP)

A collection of attributes used to control access to a print-server, or to an object controlled by that print-server.

3.2.10 document

In ISO/IEC 10175, when not otherwise qualified, a document is assumed to be the electronic form of a document, in a form acceptable to the print-server(s) to which the document is (to be) sent. Qualified terms that may be used include *final form document* and *revisable form document.*

3.2.11 document copy

The output from each copy of a document object; a document set has more than one document copy if the document's copy-count attribute is present and greater than 1.

3.2.12 document-format

The generic name for any data syntax with which a final form document may be encoded.

3.2.13 document production instructions (DPI)

Print operation parameters that affect the appearance of the document or documents to printed in a print-job. Some print operation parameters may be delivered with the print-request or in the document, or both; if a specific instruction appears in both places for a given request and document, the print-server will resolve the potential conflict by means of an algorithm that is beyond the scope of ISO/IEC 10175. Different subsets of document production instructions may be defined for different specific document formats.

3.2.14 document set

The output from a single document object of all its document copies; a document set has more than one document copy if the document object's copy-count attribute is present and greater than 1.

3.2.15 final form document

An electronic document which is in a form suitable for printing by some destination print-server(s); this term generally implies that the document is no longer in a form that may be edited under normal circumstances, but this is not required. See *document format.*

3.2.16 imposition

Placement of page images on one side of a sheet. Examples of imposition include (1) the shifting of a page image with respect to the medium on which it is to be rendered, for the purpose of producing a binding margin, and (2) the placement of multiple page images on a single sheet of paper such that when cut, folded and trimmed, the resulting pages will be in the proper orientation and in correct numerical sequence.

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3.2.17 initial-value-job

An object that resides on a server, used for initializing the attributes of job objects and contained documents when a job is submitted by a client.

3.2.18 job copy

The output from each copy of a job in a job result set; a job result set has more than one job copy if the job's results-profile job-copies element is present and greater than 1; a job copy has more than one document set if the job contains more than one document object.

3.2.19 job result set

The output from a single value of the job's results-profile attribute; a job result set has more than one job copy if the job's job-copies element of the corresponding results-profile value is present and greater than 1.

3.2.20 logical medium

A DPA data object which (1) provides a generic description applicable to one or more *physical media* and/or (2) specifies medium properties by means of which a desired effect is to be achieved when a document is rendered.

3.2.21 logical printer

A data object that permits a particular set of characteristics and capabilities (e.g., location, resolution, media available, etc.) to be grouped and referenced as a single entity. The logical printer may describe one or more printing devices having the same capabilities and characteristics; alternatively, a single printing device may be described by more than one logical printer, where selection of a particular logical printer implies some specific form of processing to be applied to the document, or a particular set of resources that may be made available, e.g. medium weights that may be (manually) loaded if the relevant logical printer is selected.

3.2.22 logical resource

An electronic representation of an object that may be referenced by, or used in combination with a printable document to render the printed output. Examples of logical resources include fonts and overlays such as electronic forms, logos and personal signatures. See *resource*, *physical resource*.

3.2.23 medium

The material or surface upon which a document is rendered in visible form by a presentation device; alternatively, a logical representation of such a material or surface. Examples include paper and the display screens of video display terminals. See *logical medium* and *physical medium*.

3.2.24 non-compulsory attribute

A (job or document) attribute is said to non-compulsory if a server either 1) shall perform the associated action if the server and printer support the attribute and its value(s) or 2) shall ignore (and possibly substitute for) any unsupported value(s).

3.2.25 object states

An object can be in one of a number of states. Except for the job and printer objects, an instance of a DPA object can be in one of the following states: *ready*, *on-request*, *unavailable*, *busy*, or *unknown*.

Note: An object is said to be available when it is in either the *ready* or *on-request states*.

3.2.26 on-request state

That state of an object instance indicating that it is able to be used, but only after human intervention has occurred.

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3.2.27 output device

The hardware that renders documents; the output device is represented by the physical printer object in the print-system.

3.2.28 page

A page image or a *physical page*, depending on where the page is in the printing cycle. This general term is used where it is neither required nor desired to distinguish between the two more specific page forms.

3.2.29 page image

Image data that has been formatted for placement on a *physical page;* this term is generally applied to the electronic representation of a page.

3.2.30 page description language

A class of document format wherein the data syntax is based on the concepts of the modern programming languages, e.g., SPDL.

3.2.31 physical medium

A data object that represents a particular physical instance or realization of a medium.

3.2.32 physical page

One side of a leaf of a book, document, etc. This term is distinguished from the term *physical medium* by the fact that the physical page bears an image that has been rendered upon it, or it is identified in some other manner as a product of the printing process.

3.2.33 physical printer

A data object that represents a particular output device which is capable of rendering documents.

3.2.34 physical resource

A physical object that may be used at some point in the production of a printed document. Examples of physical resources include physical media and physical devices such as printers and finishing equipment. See *resource*, *logical resource*.

3.2.35 presentation

The process of rendering or transforming an electronic document into visible form; for the purposes of ISO/IEC 10175, presentation usually means printing a document on paper or other tangible media, and may include finishing operations such as binding and punching and stapling, etc.; however presentation, in general, also includes other forms of rendering, such as display on video terminals, or transmission to remote facsimile devices, and may include output to microfilm and other devices.

3.2.36 print-access-protocol

The application-level protocol between any print-client and any print-server.

3.2.37 print-client

The software entity that acts on behalf of a user to convey service requests to a print-server, and deals appropriately with responses from the print-server that arise from the submitted requests.

3.2.38 print-job

A class of data object created by a print-server to collect information related to the progress of a particular print-request, or related sequence of print-requests. When a print-server accepts the initial (or only) print-request of a

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sequence from a client, the print-server generates a print-job identifier that is unique within its environment, and returns it to the client to signal acceptance of the request, and to enable the client to interrogate status of the job subsequently.

3.2.39 print operation management instructions (PMI)

Print operation parameters that may be communicated only within the print-operation's arguments. These parameters are generally concerned with the management of print-jobs or of the other objects related to the management of jobs. They do not directly affect the appearance of the printed documents.

3.2.40 print operation parameters (POP)

Parameters sent to a print-server to control or guide and assist the print-server in producing the requested document in the form requested by the user. Print operation parameters are defined by means of the attribute notation conventions presented in clause 6 of ISO/IEC 10175. The set of print operation parameters are divided into two subsets, referred to as *print operation management instructions* and *document production instructions*, respectively.

3.2.41 print-request

An operation invoked by a print-client to cause a print-server to print a document or to initiate the printing of a set of documents. Parameters are sent with the print-request to identify the document, and to specify and control the act of printing and producing the document, such as number of copies to print, whether to staple the hard copy document, etc. The document to be printed may accompany the print-request, or the print-request may include a reference (pointer) to the document, indicating that the print-server is to fetch the document using some other protocol. Actual access and transport of the document to a print-server may be accomplished by other protocols that are outside the scope of ISO/IEC 10175.

3.2.42 print-server

The entity that accepts requests for print-service in the form of the abstract-operations defined by ISO/IEC 10175; a generic term for the DP-Server defined formally in Clause 6. The fundamental type of service request is a print-request.

3.2.43 print-service

The functionality defined for the Document Printing Application, as visible between a (document) print-client and a (document) print-server. For this particular application, the service is provided by the server.

3.2.44 print-system

An aggregation of one or more print-servers and one or more printing devices, which may or may not be located in the same geographical area. The components of a print-system are assumed to be interconnected in some manner, providing at least one network interface to print-clients, and acting synergistically to supply the defined document print-service.

3.2.45 printing

Unless otherwise qualified or restricted, the act of printing may include any form of output which transforms the electronically encoded and stored form of a document into a visible representation. This includes, but is not limited to, hard copy printers, plotters, display devices, and microfilm/microfiche generators.

3.2.46 privilege-attribute-certificate (PAC)

A certified set of access privileges that can be presented by a user or administrator to establish access rights.

3.2.47 ready state

That state of an object instance indicating that it is able to be used without human intervention.

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3.2.48 Reference Coordinate System

A Cartesian coordinate system with units of millimetres on both axes which provides unambiguous specification of locations on the medium. See 6.5.4.

3.2.49 resource

An object or group of objects used in the printing of documents. See *logical resource* and *physical resource*.

3.2.50 revisable (form) document

An electronic document which is in a form that may be edited by some properly equipped system; this term generally implies that the document is not in a final form for printing, but this is not required. See *document format*.

NOTE - There may be data formats that allow both revisable and final forms to be present at the same time in a single document (e.g., ISO/IEC 8613-1). In this case these terms refer to the particular aspect of information being present in a document.

3.2.51 service request

Within ISO/IEC 10175, this term refers to a request for any type of operation implemented by a print-server.

3.2.52 sheet

One instance of a medium, which may have either one or two imageable surfaces.

3.2.53 signature

Sheet of paper printed on both sides and folded to make up part of a publication. For example, a sheet of paper with 2 printed pages on each side is folded once to form a 4-page signature. One with 4 pages on each side is folded twice and slit along one fold to form an 8-page signature, and so on. The proper arrangement of pages in a signature is called imposition.

3.2.54 SPDL document

A document encoded in the Standard Page Description Language, and thus in a form suitable for printing by any print-server(s) capable of rendering an SPDL document.

3.2.55 supported

An attribute value or an object instance is said to be supported if it is the policy of an administrator of a server for the server to offer the attribute or object instance to clients. A supported attribute value or object instance may be available or temporarily unavailable.

3.2.56 unavailable state

That state of an object instance indicating that it is supported, but is not *currently* available (with or without human intervention).

3.2.57 user

Generic term applied to the initiator and/or recipient of some print-server action; may include *administrators* as well as other users with no special access rights or privileges.

4 Abbreviations

AFII Association for Font Information Interchange

ARA Assured reproduction area

ASCII American Standards Code for Information Interchange

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ASN.1	Abstract Syntax Notation One
CAP	Control Attribute Package
DCE	Distributed Computing Environment
DFR	Document Filing and Retrieval
DMTF	Desktop Management Task Force
DOAM	Distributed Office Applications Model
DoD	U.S. Department of Defense
DOR	Distinguished Object Reference
DPA	Document Printing Application
DPI	Document production instructions
DPS	Document Print Service
ENUM	Enumerated type
FIFO	First in - first out
FTAM	File Transfer and Access Method
IANA	Internet Assigned Number Authority
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IETF	Internet Engineering Task Force
ISO	International Organization for Standardization
MIB	Management Information Base
MIF	Management Information Format
MOTIS	Message Oriented Text Interchange System
NATO	North Atlantic Treaty Organization
OID	Object Identifier
ONC	Open Network Computing
OSI	Open Systems Interconnection
PAC	Privilege Attribute Certificate
PCL	Printer Control Language
PDL	Page description language
PMI	Print operation management instructions
POP	Print operation parameters
POSIX	Portable Operating System Interface
QoS	Quality of Service

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RCS	Reference Coordinate System
RDT	Referenced Data Transfer
RPC	Remote Procedure Call
SNMP	Simple Network Management Protocol
SPDL	Standard Page Description Language

5 Conventions

5.1 Conventions for abstract-services

This Part of ISO/IEC 10175 uses the following ASN.1-based descriptive conventions for the indicated purposes:

a) ASN.1 itself, to specify the abstract-syntax of information-objects and their components, common data-types, and state-variables;

b) The ASN.1 OBJECT and PORT macro and associated abstract-service definition conventions of ISO/IEC 10021-3, to specify the DPA Port;

c) The ASN.1 ABSTRACT-BIND, ABSTRACT-UNBIND, ABSTRACT-OPERATION, and ABSTRACT-ERROR macros of ISO/IEC 10021-3, to specify the DPA abstract-service;

d) The ASN.1 ATTRIBUTE MACRO and ATTRIBUTE SYNTAX MACRO from ISO/IEC 9594-2 to specify attributes and attribute syntaxes; the attribute concepts used in ISO/IEC 10175 are similar to those defined in ISO/IEC 9594-2, however, the Attribute and related datatypes have been modified to accommodate additional requirements of the Document Printing Application.

NOTE - ASN.1 specifications in ISO/IEC 10175 make use of the ISO/IEC 8824:1990 feature "IMPLICIT TAGS" convention, which means systematic omission, at the time of ASN.1 encoding, of all unnecessary "nested" tags, especially those "recovered" by context-specific ones.

5.2 Conventions for documentation in general

Throughout the text of ISO/IEC 10175, the following conventions apply:

a) Descriptive text is rendered in Times Roman, or a similar font;

b) terms are rendered in bold when defined, and in italic when referenced prior to their definitions;

c) terms that are proper nouns, rather than generic terms, are capitalized;

d) multi-word generic terms are hyphenated.

5.3 Conventions related to ASN.1

For the ASN.1-specified entities presented in ISO/IEC 10175, the following rules apply:

a) ASN.1 syntax productions are rendered in Courier, or a similar monospaced font.

b) ASN.1-specified names are rendered in bold text; these include type references, value references, identifiers, etc.

c) ASN.1 type references begin with capital letters; a compound type reference consists of a sequence of components, each beginning with a capital letter, with the components concatenated together without intervening hyphens. Example: **PositiveInteger**.

d) ASN.1 value references and identifiers begin with lower-case letters; a compound value reference or identifier consists of a sequence of components, each beginning with a lower-case letter, with the components separated by hyphens. Example: **upper-bound**.

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e) Attribute-names and attribute-identifiers are special cases of value-references (see 6.4).

1) Attribute-names are constructed by the same rules as value-references (see 6.4). Example: **descriptive-name**.

2) An attribute-identifier is the notation representation of the object identifier assigned to a particular attribute; an attribute-identifier consists of the string "**id-att-**", followed by the corresponding attribute-name. Example: **id-att-descriptive-name**.

f) Attribute-syntax-names and attribute-syntax-identifiers are special cases of value-references (see 6.4).

1) An attribute-syntax-name begins with a lower-case letter and immediately precedes the string "**Syntax**"; a compound attribute-syntax-name consists of a sequence of components concatenated together without intervening hyphens; each component after the first begins with a capital letter. Example: **descriptiveNameSyntax**.

2) An attribute-syntax-identifier is the notation representation of the object identifier assigned to a particular attribute-syntax; an attribute-syntax-identifier consists of the string "**id-syn-**", followed by the corresponding attribute-syntax-name, altered to conform to the conventions for value references, above. Example: **id-syn-descriptive-name**.

g) Object identifiers are used widely in ISO/IEC 10175 to represent values of attributes. The rules for construction and assignment of object identifier values used in this context are detailed in Annex A. References in descriptive text to particular object identifier values take one of two forms, depending on the context:

1) object identifier names conform to the value reference rules in paragraph c, above. Example: **medium-type-envelope**.

2) an object identifier-reference consists of the string "**id-val-**" followed by the corresponding object identifier-name. Example: **id-val-medium-type-envelope**.

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Section 2 - DP abstract-service definition

6 DP abstract model

This clause provides an abstract functional model of the Document Printing Application (DPA) defined by this International Standard. For an introduction and description of the abstract-service concept and its definition conventions, see ISO/IEC 10021-3.

The Document Printing Abstract Model is illustrated in Figure 6-1. This model identifies two entities, a *DP-User* and a *DP-Administrator*, which interact with a third entity, a *DP-Server*, to provide a comprehensive facility for the printing of documents in a network environment.

The abstract-services defined by this International Standard, collectively referred to as DPA, enable a **DP-User** to send electronic documents to a **DP-Server**, and to request the printing of those documents. In addition, the DPA provides the means for a DP-User to make inquiries of the DP-Server, in order to determine, for example, the status of a previously-submitted print-request, or the progress of the print-job created to execute and manage the request, or to determine the status or capabilities of the DP-Server itself.

Additional facilities are included in the DPA for the purpose of managing a DP-Server. These server management facilities may be constrained by a particular DP-Server to limit their use to members of a certain class of users, referred to as **DP-Administrators**.

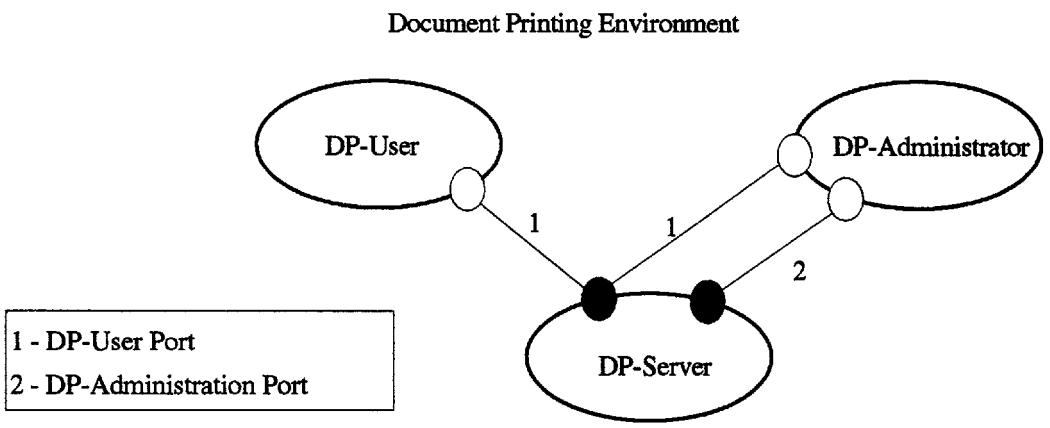

Figure 6-1 - Document Printing Abstract Model

A DP-Server is modeled as an object whose overall behavior can be described without reference to its internal structure. The services provided by the DP-Server object are made available at ports, where a type of port corresponds to a set of abstract-operations that can be accessed at the port (in this case, those abstract-operations which can be performed by the DP-Server object).

A DP-User and a DP-Administrator are each modeled as objects which obtain the services provided by a DP-Server through one or two port types, respectively. A DP-User is associated with a single port type, the DP-User port; a DP-Administrator, on the other hand, may access two types of port: the same port type available to a DP-User, and an additional port type that is reserved for administrative functions, the DP-Administration port.

This means that a DP-User is limited to performing only those operations defined on the DP-User port, but a DP-Administrator can perform any operation available to a DP-User, in addition to those operations defined on the DP-Administration port. In the context of this International Standard, therefore, any discussion of "DP-User" features,

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functions, or actions applies equally to the "DP-Administrator", except in those specific cases where it is necessary to distinguish between them, and contrast the respective features of the two objects.

The main purpose for defining two ports, and two types of objects accessing those ports, is to provide a simple means for a server implementation to discriminate between normal users and administrative users in terms of the services offered. An administrative user, in general, is one who is responsible for normal operation and maintenance of a printing system, and who may therefore need to invoke operations that deal with the normal functioning of a print-server or printer. Normal users, in general, do not need to invoke those operations that are defined on the DP-Administration port.

NOTES

1 In practice, not all DP-Server implementations will implement the DP-Administration port operations, since these operations are not required in very simple DP-Servers. And those DP-Servers that do implement the operations of both ports will not necessarily distinguish between DP-Users and DP-Administrators. These decisions are the province of the particular implementation developers and site personnel, so long as an implementation conforms to one of the conformance classes defined in Annex E.

2 Within this International Standard, the generic term "user" is employed where there is no need to distinguish between the class of user: DP-User or DP-Administrator. In such cases it may be assumed that the user may be of either kind.

A port type may be defined to be either *symmetrical* or *asymmetrical*. A **symmetrical** port type allows any of its defined abstract-operations to be invoked or performed by either of two objects associated by paired ports of that type. Conversely, an **asymmetrical** port type permits its abstract-operations to be invoked by just one of the two objects, called the **consumer**, and performed only by the other object, the **supplier**.

NOTE - the terms *consumer* and *supplier* are used only to distinguish between the roles assumed by a pair of ports in invoking or performing abstract-operations.

The assignment of the terms is usually intuitive where one object is providing a service used by another object. For example, a print-server would usually be regarded as a supplier, and its users as consumers. Accordingly, the DP-User port is defined to be of the asymmetrical type, with the DP-Server object and the DP-User object defined to be the supplier and the consumer, respectively, with respect to that port.

Similarly, the DP-Administration port is also of the asymmetrical type, with the DP-Server object as the supplier and the DP-Administrator object as the consumer.

Before an object can invoke abstract-operations on another, the two objects must be bound into an abstract-association. The binding of an abstract-association between objects establishes a relationship between the objects which lasts until the abstract-association is released.

The binding of an abstract-association validates the credentials needed for two objects to interact, and establishes the application-context and security-context of an abstract-association. The application-context of an abstract-association may comprise one or more types of ports paired between the two objects.

Because the model presented is abstract, it is not always possible for an outside observer to identify the boundaries between objects, or to decide on the moment or means by which abstract-operations occur. However, in some cases the abstract model will be realized in a visible form. For example, a pair of objects which communicate through paired ports may be located in different open systems. In this case, the boundary between the objects is visible, the parts are exposed, and the operations may be supported by some form of communication between the objects.

6.1 Objects in the Document Printing environment

The Document Printing environment can be decomposed into one central object, the Document Print Server (DP-Server); one or more Document Printing User objects (DP-Users); and one or more Document Printing Administrator objects (DP-Administrators).

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6.1.1 DP-Server object

This functional entity performs abstract-operations invoked by DP-Users and DP-Administrators in the Printing Environment via ports. Some of these operations are related to the printing of documents, others are used for inquiry and management purposes, and the rest are used for administrative purposes.

The formal definition of the DP-Server object is as follows:

```
dp-server      OBJECT
               PORTS { dp-user [S], dp-administration [S] }
               ::= id-dp-server
```

6.1.2 DP-User object

This functional entity may invoke operations that are related to the printing of documents and those that are used for inquiry and management purposes related to the progress of a print-job(s) or to the characteristics or status of a print-server.

The formal definition of the DP-User object is as follows:

```
dp-user        OBJECT
               PORTS { dp-user [C] }
               ::= id-dp-user
```

6.1.3 DP-Administrator object

This functional entity may invoke all operations supplied by the DP-Server object.

The formal definition of the DP-Administrator object is as follows:

```
dp-administrator   OBJECT
                   PORTS { dp-user [C], dp-administration [C] }
                   ::= id-dp-administrator
```

6.2 Ports used in the Document Print Service model

The Document Print Server (DP-Server) makes its services available through the ports defined in this subclause. Two ports are defined in order to segregate the operations associated with normal printing activities, available to all users, from those operations intended for administrative control of a DP-Server.

Note that not all DP-Servers will implement the DP-Administration port, since simple servers will have no need of the administrative operations. In addition, a particular DP-Server implementation may, or may not, distinguish between DP-Users and DP-Administrators.

In conjunction with other International Standards, this International Standard provides security mechanisms to enable the accessors and accessees of these ports to determine each other's identities. However, this International Standard does not mandate the use of these security mechanisms, nor is any security policy established by this International Standard; these are the province of the implementors and using organizations.

6.2.1 DP-User port

This port is intended for submitting service requests that are directly related to the primary function of the print-server, i.e., the printing of documents. This includes service requests related to retrieving and altering information about the status of print-jobs. This port also provides facilities for inquiring about the status and characteristics of the print-server.

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This port is formally defined as follows:

```
dp-user-port  PORT
      CONSUMER INVOKES {
                              Print,
                              ModifyJob,
                              CancelJob,
                              ListObjectAttributes }
      ::= id-pt-dp-user
```

6.2.2 DP-Administration port

This port is intended for performing administrative functions (e.g., to exercise control over a print-server). The use of this port is intended for use only by administrative users. [But note that this is an implementation and site management policy decision, not mandated by ISO/IEC 10175.]

This port is formally defined as follows:

```
dp-administration-port  PORT
      CONSUMER INVOKES {
                              PromoteJob,
                              InterruptJob,
                              PauseJob,
                              ResumeJob }
      ::= id-pt-dp-administration
```

6.3 DPA object classes

As described in the preceding subclauses, a DP-User (or DP-Administrator) is able to access the services offered by a DP-Server by invoking one or more of the operations defined for the port associated with that class of user. In order to specify completely the manner in which an operation is to be performed, the invoker generally must provide additional data in the form of an *argument* to the operation. In response, the DP-Server provides details of the status and outcome of an operation in the form of *results*.

To accomplish the action(s) requested via operation invocation, the DP-Server manages and manipulates data entities that are referred to as DPA-Objects. These DPA-Objects are simply convenient collections of data that may represent objects that are defined elsewhere. The invoker of an operation provides many of the necessary additional argument details in the form of values for some of the DPA-Object components; similarly, the server may inform a user of the status or outcome of an operation by providing values for DPA-Object components in the operation results.

The DPA-Objects are subdivided into the following classes:

a) Job
b) Document
c) Printer
d) Server
e) Medium
f) Font
g) Resource
h) Transfer-method
i) Delivery-method
j) Auxiliary-sheet package
k) Auxiliary-sheet

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l) Finishing

m) Output-method

n) Imposition

o) Scheduler

p) Initial-value-job

q) Initial-value-document

r) Resource-context

The following subclauses provide an informal description of each of these object classes, along with their purposes and relationships to the defined operations. In this narrative, and in the remainder of this document, the term "user" will be employed to refer to both DP-Users and DP-Administrators, except when necessary to distinguish between the two. Details of the objects that comprise the respective classes are to be found in clause 9.

Conforming servers are not required to implement support for all object classes. However, a server may support certain attributes of an object class even though it does not support the class itself. The values of some attributes of some objects, such as job, document, printer, and server, identify object instances of other classes, such as medium, auxiliary-sheet-package, finishing, and imposition. Servers may implement such attributes without implementing the object classes which these attribute values identify, as long as the semantics of such attributes is implemented for the specified object instance. For example, the **default-medium** document attribute identifies medium object instances, such as **iso-a4-white**. A server need not implement the medium object class in order to implement the **default-medium** document attribute, as long as the server prints the document on a white ISO A4 medium.

Refer to conformance requirements detailed in Annex E to this part of ISO/IEC 10175, and in part 2 of ISO/IEC 10175.

6.3.1 Job object class

When a user invokes a Print abstract-operation, the DP-Server (also referred to generically as a print-server) creates a body of information to be used in the management and control of that operation. The action of invoking the Print operation is referred to as a **print-request**, and the body of information created as a result of that request is termed a **print-job**, or simply, **job**.

Various attributes of a job object convey and record information about the status, progress, and other characteristics of the job. In addition, a document to be printed is treated as a component of the job object, to be transferred transparently during the processing of the job.

Some print-servers and printers are capable of processing more than one document within a single print-job. Such *multiple-document jobs* require one Print abstract-operation invocation for each of the documents that comprise the job.

A job is created as a consequence of the first (or only) print-request of a related sequence of print-requests. An argument parameter of the print-request indicates whether or not it is the final print-request of the job, thus providing the delimiter for the job.

In addition to printable documents, other entities, called logical resources, may be transferred to a print-server during the course of a print-job. If such a resource is to be sent to the print-server with a print-job, the resource is conveyed by a single print-request that indicates that it is carrying a resource rather than a printable document.Examples of resources include electronic forms and overlays.

There are no restrictions on the sequencing of resource-bearing print-requests within the job, except that a resource must be present in the environment of the printer or server prior to being needed during the actual processing of the job (which normally begins after all print-requests have been submitted for the job).

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6.3.2 Document object class

A document to be printed may be transmitted (immediately) within the sequence of parameters that compose a print-request, or it may be transferred at a later time by other means described subsequently.

In either case, each document in a print-job is represented in the print-server by a **document object,** which collects together summary information about the characteristics of the document and its status in the print cycle. The document object is created in response to the print-request that conveys the electronic document or provides the information by which the document is to be transferred subsequently. When a server creates a job object in response to a Print abstract-operation, each document object is contained within the job object.

6.3.3 Printer object class

The principal object managed by a print-server is a printer. A printer object is the repository of information about the printer that the object represents. Examples of the information that may be recorded by a printer object are the printer's identity, installed features, available media and fonts, etc.

In abstract terms, a printer object can be considered a grouping of certain attributes within the associated server's environment. Indeed, in the document processing model presented subsequently, the actual printer is not referenced at all, but is simply considered a latent component of the document presentation process. In this context, a printer object may thus represent either a *physical printer* or a *logical printer*.

A **physical printer** object represents some form of physical device capable of rendering graphical output on some physical medium; however, ISO/IEC 10175 makes no stipulation as to the actual physical characteristics embodied in a particular physical printer.

A **logical printer** object represents some collection of printer characteristics that have been defined and grouped together as a convenience to users of a print-server. A single logical printer may be associated with several physical printers; conversely, a single physical printer may be associated with several logical printers. By directing a print-request to a particular logical printer, the user is informing the associated print-server that a certain predefined set of printer and server features and facilities are to be applied to the requested Print abstract-operation. By directing a print request to a particular physical printer, the user is informing the associated print-server that a particular physical printer shall be used.

The logical printer concept can also aid a print-server in managing several physical printers in a manner that is transparent to the user population. That is, while a user might be directing a print-request to a (logical) printer that embodies a certain set of features and functionality, the associated print-server might actually assign the resulting job to any one of several physical printers possessing the features implied by the logical printer attributes. This would enable the server to balance the load among its associated printers, and to remove printers from service for maintenance reasons, while still offering the same functionality to its clients.

A printer object may be specified to be either logical, physical, or both.

6.3.4 Server object class

The print-server is the entity that provides print-services to clients in a distributed system. Users desiring to print documents submit their print-requests to a print-server and receive from the print-server information concerning the status and outcome of their requests.

A **server object** represents a particular print-server, and is the repository of information about that particular server.

A print-server is associated with one or more printers. To the normal user, the distinction between a print-server and a physical printer may not be visually apparent, since a printer and the server associated with it may be housed in one physical entity. However, a print-server may be capable of supporting multiple printers; and the printers supported by one server need not be of the same type, model, or capabilities, and there is no need that the server and its printer(s) be collocated.

In practical terms, the printer and the associated server may be one and the same. And a physical printer may be capable of functioning as a server if so assigned by the local administrator.

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ISO/IEC 10175 deals only with the application-level interface between a print server and the users of that print-server; it does not mandate any particular server/printer configuration, nor does it address the physical interconnection between a server and the printer(s) associated with it. The physical connection and access protocol(s) used between server and printer are considered implementation-specific; while it is possible to utilise the same methodology and protocol(s) to interconnect associated servers and printers as are employed in the interface between the server and the user of that server, that is neither addressed nor required by ISO/IEC 10175.

6.3.5 Medium object class

A **medium object** represents a medium on which a document (or part of a document) may be rendered. The most common example is paper, but also included are transparencies and virtually any physical material or device on which an image may be rendered.

Two different categories of media are addressed: *logical media* and *physical media.* A medium object may be specified to be logical, physical, or both. A **physical medium** is a medium that has distinct physical characteristics such as size, weight, type or pre-printed information. The final output of a printer will normally be on physical media. A **logical medium** incorporates a generic set of characteristics which indicate the approximate desired effect, and which may be realized by one or more physical media. A logical medium object may include a list of physical media from which the print-server is to select.

6.3.6 Font object class

As defined in ISO/IEC 9541, a font resource consists of a collection of glyph representations together with descriptive and font metric information relevant to the collection of glyph representations as a whole. A **font object** is a summary of information about one particular font resource that is available for use in rendering documents during the course of a print-job.

A **font object** is created and managed by a print-server in response to one of two situations:

a) the font resource is submitted with one print-request of a print-job; the lifetime of such a font is limited to the job in which the font is submitted, and may be used in printing any of the documents that compose the job;

b) the font resource is installed on a print-server or printer by some means outside the scope of this part of ISO/IEC 10175; such fonts may be persistent, i.e., not limited to the lifetime of any one job, but not necessarily permanent.

By means of operations defined subsequently in clause 8, a DP-User may interrogate a DP-Server to determine the font resources supported by, or available through, the DP-Server.

NOTE - the term font resource is used in a generic sense; that is, depending on implementation and other considerations, a font object may represent a font resource that does not conform to ISO/IEC 9541.

6.3.7 Resource object class

A **resource object** is similar to a font object, and is expected to represent some other logical resource such as an overlay or logo that may be used during the processing of a print-job.

As with font objects, a resource object is created and managed by a print-server in response to one of two situations:

a) the resource object is submitted with one print-request of a print-job; the lifetime of such an object is limited to the job in which the object is submitted, and may be used in printing any of the documents that compose the job;

b) the resource object is installed on a print-server or printer by some means outside the scope of this part of ISO/IEC 10175; such objects may be persistent, i.e., not limited to the lifetime of any one job, but not necessarily permanent.

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6.3.8 Transfer-method object class

A **transfer-method object** represents one specific method available for transferring electronic documents to a print-server (and printer). For example, a print-request may convey the subject document immediately and directly, or the request argument may provide a reference to an object stored in some remote file system, which the print-server is to fetch by some other means, as indicated in the attributes of the transfer-method.

6.3.9 Delivery-method object class

A **delivery-method object** represents some particular means available to the print-server for delivering printed documents, logs and notifications. For example, a particular print-server might offer a secure-pickup facility with controlled access; or some means might be available for delivering the output by postal mail. Such details are recorded as attributes of the delivery-method object.

6.3.10 Auxiliary-sheet-package object class

An **auxiliary-sheet-package object** represents a set of one or more auxiliary-sheets that are to be printed at positions relative to a job or relative to the documents in a job. For jobs, the auxiliary-sheets are to be printed before job components (job result sets and job copies), after components and/or between components of the same type. For documents, the auxiliary-sheets are to be printed before document components (document sets and document copies), after components and/or between components of the same type. A set of standard object identifiers representing various combinations of auxiliary-sheets is specified to facilitate interoperability.

6.3.11 Auxiliary-sheet object class

An **auxiliary-sheet object** represents a particular form of auxiliary-sheet that may be printed at the beginning of the requested print output, or at the end of the output, or between different parts of a print-job output to separate them. Different print-servers will have different numbers and formats of such things available, summarized by the auxiliary-sheet objects.

6.3.12 Finishing object class

Finishing encompasses the different kinds of processes that may be applied to printed output to produce completed documents. This includes such things as stapling (with various characteristics), binding, hole-punching or drilling, etc. Each specific kind of finishing available on a particular printer may be represented by a **finishing object**, which records the characteristics of the process, and provides an identifier by which it may be invoked.

A finishing object may be characterized and defined as either *logical* or *physical*, or both.

A **physical finishing object** defines the characteristics of a particular finishing process or mechanism that can be applied by one or more printers. A stapler installed on a printer is an example of such a physical mechanism; it would be represented in the server by a finishing object that details the features and parameters of the mechanism.

A **logical finishing object**, conversely, describes a finishing effect, but not necessarily the process or mechanism to be employed to achieve the effect. Thus, for example, a request for 3-hole punching of a document could be achieved by a punch or drill mechanism, or by substitution of a prepunched medium that otherwise satisfies the specified medium characteristics.

In addition, a logical finishing object can specify a set of finishing processes that are to be applied in sequence. For example, a single logical finishing object could be defined to cause an output document to be: (1) punched for eventual insertion into a 2-ring binder, (2) stapled along one edge, and (3) bound with tape. The entire set of finishing processes could then be invoked in a print-request by referencing the finishing object by means of its assigned identifier.

6.3.13 Output-method object class

Output-method objects represent an additional family of operations that may be applied to the output of a print-job. Such actions as sorting and collating are examples of output-methods.

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6.3.14 Imposition object class

Some print-servers may provide one or more utility functions that can be applied to a composed (electronic) document to alter its description prior to imaging and rendering the document on the output medium. The members of one group of such utility functions are termed convenience impositions

The **imposition object** describes the placement of multiple logical page images onto a single physical page, such as 2-up or 4-up. In 2-up imposition, consecutive pairs of page images are selected from the composed document, and transformed such that the page images are rotated 90 degrees, reduced in size, and printed side-by-side, i.e., two page images on one surface of a physical sheet.

This International Standard defines several imposition objects, but a site might define special imposition objects with behavior that is different from the impositions performed by the standard objects or the standard numeric values of the **number-up** document attribute.

> NOTE 1 - the **number-up** attribute value is either (1) a non-negative integer or (2) a simple-name or an OID that names an imposition object.

When an imposition object has been defined on a printer/server, an imposition function can be invoked in a print-request by supplying the identifier of the imposition object that represents it.

An imposition object describes an imposition effect, but not the method to be employed to achieve the effect. Further, the definition of an imposition object is independent of any physical details of the printer used to render the requested output.

> NOTE 2 - the behavior of the imposition object depends on the values of other attributes.

6.3.15 Scheduler object class

Print servers may support different scheduling algorithms for selecting and processing print-jobs on different printers. The details of such algorithms are outside the scope of ISO/IEC 10175. Summary information about such algorithms, however, may be collected in a **scheduler object**, enabling administrators to create and select different algorithms, and users to inquire about those available and currently in effect.

6.3.16 Initial-value-job object class

Initial-value-job objects contain the attributes of the job class that the server may default when constructing or processing a job object. Initial-value-job objects may be referenced explicitly by a print-job or indirectly through a printer object.

The server shall maintain an initial-value-job object with the same set of attributes that the job object class supports and that may be specified on a print-request. There are, however, some exceptions and these attributes are listed in subclause 9.17.

6.3.17 Initial-value-document object class

Initial-value-document objects contain the attributes of the document class that the server may default when constructing or processing a document object. Initial-value-document objects may be referenced explicitly by a document or indirectly through a printer object.

The server shall maintain an initial-value-document object with the same set of attributes that the document object class supports and that may be specified on a print-request. There are, however, some exceptions and these attributes are listed in subclause 9.18.

6.3.18 Resource-context object class

Resource-context objects encapsulate details about the server's environment which, when used with a resource name, uniquely identify a resource in the server's environment. Certain information about a server's environment, for example the file system structure, need not be known by a client. This object encapsulates such details, allowing the

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client to identify resources on a name only basis. It also allows administrators to change the location of resources on a system without requiring corresponding changes in the client.

Since resource-context objects reside in the domain of the server, a client may not be able to predetermine if a name for a resource-context is an explicit reference in the domain of the server, and hence should be represented as a Text name, or a resource-context object name as identified by the **name** CHOICE of the NameOrOid data type. Therefore, a conforming client shall pass the name of a resource-context object in the name field of the NameOrOid CHOICE of the ResourceContext data type. Upon receipt of an attribute with this data type, the server shall determine if this name is the name of a resource defined explicitly in the domain of the server (e.g. the filename of a resource). If so, the server shall recast the value of the attribute from the name field of the NameOrOid data type to the Text data type.

6.3.19 Derived classes and class inheritance for implementor extensions

In the object oriented (OO) concept of class inheritance, the specification of a derived class includes all of the attributes and operations of the base class, but adds additional attributes and/or operations that are relevant to the specialized derived class. In other words, the base class is more generic and the derived class is more specialized.

Each object of an object class, including all derived classes of the base class, shall have an unambiguous name or identifier. In other words, no two objects of the same object class or any of its derived classes shall have the same name or identifier.

ISO/IEC 10175-1 does not use object class inheritance in defining any of its standard object classes, for reasons of not introducing such a powerful tool when it is not really needed. However, implementors may wish to use the class inheritance approach to adding attributes to objects defined by ISO/IEC 10175, though they are not required to when adding implementor-defined attributes. See 8.2.4.4 for a complete example of implementor-defined derived classes for the printer class.

6.3.20 Events and event classes

Different classes of abstract-events are defined in ISO/IEC 10175 in a manner similar to that of object classes.

An event indicates that something has occurred during the processing of a print-job, or in the operation of a printer or server. An event may be expected (e.g., the change in state of a job), or it may be an abnormal occurrence (e.g., an error). Every error detection is an event, but not all events involve errors.

Both **event types** and **event classes** are defined. The former are used to identify the specific event (e.g., the error event that signifies a specified deadline has passed) while the latter enable the user to identify the sets of events for which the server is to provide notifications (e.g., "log *all* error events"). See 8.5 for further details about event types and event classes.

Subclause 9.2.3 defines the job-event-handling attributes which are utilized to convey the event information. These attributes enable clients to indicate which events and event classes are to be logged for later analysis, and which are to cause notifications to be sent to the client immediately. ISO/IEC 10175 does not dictate any rules governing the use of these logs or notifications, however; these aspects are outside the scope of this International Standard.

6.4 Attributes

Each DPA-Object is represented by a set of attributes which characterize that object. That is, each attribute provides a piece of information about, or derived from, the object to which it corresponds. DPA employs attributes to identify the objects upon which to operate, to affect and modify the manner in which an operation is performed, to return details of the status and outcome of an operation, and to provide information about DPA-Objects.

In general, the principal reason for using attributes in an abstract-service definition is the ability to extend the facilities provided by a particular implementation, without the necessity of revising the governing standard. Each instance of an attribute includes both an identifier for that particular *attribute-type*, followed by a structure containing zero or more value elements appropriate to that attribute-type. Because of this consistent, self-identifying form, it is possible in DPA to define and integrate a new attribute-type into a print-server implementation in order to

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provide access to some new facility, and for a print-client implementation to integrate and use the new attribute-type as soon as the new facility is available.

The attribute concept and the associated ASN.1 specifications originated in the OSI Directory Standard (ISO/IEC 9594-2). However, certain requirements of the Document Printing Application necessitated changes to the original definitions. For this reason, revised versions of these definitions appear, and are utilized in, ISO/IEC 10175.

6.4.1 The attribute-type

A DPA attribute consists of an **attribute-id** component, which identifies the specific type of **attribute**, and the corresponding **attribute-values** component, which encapsulates the information to be conveyed by the attribute. Figure 6-2 illustrates the attribute concept.

The DPA attribute is formally defined by the following ASN.1 production:

```
Attribute ::= SEQUENCE {
      attribute-id          [0] AttributeId,
      attribute-values      [1] SET OF ANY -- DEFINED BY attribute-id -- }
```

Particular DPA attributes are referred to as **attribute-types**. All attributes of a given object must be of distinct

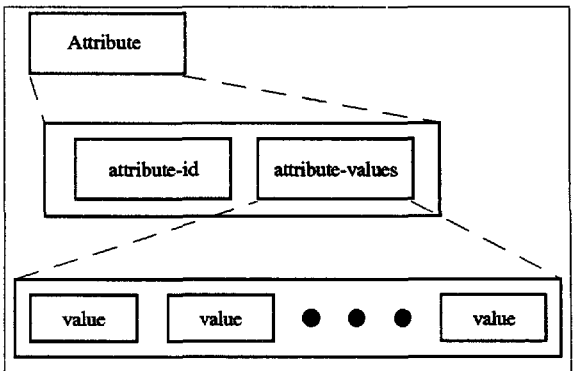

Figure 6-2 - General Structure of Attributes

attribute-types; i.e., for any particular object instance, no more than one instance of any particular attribute-type may exist at one time.

6.4.2 Attribute-id

Some attribute-types are standardized by ISO/IEC 10175. Other attribute-types will be defined by national administrative authorities and private organizations. Some externally defined attribute-types will not be specific to DPA such as, for example, security attributes. This implies that a number of separate authorities will be responsible for assigning types in a way that ensures that each is distinct from all other assigned types. This is accomplished by identifying each attribute-type with an object identifier when the attribute-type is defined.

```
AttributeId ::= OBJECT IDENTIFIER
```

Attribute-types defined by ISO/IEC 10175 are specified in clause 9. The procedures for constructing and registering object identifiers for other attribute-types may be found in ISO/IEC 8824; registration and dissemination of information regarding these attribute-types is the responsibility of the organizations that define them.

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6.4.3 Attribute-values

Defining an attribute-type also involves specifying the ASN.1 datatype to which every value in such attributes must conform. As defined above, the datatype of the **attribute-values** component is the same for all attribute-types, i.e., SET OF ANY. However, encapsulated within each attribute-value are **value elements** whose types are specifically defined for each attribute-type, and identified by means of the associated attribute-id.

For some attribute-types, the **attribute-values** component may contain no more than a single element of the specified type. Such an attribute-type is said to be single-valued. For others, an **attribute-values** may (but need not) contain more than one component, all of the same ASN.1 datatype. Such an attribute-type is said to be multi-valued. Whether an attribute-type is single-valued or multi-valued is stated when the attribute-type is defined (see 6.4.4.1).

6.4.4 Attribute-type definition

In summary, the definition of an attribute-type involves :

a) assigning an object identifier to the **attribute-id**;

b) indicating or defining the datatype of the associated **attribute-values** element;

c) indicating whether an attribute of this attribute-type may have more than one value (i.e., whether the **attribute-values** element may contain more than one component of the specified type);

d) indicating whether an attribute of this attribute-type may be used for filtering using equality, substring, and/or ordering or set-valued relations (see subclause 6.4.5).

NOTE - A filter may always test for the presence or absence of an attribute of a particular attribute-type.

6.4.4.1 The ATTRIBUTE macro

The following ASN.1 macro is used to define an attribute-type:

```
ATTRIBUTE MACRO ::=
BEGIN
    TYPE NOTATION      ::= AttributeSyntax Multivalued | empty
    VALUE NOTATION     ::= value (VALUE OBJECT IDENTIFIER)
    AttributeSyntax          ::= "WITH ATTRIBUTE-SYNTAX" SyntaxChoice
    Multivalued              ::= "SINGLE VALUE" | "MULTI VALUE" | empty
    SyntaxChoice             ::= value (ATTRIBUTE-SYNTAX) Constraint
                               | type MatchTypes
    Constraint               ::= "(" ConstraintAlternative ")" | empty
    ConstraintAlternative    ::= StringConstraint | IntegerConstraint
    StringConstraint         ::= "SIZE" "("SizeConstraint")"
    SizeConstraint           ::= SingleValue | Range
    SingleValue              ::= value (INTEGER)
    Range                    ::= value (INTEGER )".." value (INTEGER)
    IntegerConstraint        ::= Range
    MatchTypes               ::=  "MATCHES FOR" Matches | empty
    Matches                  ::=  Match Matches | Match
    Match                    ::=  "EQUALITY" | "SUBSTRINGS" | "ORDERING" |
                                  "SET-COMPARISON" | "SET-INTERSECTION"
END
```

The correspondence between the parts of the definition and the various pieces of the notation introduced by the macro is as follows:

a) the object identifier assigned to the **attribute-id** is the value supplied in the value assignment of the macro;

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b) the datatype of the **attribute-values** element(s) is that indicated by the AttributeSyntax production: a separately defined attribute-syntax identified by an object identifier and matching rules. A size constraint for underlying string types or a value range for an underlying integer type may optionally be indicated;

c) the attribute is single valued if the Multivalued production is **SINGLE VALUE** and may have more than one value element if it is **MULTI VALUE** or empty.

NOTE - The attribute macro defined above is derived from ISO/IEC 9594-2, but has been revised to incorporate additional matching rules (see 6.4.5.1). Matching rules are discussed in 6.4.4.3.

6.4.4.2 Attribute-syntax definition

The definition of an attribute-syntax involves:

a) assigning an object identifier to the attribute-syntax;

b) indicating the datatype, in ASN.1, of the attribute-syntax;

c) defining appropriate rules for matching an asserted value with a target attribute value. None, some, or all of the following matching rules may be defined for a particular attribute-syntax:

1) equality. Applicable to any attribute-syntax. The asserted value must conform to the datatype of the attribute-syntax;

2) substrings. Applicable to any attribute-syntax with a string datatype. The asserted value must be a sequence ('SEQUENCE OF'), each of whose elements conforms to the datatype;

3) ordering. Applicable to any attribute-syntax for which a rule can be defined that will allow an asserted value to be described as less than, equal to, or greater than a target value. The asserted value must conform to the datatype of the attribute-syntax.

4) set-comparison. Applicable to any attribute-syntax for which a rule can be defined that will allow an asserted value, or set of value elements, to be described as a subset or superset of the identified **attribute-values** set. The asserted value(s) must conform to the datatype of the attribute-syntax.

5) set-intersection. Applicable to any attribute-syntax for which a rule can be defined that will allow an asserted value to be described as having one or more members in common with the identified **attribute-values** set. The asserted value(s) must conform to the datatype of the attribute-syntax.

If no matching rule is defined, the DP-Server:

a) treats values of attributes of this attribute-syntax as having the type ANY, i.e., the DP-Server does not check that those values conform with the datatype indicated for the attribute-syntax;

b) shall not attempt to match asserted values against target values of such an attribute-type.

If a matching rule is defined, the DP-Server:

a) treats values of attributes of this attribute-syntax as having type ANY defined by the datatype indicated for the attribute-syntax;

b) shall only match according to the matching rules defined for that attribute-syntax;

c) shall only match an asserted value of a suitable datatype.

6.4.4.3 The ATTRIBUTE-SYNTAX macro

The following ASN.1 macro is used to define attribute-syntaxes:

```
ATTRIBUTE-SYNTAX MACRO ::=
BEGIN
    TYPE NOTATION  ::= Syntax MatchTypes | empty
    VALUE NOTATION ::= value (VALUE OBJECT IDENTIFIER)
```


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```
    Syntax          ::=  type
    MatchTypes      ::=  "MATCHES FOR" Matches | empty
    Matches         ::=  Match Matches | Match
    Match           ::=  "EQUALITY" | "SUBSTRINGS" | "ORDERING" |
                         "SET-COMPARISON" | "SET-INTERSECTION"
END
```

The correspondence between the parts of the definition and the various pieces of the notation introduced by the macro is as follows:

a) the object identifier assigned to the attribute-syntax is the value supplied in the value assignment of the macro;

b) the datatype of the attribute-syntax is that identified by the Syntax production, i.e., that following the macro name;

c) the defined matching rules are **equality**, if "EQUALITY" appears in the MatchTypes production, **substrings** if "SUBSTRINGS" appears, **ordering** if "ORDERING" appears, **set-comparison** if SET-COMPARISON appears, and **set-intersection** if SET-INTERSECTION appears. If the production is empty, then no matching rules are defined.

Should the "empty" alternative of the notation be selected, the resulting notation ("ATTRIBUTE-SYNTAX") can be used to denote any possible attribute-syntax.

NOTES

1 The attribute-syntax macro defined above is derived from ISO/IEC 9594-2, but has been revised to incorporate additional matching rules. (see 6.4.5.1)

2 No support is provided in the macro for actually defining the matching rules themselves: this must be done by natural language or by other means.

6.4.5 Filters

A filter parameter specifies a test that is either satisfied by a particular DPA-Object or not. The **Filter** is expressed in terms of assertions about the (1) presence or (2) values of certain attributes of the DPA-Object; the test is satisfied if and only if the **Filter** evaluates to true.

```
Filter ::= CHOICE {
      item       [0]  FilterItem,
      and        [1]  SET OF Filter,
      or         [2]  SET OF Filter,
      not        [3]  Filter }
```

A **Filter** is either a **FilterItem**, or an expression involving simpler **Filters** combined by using the logical operators **and**, **or**, and **not**.

Where the **Filter** is:

a) an **item**, it is true if and only if the corresponding **FilterItem** is true;

b) an **and**, it is true unless any of the **Filters** in the SET are false;

NOTE - Thus, if there are no **Filters** in the SET, the **and** evaluates to true.

c) an **or**, it is false unless any of the **Filters** in the SET are true;

NOTE - Thus, if there are no **Filters** in the SET, the **or** evaluates to false.

d) a **not**, it is true if and only if the specified **Filter** is false.

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6.4.5.1 Filter-item

A **FilterItem** is an assertion about the (1) presence or (2) value(s) of a particular attribute-type in the DPA-Object under test. Each such assertion is either true or false.

```
SubstringMatchCriteria ::= ENUMERATED {
    exact            (0),
    case-insensitive (1),
    same-letter      (2), -- ignoring accents, case, etc.
    approximate      (3)  -- implementation-defined -- }

FilterItem ::= CHOICE {
    equality                    [0] AttributeValueAssertion,
    substrings                  [1] SEQUENCE {
        attribute-id                [0] AttributeId,
        match-criteria              [1] SubstringMatchCriteria,
        initial-string              [2] ANY OPTIONAL,   -- DEFINED BY attribute-id
        any-string                  [3] SEQUENCE OF ANY OPTIONAL,
                                                        -- DEFINED BY attribute-id
        final-string                [4] ANY OPTIONAL }, -- DEFINED BY attribute-id

    greater-or-equal            [2] AttributeValueAssertion,
      -- asserted value is greater than or equal to the attribute value
    less-or-equal               [3] AttributeValueAssertion,
      -- asserted value is less than or equal to the attribute value
    present                     [4] AttributeId,
      -- asserted attribute is present (with any value)
    subset-of                   [5] AttributeValueAssertion,
      -- asserted value is a subset of attribute value
    superset-of                 [6] AttributeValueAssertion,
      -- asserted value is a superset of attribute value
    non-null-set-intersection   [7] AttributeValueAssertion,
      -- at least one of the members of the asserted value is present
      -- in the attribute value  -- }
```

Every **FilterItem** includes an **attribute-id** that identifies the particular attribute concerned.

Any assertion about the value of such an attribute is only evaluated if the **attribute-id** is recognized and defined for the DPA-Object, and the purported **attribute-values** conforms to the attribute-syntax defined for that attribute-type.

> NOTE 1 - The **AttributeError invalid-attribute-syntax** is reported if the purported attribute-values does not conform to the attribute-syntax. No error is reported if the attribute-type is not defined for the object instance.

Assertions about the value of an attribute are evaluated using the matching rules associated with the attribute-syntax defined for that attribute-type. A matching rule not defined for a particular attribute-syntax cannot be used to make assertions about that attribute.

> NOTE 2 - The **AttributeError inappropriate-matching** is reported if the matching rule was not defined for that attribute-type.

Where the filter-item asserts:

a) **equality,** it evaluates to TRUE if and only if the value supplied in the assertion is equal to the value of the attribute.

   If the subject attribute is multi-valued, the assertion evaluates to TRUE if and only if the set of members supplied in the assertion is equal to the set of members in the attribute value.

b) **substrings,** it evaluates to TRUE if and only if all of the substrings specified in the assertion appear in the attribute in the given order; the substrings must be non-overlapping, and may be separated from the ends of

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the attribute-value and from one another by zero or more string elements.

If **initial-string** is present, the substring shall match the initial substring of the attribute value; if **final-string** is present, the substring shall match the final substring of the attribute value; if **any-string** is present, each of the specified component substrings shall match a substring in the attribute value, in the order specified.

If the subject attribute is multi-valued, the assertion shall contain exactly one member, i.e., one sequence of substrings that will be matched separately to each member value of the subject attribute; the assertion evaluates to TRUE if and only if the supplied value evaluates to TRUE *for at least one* member of the attribute value, as defined above..

c) **greater-or-equal,** it evaluates to TRUE if and only if the value supplied in the assertion is greater than or equal to the value of the attribute.

If the subject attribute is multi-valued, the assertion shall contain exactly one member; the assertion evaluates to TRUE if and only if the supplied value is greater than or equal to *at least one* member of the attribute value.

d) **less-or-equal,** it evaluates to TRUE if and only if the value supplied in the assertion is less than or equal to the value of the attribute.

If the subject attribute is multi-valued, the assertion shall contain exactly one member; the assertion evaluates to TRUE if and only if the supplied value is less than or equal to *at least one* member of the attribute value.

e) **present,** it evaluates to TRUE if and only if such an attribute is present in the object.

f) **subset-of,** it evaluates to TRUE if and only if all of the assertion value is present in, or lies within, the attribute value.

This matching rule applies both to multi-valued attributes and to single-valued attributes that specify ranges or two-dimensional areas.

In the case of multi-valued attributes, the assertion evaluates to TRUE if and only if each of the assertion value members is present in the attribute value set.

For attributes.that specify a range (or two-dimensional area), the assertion evaluates to TRUE if and only if the assertion rangelarea lies within the attribute value rangelarea. For examples, see 9.1.5.16, IntegerRange and integerRangeSyntax, and 9.1.5.47, Area and areaSyntax.

g) **superset-of,** it evaluates to TRUE if and only if all of the attribute value is present in, or lies completely within, the assertion value.

This matching rule applies both to multi-valued attributes and to single-valued attributes that specify ranges or two-dimensional areas.

In the case of multi-valued attributes, the assertion evaluates to TRUE if and only if each of the attribute value members is present in the assertion value set.

For attributes.that specify a range (or two-dimensional area), the assertion evaluates to TRUE if and only if the attribute rangelarea lies within the assertion value rangelarea. For examples, see 9.1.5.16, IntegerRange and integerRangeSyntax, and 9.1.5.47, Area and areaSyntax.

h) **non-null-set-intersection,** it evaluates to TRUE if and only if at least one of the assertion members is present in the attribute value.

This matching rule applies only to multi-valued attributes.

NOTE 3 - An ordering rule must be stated for each different datatype used as the syntax of an attribute for which "MATCHES FOR ORDERING" is declared (i.e., an attribute which may be the object of greater-or-equal and less-or-equal attribute-value-assertions).

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6.4.5.2 Attribute-value-assertion

An **AttributeValueAssertion** is a proposition concerning the values of a DPA-Object, which, in the context of that object instance and matching relation, may be true, false, or undefined. It involves an **attribute-id** and an **attribute-values**:

```
AttributeValueAssertion ::= SEQUENCE {
      attribute-id            [0] AttributeId,
      attribute-values        [1] SET OF ANY -- DEFINED BY attribute-id -- }
```

and is:

a) **undefined**, if any of the following holds:

1) the attribute-type is not present in the DPA-Object;

2) the definition of the attribute-type cannot be matched for the specified matching relation (i.e., equality, substrings, ordering, set-comparison, or set-intersection);

3) the **attribute-values** component of the assertion does not conform to the datatype defined for the **attribute-values** component of the specified attribute-type;

b) **true**, if the DPA-Object contains an attribute of that attribute-type whose **attribute-values** component matches the **attribute-values** component in the assertion, according to the associated matching rule;

c) **false**, otherwise.

6.4.6 Compulsory and non-compulsory attributes

Normally, a print-server is expected to honour a print-request explicitly. That is, a print-server will attempt to satisfy each and every parameter of the print-request exactly as submitted; unless instructed otherwise, a print-server shall reject any print-requests that cannot be honored completely, as specified.

However, the Document Printing Application assumes that there will exist many different print-server configurations and software implementations, with potentially a large variation in the set of features and resources available at a particular print-server. Likewise, because DPA utilizes the inherent extensibility of the attribute-type to model argument and result parameters, it is assumed that many different attributes will be defined over time; and it is assumed that not all of these attributes will be understood by all print-servers or print-clients.

Conversely, print-clients acting on behalf of human users will have different requirements. In some cases documents must be rendered exactly as specified; no substitutions can be allowed in font, choice of media, or finishing operations for example. But in many other cases the human-user wants only to print a set of documents (e.g., mail messages) in *some* form; the choice of font, media, etc., is of little importance, as long as readable documents are produced.

In order to deal consistently with this variability in user-requirements and available functionality, DPA provides print-clients with a means of indicating that certain print-request attributes are non-compulsory. Two attribute-types exist for this purpose: **job-non-compulsory-attributes** and **non-compulsory-attributes**, defined in subclauses 9.2.1.11 and 9.3.3.5, respectively. As indicated by their names, they enable clients to identify attributes of the job-object and the document-object that are to be treated as non-compulsory.

If an attribute-type is submitted in a print-argument and is *not* identified as non-compulsory:

a) the server shall recognize the **attribute-id**, and shall understand the semantics of the attribute and its value;

b) the requested attribute and value shall be supported (in the case of several compulsory attributes, all on the assigned printer(s).

If either of the above conditions cannot be satisfied, the server shall return an AttributeError and reject the job. The AttributeProblem reported in each case shall be, respectively:

a) undefined-attribute-type and

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b) unsupported-attribute-type and unsupported-attribute-value.

If an attribute-type has been identified as non-compulsory by means of either the **job-non-compulsory-attributes** or the **non-compulsory-attributes** attribute-type, the server is allowed to ignore the attribute or the attribute value, or take a default action, but ONLY if it does not understand or support the semantics of the attribute or its value.

In the case where not all non-compulsory attributes are supported on any associated printer, and the client has not specified a particular physical printer, the server may select a printer for the job in an implementation-dependent but consistent and reproducible manner. That is, the selection algorithm must always select the same printer, given the same set of print-request attributes, and the same conditions of server and printer state and resource availability.

If a server ignores attributes at the time of their submission in a print-request, they are included in the status information returned to the client, with the indication that they have been ignored.

In some cases, however, it may not be discovered until later, during the processing of the print-request, that certain attributes must be ignored. To accommodate such cases, the client can request to be notified of these events, and can query the server to obtain the ignored attributes.

Whether an attribute is compulsory or non-compulsory is applicable throughout the life of a job. That is, if a job has been accepted, but the server determines subsequently that the value of some compulsory attribute cannot be satisfied, the server shall abort the job.

Conversely, if an attribute has been identified as non-compulsory, the effect of the attribute may be ignored, regardless of where in the processing cycle it is determined that the attribute cannot be satisfied.

This situation could occur for example if the client has specified some medium that was available at print-request time, but which has been depleted prior to completion of the job, and which will not be available prior to expiration of a local timeout condition (e.g., **job-deadline-time** or **job-discard-time** -- see 9.2.4.7 or 9.2.4.8). In both cases, the requested medium would be scheduled for the job at print-request time; but the job would be aborted when it is discovered that the media is no longer available if the medium is compulsory, whereas a different medium would be substituted and the job completed if the medium selection attribute was identified as non-compulsory.

> NOTE - In order to avoid having a large number of jobs rejected, print-client and user-interface implementations should be prepared to designate print-argument attributes as non-compulsory except where the user explicitly requires the attribute values to be honoured. In addition, a print-server implementation should include substitution for non-compulsory attribute values where ignoring the unsupported attribute value is not sufficient.

6.5 Document Processing and Print Operation Models

Figure 6-1 in the introduction to this clause illustrates the basic relationship between the principal entities involved in the Document Printing Application: the DP-Server on one side of the operational interface, and the DP-User and DP-Administrator on the other. Additional views of the Document Printing Application are provided by two models described in this subclause: the Document Processing Model and the Print Operation Model.

The Document Processing Model is presented in Figure 6-3. This model identifies the two primary forms that an electronic document may take during its progress from initial *creation* to *presentation*, and the three fundamental processes involved in the life of the document.

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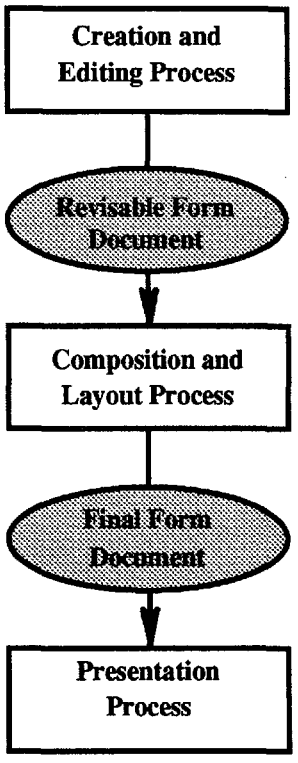

Figure 6-3 - Document Processing Model

The **Creation and Editing Process** generates the character text and graphics which comprise the logical content of the document and the logical document structure. This information is represented as a **RevisableForm Document**. The **Composition and Layout Process** formats the character text and graphics contained in the revisable form document for presentation, and incorporates the composition and layout decisions in a **Final Form Document**. The **Presentation Process** renders the final form document in visible form.

The model presented here is highly simplified in order to clearly illustrate its basic aspects. In practice this sequence is often highly recursive, and may be repeated many times in many variations during the life of the document. For example, a document such as this International Standard must be edited, composed and printed many times before it is ready for publication. And it is important to note that this model does not indicate where the respective processes are invoked or executed, or where the revisable form or final form documents reside during their lifetimes, or how many copies of each may exist at any given time; these details are purposely not defined, to avoid mandating any particular architecture, system configuration or implementation details beyond those required to realize the model as shown.

The Print Operation Model, illustrated in Figure 6-4, is an informal refinement of the Document Printing Abstract Model discussed previously. Its purpose is to aid in the understanding of the concepts and abstract entities involved; as with the Document Processing Model, the Print Operation Model it is not intended to specify any particular implementation. The major processes are characterized, along with their interrelationships, in terms of the flow of data and control among them.

The key concepts of these two models are discussed further in the following subclauses.

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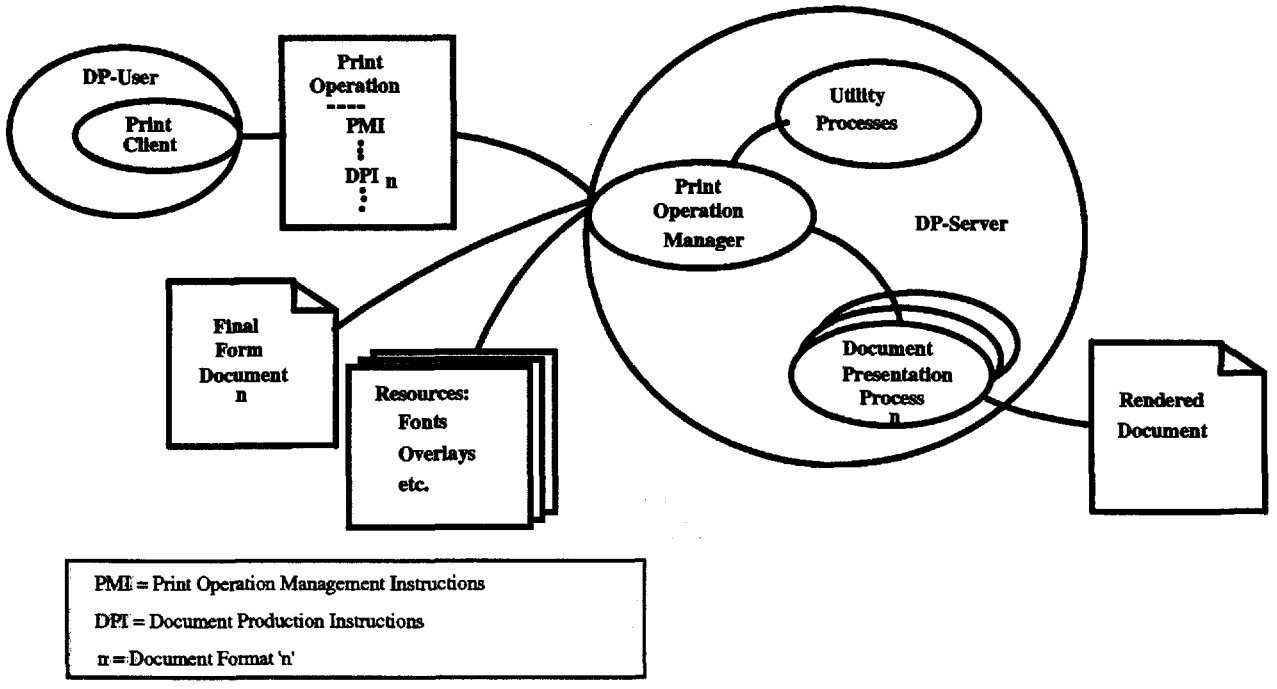

Figure 6-4 - Print Operation Model

6.5.1 Objects in the DP-User environment

One major process is shown in the DP-User environment, the *Print-Client*. The Creation and Editing Process and the Composition and layout Process are both very closely associated with the DP-User, but they are not shown in the DP-User's immediate environment since they may occur elsewhere. Other processes may be in, or related to, the DP-User's environment as well, but they are outside the scope of this discussion.

The **Print-Client** is the interface between the initial requester of printing and the DP-Server itself. The print-client accepts and acquires details of the requested printing action, transforms them into the form expected by the DP-Server, and collects them into a print-request consisting of the identity of the abstract-operation to be invoked, and the argument parameters to that operation. The completed request is then transferred to the desired DP-Server by the supporting protocol layers.

The argument parameters included with the print-request are referred to collectively as **Print Operation Parameters** (POP). As illustrated in Figure 6-4, they may be subdivided into **Print Operation Management Instructions (PMI)** and **Document Production Instructions (DPI)**.

As described previously (see 6.3.1) a print-job may encompass the printing of more than one document (and/or the downloading of one or more resources). Such jobs, referred to as multiple-document jobs, require one print-request for each document and each logical resource to be transferred to the server. The **Composition and Layout Process** transforms documents to be printed from their original revisable form into a form that is suitable for a printer to deal with. In the case of modern page description languages, it is the composition and layout process that supplies the additional information concerning precise placement of text and graphics on the pages, information about fonts to be used, etc. Note that some revisable formats may actually be in a form that some class of printers can deal with directly, without requiring a separate composition and layout process to be invoked. The rationale and details concerning different document formats are subjects of other standards, and are outside the scope of ISO/IEC 10175.

The composition and layout process does not necessarily reside in the same physical system as the Print-Client, nor is that process necessarily invoked at the same time a print-request is made; the only requirement is that the document

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be available in the required printable form at the time it is conveyed to the document presentation process. It is also not a requirement that the document to be printed be resident on the same physical system as the Print-Client. The Print-Client may instead supply a reference to the document when the print-request is invoked, enabling the transfer to be made independently of the association between the Print-Client and the Print-Server. Thus, in those systems that support the necessary facilities, the Print-Client may supply a reference to the document that will enable the Print-Server to acquire the document from a remote filestore, for example, by some means independent of the protocol used to transfer the print-request.

6.5.2 Objects in the DP-Server environment

The abstract DP-Server environment includes one process that may be called a *Print Operation Manager*, one or more *Document Presentation Processes*, and optionally, one or more *Utility Processes*. Other processes may be included as well, but they are outside the scope of this discussion.

The **Print Operation Manager** is the counterpart of the Print-Client, and is that part of the print-server that interfaces with the print-client for the purpose of accepting print-requests and providing the client with status and completion information regarding print-requests. The print-operation manager coordinates the activities of the other processes involved in the processing of print-requests, scheduling print-jobs, managing print queues, passing acquired data to the other processes, etc. The print operation manager deals with the print operation parameters passed in a print-request and may relay them to one of the other processes for action.

A **Document Presentation Process** is the counterpart of a specific type of composition and layout process. For example, an SPDL composition and layout process formats a document in accordance with the SPDL standard (ISO/IEC 10180); likewise there must be a corresponding SPDL presentation process in order to interpret the content of an SPDL document, and prepare it for output to a printer or other presentation device.

In addition to dealing with a specific document format, a presentation process also may be passed a subset of the print operation parameters, referred to collectively as **Document Production Instructions**. This subset concerns the final structure and appearance of the document to be printed, and may include binding and finishing instructions as well. Some document formats permit document production instructions to be carried within the document itself, as well as in the print-request parameters that are transferred outside of the document. In those cases where a specific type of production instruction appears in both the print-request and the document, it is the responsibility of the presentation process to resolve precedence. Such precedence rules must be specified in conjunction with the particular document format specification, and are outside the scope of ISO/IEC 10175.

Some print-servers may include one or more **Utility Processes** to provide some additional functions for clients. Examples include convenience imposition functions capable of altering the structure of a formatted (electronic) document such that multiple page images may be rendered on each sheet of paper; such functions facilitate the production of booklets, etc. In addition, a utility process could be included to format a document for printing, e.g., in the case of an ODA processable form document.

6.5.3 Resources

The Document Printing Application deals with resources in two basic forms: physical and logical. Physical media such as paper, transparencies and preprinted forms are examples of physical resources.

Logical resources are electronic representations of objects that may be referenced by, or used in combination with, a printable-document to render the final printed output. Examples of logical resources are fonts, and overlays such as electronic forms, logos and signatures.

Logical resources may exist, and be accessed, in two forms:

a) Environment -- a logical resource is usually found in the environment of the printer at the time of need; i.e., either it has been installed previously on the printer, or on the associated print-server, or it has been made available to be retrieved from some node within the distributed network;

b) Intra-job -- alternatively, or in addition, one or more logical resources may be transmitted to the server (and printer) within the stream of documents that comprise a print-job.

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Logical resources in the environment are considered to be persistent; i.e., they have lifetimes that transcend the duration of any particular print-job that references them. They are installed in the environment by methods that are outside the scope of this part of ISO/IEC 10175.

Logical resources that are conveyed within the job-stream are referred to as job-resources, and are treated in basically the same manner as printable-documents. That is, the transfer of each job-resource is accomplished by means of a Print abstract-operation, and each is assigned a document sequence number indicating its position within the job-stream. In addition, a simple *resource-name* is supplied in the print-argument, and assigned to the associated job-resource.

Job-resource instances are considered to be transient, lasting only for the duration of the job in which they are transferred. However, a resource of this type can be referenced any number of times, from any document or any other resource in the job.

A logical-resource is accessed within a job by means of a resource-name, and possibly, a *resource-context*. For resources transferred within the job-stream, the simple-name supplied with the document-resource is sufficient to identify the required resource. In the case of resources to be obtained from somewhere in the distributed environment, the name of the requested resource may need to be combined with a resource-context to form a fully-qualified name, which then specifies a path to the required resource.

ISO/IEC 10175 defines attributes which enable a client to specify several different contexts, and a sequence for searching them, in order to resolve references to logical resources.

NOTES

1 Numerous variations exist in the standards and conventions that govern the naming and referencing of different kinds of logical resources. For this reason, the present version of ISO/IEC 10175 does not mandate any structure for the resource-name, nor does it specify how the resource-contexts are to be used to search for a particular resource. These details are considered implementation-specific at this time. Future versions of ISO/IEC 10175 may provide additional specificity, however.

2 Fonts transferred as job-resources within a job may be referenced by simple resource-names, but fonts that are to be accessed from the distributed environment, should be referenced by means of the conventions defined by ISO/IEC 9541.

6.5.4 Reference Coordinate System (RCS)

The Reference Coordinate System (RCS), illustrated in Figure 6-5, is defined in the SPDL Standard (ISO/IEC 10180) to provide for unambiguous specification of locations on the medium.

The Document Printing Application employs the same RCS when dealing with the placement of page images on media, and with finishing operations that are to be applied to the media that comprise the output of a document or job. In DPA, use of the RCS is not limited to SPDL documents, but is applicable to operations with all document formats.

The RCS is a Cartesian coordinate system with units of millimetres on both axes. The location and orientation of the RCS on the medium is a property of the medium, and not of the page image to be placed on the medium. For rectangular media that have a normal, distinguished viewing position, the convention is that with the medium oriented in its natural viewing position:

a) the origin is at the bottom left corner of the medium;

b) the *x*-axis is placed along the bottom edge, with positive values of x to the right;

c) the *y*-axis is placed along the left edge of the medium, with positive values in the upward direction.

[The *x*-axis and the *y*-axis are referred to as reference axes in subsequent discussions.]

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For rectangular media that have no distinguished natural viewing position, the convention is that the reference viewing position is with the long edge vertical (commonly called portrait orientation). This convention is adhered to even if the page images are being placed on the medium in such a way that the completed document will commonly be viewed in another orientation (e.g., with the long edge horizontal, in what is commonly referred to as landscape orientation).

A sheet of plain, unmarked paper is an example of a medium with no distinguished natural viewing position, that is, until image data is placed on a sheet of plain paper, or some other operation is performed on the medium to give it a distinguishing feature, the medium has no natural viewing position. Thus, plain paper is normally treated as portrait media, in accordance with the convention stated above.

Preprinted forms are examples of media that *do* exhibit a distinguished natural viewing position. A preprinted form

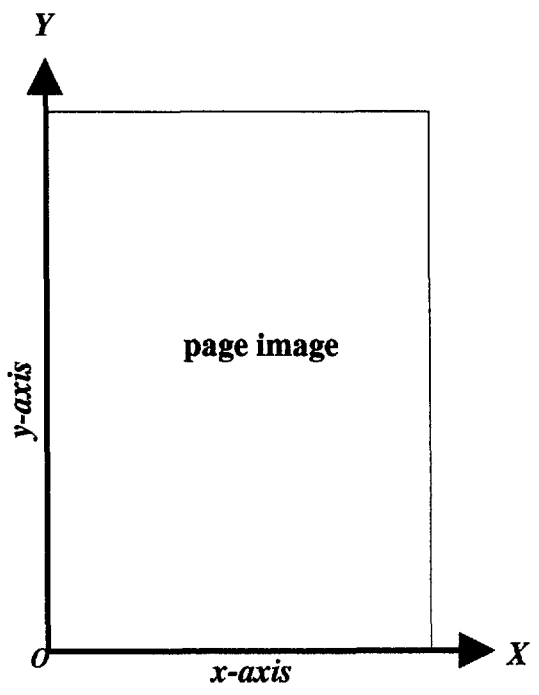

Figure 6-5 - Reference Coordinate System

can therefore be treated as either a portrait or a landscape medium, depending upon whether the long edge of the form is vertical or horizontal when the form is held in its natural viewing position.

6.6 Security in DPA

Two specific security mechanisms are addressed here: Authentication and Access authorization.

6.6.1 Authentication

At BIND time, the security subject represented by the DP-User is authenticated either by using password(s) or, in the case of a user who has been previously authenticated elsewhere, by checking a certified identity. The authentication mechanism verifies the credentials of the DP-User requesting access to the DP-Server. This does not, however,

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qualify the DP-User to access all DPA-Objects stored in the DP-Server, or to access the abstract-services implemented by the DP-Server.

Certified identities can also be presented subsequent to the BIND operation, as arguments to individual operations. This permits the BIND to be shared between multiple security subjects, the DP-User representing a different security subject for each of the operations concerned.

NOTE - The object designator DP-Administrator will be used throughout ISO/IEC 10175 primarily to identify those specific cases where it is necessary to distinguish between users with normal access privileges and those with some form of administrative privilege. Unless otherwise qualified, this and following discussions concerning DP-Users apply equally to DP-Administrators.

6.6.2 Access authorization

Access authorization is controlled by a group of security-related attributes assigned to DPA-Objects, known collectively as a Control Attribute Package (CAP).

In order to provide the design freedom necessary to enable DP-Servers to operate under a wide variety of security policies, the DPA implementor should be free to choose control attribute-types appropriate to the security regimes for which the implementation is targeted. In the longer term, standards will be defined for access authorization rules and for control attribute-types, from which users of DPA will make their choices. Examples of such attributes might be the identity, the access rights, and the role of the initiator of a print-job.

In the short term these standards are not available, and ISO/IEC 10175 defines one specific control attribute, the DpAccessList.

```
DpAccessListElement  ::= SEQUENCE {
        access-id          AccessId,
        access-rights      DpAccessRights }

AccessId             ::= DistinguishedNameString

DpAccessRights       ::= ENUMERATED {
        dp-user            (0),
        dp-administrator   (1) }
```

If the accessing DP-User has presented a Privilege Attribute Certificate (PAC) containing privilege attributes for a DPA-Object (e.g., a print-job), these attributes will be used where appropriate, in conjunction with the attributes in the CAP, in order to determine what form of access the user may have to that object. Privilege attributes are optionally presented either at abstract-bind time via a PAC type credentials argument (see 7.1.1) or explicitly at the time of the operation request in the privileges argument (see 8.1.2.3) or both. The DP-User may also specify a proxy PAC in a specific operation request. This proxy PAC is used by the DP-Server on behalf of the requesting DP-User (see 8.1.2.3).

```
PrivilegeAttributeCertificate ::= EXTERNAL
```

Each specific DPA realization may determine which CAP attributes it is intended to support according to some defined matching algorithms.

7 Abstract-association information

This clause specifies the information that must be defined or supplied to effect the BIND operation.

7.1 Abstract-bind-operation

An abstract-bind-operation opens the DP-Server ports. The initiator is the DP-User or DP-Administrator, while the responder is the DP-Server.

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```
DpBind::= ABSTRACT-BIND
  TO { dp-user[S], dp-administration[S] }
  BIND
    ARGUMENT      DpBindArgument
    RESULT        DpBindResult
    BIND-ERROR    DpBindError
```

The abstract-bind parameters needed by the DP-Server Port are defined and described in the present subclause.

7.1.1 Bind-argument Parameters

The **dp-bind-argument** parameter identifies or authenticates the DP-User or DP-Administrator. It also accepts a set of restrictions for entries to be returned as the result of an abstract-operation.

The definition is:

```
DpBindArgument ::=   SEQUENCE {
      credentials             [0] Credentials,
      retrieve-restrictions   [1] Restrictions OPTIONAL, --default is none--
      bind-security           [2] BindSecurity OPTIONAL }
```

The components are defined as follows:

credentials may be exchanged between the DP-User and the DP-Server. Whether the DP-User is representing a specific end user or not is of no concern to the DP-Server. The DP-Server's view of the accessing subject's identity and access privileges is obtained from the credentials passed (though this view may be modified for a particular operation). Credentials serve to identify a user, authenticate a user, or certify the identity of a user previously authenticated externally. In the latter case, access control privileges associated with the user can also be passed. The full syntax and semantics of credentials when used for authentication purposes are outside the scope of ISO/IEC 10175 (since these matters are common to all bind operations). Use of certified security attributes is described in outline below. Semantic details are however not defined since this is dependent on the actual security policy formulated and implemented by the organisation operating the DP-Server.

The authentication of the user may have taken place external to the DP-Server; the resulting access control attributes will then be passed in the abstract-bind process to allow the DP-Server to make subsequent access control decisions. This is the function of the PAC construct. Either the DP-User or the DP-Server may abort the abstract-bind process if the authentication parameters do not justify successful completion of the abstract-bind operation.

```
Credentials ::= CHOICE {
      simple          [0] Creds,  -- used for initial authentication --
      certified       [1] PrivilegeAttributeCertificate  }
       -- used when initial authentication has already taken place external to
       -- the DP-Server --
```

A **Creds** contains a password associated with the DP-User.

```
Creds ::= SEQUENCE {
      name            [0] DistinguishedNameString,
      password        [1] OCTET STRING  }
```

A **PrivilegeAttributeCertificate** contains attributes associated with the DP-User, for example the user's name or security clearance. These can be used in making access control decisions (see subclause 6.6.2).

retrieve-restrictions contains the restrictions on objects to be returned as a result of an abstract-operation. The restrictions remain in effect until an abstract-unbind-operation is issued.

In the absence of this argument, the default is that no restrictions need to be performed.

This argument consists of the following components:

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```
Restrictions ::= SET {
    maximum-result-length  [1] ResultLength OPTIONAL  }
                               -- default is no restriction

ResultLength  ::=     INTEGER (1..ub-integer)
```

maximum-result-length: The maximum-result-length that the DP-User is prepared to accept as result of a list-object-attributes abstract-operation. Any result with a result-length exceeding the one specified will not be returned, but will result in a **resource-limit-exceeded** ServiceError unless the abstract-operation has explicitly overridden the restriction.

In the absence of this component, the default is that **no read-restrictions on result-length** need to be performed.

bind-security specifies OSI security services required in the bind, such as, for example, peer entity authentication of the software entities involved, or confidentiality, or integrity protection.

```
BindSecurity ::= EXTERNAL
```

7.1.2 Bind-result parameters

The **dp-bind-result** parameter returns any authentication-attributes needed.

The definition is:

```
DpBindResult ::= SET {
      authentication-attributes [0] SET OF AuthenticationAttribute }

AuthenticationAttribute ::=  EXTERNAL
```

authentication-attributes carries information returned as confirmation of an authentication check, which is not constrained by ISO/IEC 10175.

7.1.3 Bind-error parameters

The DP-Server may report:

- a **SecurityError** which indicates that the identity of the DP-User cannot be established on the basis of the information the DP-User supplied,
- a **ServiceError** which indicates an error related to the provision of the service.

```
DpBindError ::= CHOICE {
      service-error     [0] ServiceProblem, -- see subclause 8.4.7 --
      security-error    [1] SecurityProblem -- see subclause 8.4.5 -- }
```

The same errors may occur in DP abstract-operations, and are described in subclause 8.4.

7.2 Abstract-unbind operation

An abstract-unbind operation closes the user and/or administration port(s). There are no arguments or errors associated with the abstract-unbind operation.

```
DpUnbind ::= ABSTRACT-UNBIND
      FROM { dp-user[S], dp-administration[S] }
```


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8 Abstract-operations

This clause defines the following abstract-operations:

a) Print
b) ModifyJob
c) CancelJob
d) ListObjectAttributes
e) PromoteJob
f) InterruptJob
g) PauseJob
h) ResumeJob

Certain print-servers may choose to permit some of these operations to be invoked only by users possessing the appropriate access privilege level, e.g., system administrators.

8.1 Common datatypes and values used in DPA abstract-operations

8.1.1 Imported datatypes

Some datatypes described in clause 6, as well as in this clause, are actually defined in other Standards. These imported datatypes are:

From the OSI Directory (ISO/IEC 9594-2):

DistinguishedName,
RelativeDistinguishedName.

From Management Information Model (ISO/IEC 10165-4)

AttributeId

From DOAM (ISO/IEC 10031-2):

DOR

From MOTIS (ISO/IEC 10021-4):

ORAddressAndOrDirectoryName

8.1.2 Datatypes common for most DPA abstract-operations

The **CommonArguments** data type is a set of attributes that the client may include on all abstract-operations. The server shall apply these attributes to the performance of the abstract-operation. The intent of **CommonArguments** is to allow clients to provide standard attributes and implementation-specific extension attributes to servers that control or modify the performance of abstract-operations. **CommonArguments** shall not be used for attributes of objects.

```
CommonArguments ::= SET OF Attribute
```

If the client specifies an attribute in **CommonArguments** that the server supports, the server shall perform the actions described in that attribute's definition. If the client specifies an attribute that the server does not support or cannot identify, the server shall ignore that attribute.

8.1.2.1 Priority

The client may specify the Priority parameter for any DPA abstract-operation. It is useful in the context of a heavily loaded server to allow better access to some privileged requests, according to a locally applied priority policy.

```
Priority ::= INTEGER (1..100)
```


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```
prioritySyntax ATTRIBUTE-SYNTAX
        Priority
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-priority

priority ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX prioritySyntax
        SINGLE VALUE
        ::= id-att-priority
```

The concept of operational priority is not necessarily related to any communication priority. Client and server may, but need not, allow specification of this parameter to influence the quality of service of the underlying communication layers.

The server may grant the abstract-operation with the priority requested, but need not. The assignment of and association of any particular priority interpretation with any numeric value is site specific. The values defined in this subclause are intended to be advisory. This priority concept should not be confused with **job-priority** (clause 9.2.4.6), though they use the same data type.

8.1.2.2 Privileges

This attribute defines access certificates to be associated directly with an abstract-operation request replacing or supplementing those available from the abstract-bind within which the request is being made.

```
Privileges ::= SEQUENCE {
        operation-pac [0] PrivilegeAttributeCertificate OPTIONAL,
                          -- see clause 6.6.2
        proxy-pac     [1] PrivilegeAttributeCertificate OPTIONAL }

privilegesSyntax ATTRIBUTE-SYNTAX
        Privileges
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-privileges

privileges ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX privilegesSyntax
        SINGLE VALUE
        ::= id-att-privileges
```

The server may require an **operation-pac** for either of two reasons:

a) When the access privileges established by the user during the bind are not sufficient to permit the requested operation,

b) when the bind is being multiplexed between a number of users, and each abstract-operation is potentially under the control of a different user, who must present his own access privileges.

The **proxy-pac** may be required because the DP-Server shall make further access to another application on behalf of the DP-User, and itself would have insufficient access rights unless supplemented by those in the **proxy-pac.** The DP-Server that receives the **proxy-pac** itself then uses this as an **operation-pac** to the other application.

For additional information, refer to subclause 6.6 and to ISO/IEC 10166-1 (Document Filing and Retrieval, part 1) subclause 8.1.3.5.

8.1.2.3 Operation-locale

The operation-locale operation attribute shall identify the locale that the server shall use when processing human readable text as part of an abstract-operation.

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```
Locale ::= SEQUENCE {
        language        [0] OCTET STRING ( SIZE (2) ),
        country         [1] OCTET STRING ( SIZE (2) ),
        character-set   [2] OBJECT IDENTIFIER,
        modifier        [3] OCTET STRING ( SIZE (64) ) OPTIONAL }

localeSyntax  ATTRIBUTE-SYNTAX
        Locale
        MATCHES FOR EQUALITY
        ::= id-syn-locale

operation-locale  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        SINGLE VALUE
        ::= id-att-operation-locale
```

This locale specification shall control, at least, server-generated messages returned in the abstract-error data types, and server-returned character-coded attributes.

The **operation-locale** attribute shall not affect object names.

The locale specified by this attribute shall affect all localization-dependent characteristics, such as language, territory, date, time, money, etc. associated with this operation.

The language element contains the 2 character language abbreviation as defined in ISO 639:1988 - Codes For the Representation of Names of Languages.

The country element contains the 2 character country or territory abbreviation as defined in ISO 3166:1993 - Codes for the Representation of Names of Countries.

The **character-set** element is an object identifier specifying the coded character set. See the **default-character-set** document attribute for the list of standard values.

Since a server shall support at least the coded character set of ISO/IEC 646 IRV (ASCII), that the server shall accept and treat as equivalent the common code points 32-126 (decimal), inclusive, in the data types: **VisibleString**, **T61String**, **Latin1String**, and **UCS2Level2String** that the client might send. See 9.1.5.

If the server supports the ISO 8859-1 coded character set (ISO Latin-1), the server shall accept and treat as equivalent the common code points 32-126 (decimal) AND 160-255 (decimal), inclusive, in the data types **ISOLatin1String** and **UCS2Level2String** that the client might send. See 9.1.5.

If the client specifies the **operation-locale** attribute, the server shall convert any character-coded attributes to the coded character set specified by the client in the **operation-locale**, when returning character-coded attributes to the client, if the server supports the specified coded character set. See 9.1.5. If the value specified for this attribute is not supported by the server, or the client does not supply this attribute, the server shall use the locale specified in the server's **locale** attribute.

If the client omits the **operation-locale** attribute, then the client shall be able to accept any of the 4 standard character sets and the client shall accept and treat as equivalent the common code points 32-126, inclusive, in the data types received from the server: **VisibleString**, **T61String**, **Latin1String**, and **UCS2Level2String**.

In addition, if the client omits the **operation-locale** attribute and the client supports the ISO 8859-1 coded character set (ISO Latin-1), then the client shall accept and treat as equivalent the common code points 32-126 (decimal) AND 160-255 (decimal), inclusive in the data types **ISOLatin1String** and **UCS2Level2String** that the server might return.

The **modifier** element is reserved for future use and is not used in this version of the protocol.

This attribute shall not directly affect any object, attribute, or attribute value that the client specified as part of the operation argument; other specific mechanisms for determining locale are provided for those areas. The server shall

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use the value of this attribute as a default locale for these other locale mechanisms, for example, the locale element of **EventHandlingProfile**.

8.1.2.4 Default-delivery-addresses

This attribute provides default delivery addresses for various delivery-methods that might be required for the operation for notification and logging.

```
DeliveryAddressForMethod::= SEQUENCE {
        delivery-method         [0] OBJECT IDENTIFIER,
        delivery-address        [1] DeliveryAddress }

deliveryAddressForMethodSyntax  ATTRIBUTE-SYNTAX
        DeliveryAddressForMethod
        MATCHES FOR EQUALITY
        ::= id-syn-delivery-address-for-method

default-delivery-addresses ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deliveryAddressForMethodSyntax
        MULTI VALUE
        ::= id-att-default-delivery-addresses
```

By itself, this attribute does not indicate whether notification and/or logging is to be performed.

The client may submit a default delivery-address for each of several delivery-methods to be used by the server after the server has performed the usual defaulting for the job's **notification-profile** and **logging-profile** attributes, as follows:

a) As with any defaulting, if the client does not explicitly supply a **notification-profile** or **logging-profile** job attribute, the server supplies the values of the **notification-profile** and **logging-profile** attribute from:

   1) the initial-value-job object, specified by the client in the job's **initial-value-job** attribute, if any;

   2) else from the printer-initial-value-job object specified by the printer's **printer-initial-value-job** attribute.

b) If the server determines that any of the values of the job's **notification-profile** and/or **logging-profile** attribute do not contain delivery-addresses, the server shall fill in the delivery address supplied by this attribute for the corresponding delivery-methods, if any.

c) If there are still values of the job's **notification-profile** and/or **logging-profile** attribute that do not have delivery-addresses, the server shall ignore those values and the server shall perform no notification or logging for those (partially specified) values.

8.1.3 Upper and lower bounds

This International Standard defines maximum and minimum values for certain integer types and for the lengths of certain string types. These upper bound values are employed in datatype definitions presented elsewhere in this International Standard.

ub-text-string	INTEGER ::= 4095
ub-descriptor-string	INTEGER ::= 4095
ub-message-string	INTEGER ::= 4095
ub-name-string	INTEGER ::= 255
ub-octet-string	INTEGER ::= 255
ub-integer	INTEGER ::= 2147483647 -- 2^{31}-1 --
ub-integer64	INTEGER ::= 9223372036854775807 -- 2^{63}-1
lb-integer	INTEGER ::= -2147483648 -- -2^{31}
lb-integer64	INTEGER ::= -9223372036854775808 -- -2^{63}

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8.2 DP-User Port Abstract-Operation Definitions

The following ASN.1 productions make use of datatypes described in sub-clauses of clause 6.4. Clause 11 describes the steps a print-server shall perform for each operation.

8.2.1 Print

The Print abstract-operation allows a user to submit a print-request to the print-server. A print-request contains the information needed by the print-server to print a particular document. A client may print multiple documents in a single print-job by making multiple Print invocations.

This abstract-operation is formally defined as follows:

```
Print ::= ABSTRACT-OPERATION
      ARGUMENT      PrintArgument
      RESULT        PrintResult
      ERRORS        { AttributeError,                    -- see clause 8.4 --
                      DocumentAccessError,
                      PrinterError,
                      SecurityError,
                      SelectionError,
                      ServiceError }
```

When the print-server accepts the initial **create-job** print request of a job, it establishes a print-job and responds with a print-job identifier unique within the server. Otherwise the server shall reject the print-request and report the reason.

This International Standard assumes that printers and other server components are reset or returned to appropriate states prior to processing each job. The **reset-printer** attribute permits the client to suspend the reset of the printer after particular documents, if desired for down-line loading of fonts, forms, PDL prologues, etc.

The parameters of a job and its associated documents completely (and independently) define the processing and printing of the job. The existence of other jobs and their parameters is expected to affect only job scheduling.

For a single document print-job or the first document of a multiple document print-job, the first invocation of the Print abstract-operation shall be a **create-job** operation and shall allow a client to pass all job attributes and the first document's attributes. The client shall omit the **job-identifier** attribute from the job attributes provided on the first request. The server processing the Print abstract-operation shall return the **job-identifier** attribute as a result of the first request.

For a multiple document print-job, each additional document requires an additional invocation of the Print abstract-operation. The client shall specify an **add-document** operation in the PrintArgument for each additional document. The client shall provide the value of the **job-identifier** attribute (returned by the server on the first invocation) and the attributes for each additional document. Document attributes are not inherited from previously submitted documents.

Resources such as fonts and electronic overlays may be transferred to a print-server in the form of non-printable, or resource, documents (for those servers that support this capability). These documents are created the same as printable documents; i.e., each resource document must be created by means of a Print abstract-operation, and each is assigned a document-number in accordance with its position in the job-document stream. Document attributes in the corresponding Print argument that are not applicable to resource documents shall cause the server to fail the entire Print abstract-operation and report an **inconsistent-with-other-attributes** AttributeError, unless they are listed in the **non-compulsory-attributes** attribute in which case the server shall ignore them.

The server may schedule print-jobs for printing before all documents of the job have been received (see 9.2.4.11, **job-scheduling**). It is implementation-dependent whether scheduling will actually occur before receipt of all documents; however, note that in order to properly schedule a job for printing, a server may need to collect all documents of a job in order to determine the job's resource and functional requirements.

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A conforming server that supports multiple document print-jobs either 1) shall always accept all Print abstract-operations invoked to create that job before the start of printing or 2) shall support the **after-complete** value of the **job-scheduling** attribute (see 9.2.4.11). If the server does not have sufficient resources in such cases (e.g. storage for all the documents,) the server shall report a **resource-limit-exceeded** ServiceError.

Error handling with respect to print-jobs depends upon where errors occur in the job processing cycle and upon the settings of certain attributes and parameters.

Errors found during the submission of the sequence of Print abstract-operations that compose a job are handled by the client and are not affected by the settings of job attributes. The client may choose to implement any error handling policy it wishes (e.g. all or nothing, until first error, do maximum) by the way it chooses to either abort (using the CancelJob abstract-operation) or continue submitting requests after an error is encountered.

The job attributes job-abort-criteria and document-abort-criteria apply to the errors, warning conditions, etc. that occur after the submission of the job and/or document; that is, they apply to those *events* that are not detected until after the server returns to the client.

When errors occur during the processing of print-jobs, the following conditions apply:

a) If an error occurs in the first (or only) Print abstract-operation submitted for the job, before the server returns to the client, the server shall not establish a job and shall not assign a job-identifier (i.e., the Print abstract-operation must return an Error, not a PrintResult).

b) If an error occurs after the job is established but before the final Print abstract-operation in the set has been accepted, e.g., in the Print abstract-operation that submits document number N, the server shall reject the request for document number N and shall behave as if that Print abstract-operation had not occurred. Hence, 0 copies of document N are printed (since the operation was rejected and the job shall contain N-1 documents at that point). The server shall reuse the number N for the next successful **add-document** Print abstract-operation for the job, if any.

A conforming server shall treat each subsequent **add-document** Print abstract-operation of a multiple document print-job as an atomic operation. The success or failure of these **add-document** operations do not affect the overall status of the job. The client shall cancel the job or continue submitting requests according to its own error handling policy.

A conforming server shall implement a time-out mechanism to handle cases where a print-job has been created, but a **job-submission-complete** value of TRUE or a **close-job** Print abstract-operation has not been received. Upon reaching an implementation defined time-out period, the server shall print the incomplete job as if a **close-job** Print abstract-operation had just been received.

A conforming server shall reject the Print abstract-operation and report a **no-modifications-allowed** UpdateError if either an **add-document** or **close-job** Print abstract-operation is received on a job that is complete (i.e. has previously received a **job-submission-complete** element with a value of TRUE or a **close-job** Print abstract-operation).

8.2.1.1 Print-argument

The argument of this abstract-operation is formally defined in the following productions. If any attribute occurs more than once in the **job-attributes**, **first-document**, or **new-document** elements of the PrintArgument, a conforming server shall use the later occurrence and report a **duplicate-attribute-ignored** warning. Duplicate values supplied in the value of a multi-valued attribute shall not generate an error or warning.

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```
PrintArgument ::= CHOICE {
        create-job    [0] SEQUENCE {
              printer-name                [0] SimpleName,
              job-submission-complete     [1] BOOLEAN DEFAULT TRUE,
              job-attributes              [2] SET OF Attribute OPTIONAL,
                                        -- may include any job attribute, except
                                        -- id-att-job-identifier,
                                        -- id-att-printer-name-requested, and
                                        -- any job-status attribute
              first-document              [3] DocumentDescription OPTIONAL,
              common-arguments            [4] CommonArguments OPTIONAL },
        add-document  [1] SEQUENCE {
              existing-job                [0] JobIdentifier,
              job-submission-complete     [1] BOOLEAN DEFAULT TRUE,
              new-document                [3] DocumentDescription,
              common-arguments            [4] CommonArguments OPTIONAL },
        close-job     [2] SEQUENCE {
              existing-job                [0] JobIdentifier,
              common-arguments            [4] CommonArguments OPTIONAL } }

DocumentDescription ::= SEQUENCE {
        transfer-method       [0] OBJECT IDENTIFIER
                                  DEFAULT id-val-transfer-method-with-request,
        document-content      [1] DocumentContent OPTIONAL,
        document-type         [2] OBJECT IDENTIFIER
                                  DEFAULT id-val-document-type-printable,
        document-attributes   [3] SET OF Attribute OPTIONAL
          -- Contains any document attributes valid for the document,
          -- except any document-status attributes.
          -- document-type = printable, font, or resource.
          -- If document-type is font, a font-identifier attribute is required
          -- in the document-attributes element.
          -- If document type is resource, a resource-name attribute
          -- is required in the document-attributes element.
    }
```

The client shall supply a non-empty **printer-name** element in the PrintArgument to identify the destination of the print-job. This element specifies the value for the **printer-name-requested** job attribute. The server shall replace any client supplied value (if any) for the **printer-name-requested** attribute with the value of the **printer-name** element. The server may, but need not, issue a warning that it has replaced this attribute value.

> NOTE - Some print-server implementations and/or system administration policies may not allow the printer-name element to contain the name of a physical printer. See 9.2.5.2 for the definition of an attribute that allows clients of such servers to specifically request a physical printer.

If the client does not supply the **transfer-method** element the default transfer-method is **with-request** and the client shall place the document data in the **document-content** element.

8.2.1.2 Print-result

The result of this abstract-operation is formally defined as follows:

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```
PrintResult ::= SEQUENCE {
        job-identification    [0] JobIdentifier,
                                -- value of id-att-job-identifier   [see 9.2.1.1]
        server-state          [1] OBJECT IDENTIFIER OPTIONAL,
                                -- value of id-att-server-state
        server-message        [2] Message OPTIONAL,
                                -- value of server's id-att-message
        document-status       [3] SET OF Attribute OPTIONAL,
                                -- may include id-att-document-state,
                                -- id-att-document-sequence-number,
                                -- id-att-file-reference, and
                                -- id-att-copies-completed.
                                -- See document-status attributes subclause.
        job-status            [4] SET OF Attribute
                                -- may include any job-status attributes
                                -- See job-status attributes subclause.
    }
```

In the case of multiple-document jobs, the returned job status information applies to the job as a whole, not to any individual part of the job.

8.2.1.3 Print Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server will report a particular abstract-error are defined in clause 8.4.

8.2.2 Modify-job

The ModifyJob abstract-operation is used to alter the values of specified job and document attributes after the print-job has been established by the print-server, i.e. after the initial Print abstract-operation. This operation may impact the scheduling of the job.

The effect of modifying a job shall be the same as if the job were originally submitted with the modified attributes whether the client had supplied values for those attributes in the original print-request or the server had supplied default values. However, for those attributes that a server supplied default values depending on the values of other attributes, the server shall not re-apply such defaults, since the server shall not distinguish between (1) values supplied originally by the client in the print-request and (2) values supplied by the server as default values as part of the print-request. In other words, once a job has been accepted by a server, the server shall not distinguish between attribute values that were supplied by the client and attribute values that were defaulted by the server.

This abstract-operation is formally defined as follows:

```
ModifyJob ::= ABSTRACT-OPERATION
        ARGUMENT      ModifyJobArgument
        RESULT        ModifyJobResult
        ERRORS        {  AccessError,              -- see clause 8.4 --
                         AttributeError,
                         DocumentAccessError,
                         PrinterError,
                         SecurityError,
                         SelectionError,
                         ServiceError,
                         UpdateError   }
```

The ability of a server to successfully modify a job attribute, and the resulting effect, depends upon the attribute involved and upon the presence of the attribute-type object identifier in the **job-non-compulsory-attributes** attribute

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or the document's **non-compulsory-attributes** attribute. If the server cannot perform the specified modification for any compulsory attribute (e.g., due to conflicting requirements, unavailability of a feature, or current status of the job or system), the server shall reject the ModifyJob abstract-operation.

In general, the server shall ignore or reject modifications to particular attributes in a manner consistent with the treatment they would have received had they been submitted in the Print abstract-operation argument(s). However, if it is necessary to reject a specified modification to any attribute (e.g., a compulsory attribute with an unsupported value is specified), then the server shall reject the entire ModifyJob abstract-operation and continue to process the print-job as accepted originally.

In particular, if an attempt is made to remove an attribute from the value of the **job-non-compulsory-attributes** or **non-compulsory-attributes**, the server shall reject the ModifyJob abstract-operation if such a value would have caused the original Print abstract-operation to be rejected. In this case, the server shall report an **invalid-non-compulsory-attribute-modification** AttributeError.

Not all parameters associated with a print-job may be modified. In particular access-and-accounting, job-security, job-status, and document-status attributes cannot be modified. See the beginning of each subclause in clause 9 for additional attributes that the server shall not permit to be modified. The server shall reject any ModifyJob abstract-operation that attempts to modify (1) the attributes that this International Standard specifies as non-modifiable or (2) for which the server does not support modification and shall report an illegal-modification AttributeError.

If the server rejects a modification because it does not support modification of an attribute or attributes, the server shall identify all such attributes in the AttributeError reported.

When the client modifies the **job-hold** attribute to a TRUE value:

a) if the state of the job is **preprocessing**, it shall remain in that state.

b) if the state of the job is **pending**, the server shall change the job to the **held** state (see 9.2.8.1) and add the **job-hold-set** value to the job's **job-state-reasons** attribute.

c) otherwise, the server shall reject the ModifyJob abstract-operation and return an **inappropriate-object-state** AccessError.

8.2.2.1 Modify-job-argument

The argument of this abstract-operation is formally defined as follows:

```
ModifyJobArgument ::= SEQUENCE {
      job-identification        [0] JobIdentifier,
      document-number           [1] PositiveInteger OPTIONAL,
                                -- required for addressing individual
                                -- documents in a multiple document print-job
      job-attr-modification     [2] SEQUENCE OF JobAttrModification,
      modify-message            [3] Message OPTIONAL,
                           -- sets value of id-att-job-message-from-administrator
      common-arguments          [4] CommonArguments OPTIONAL }

JobAttrModification ::= SEQUENCE {
      attribute-id       [0] AttributeId,
                          -- Any job attributes, except:
                          --   id-att-job-identifier,
                          --   id-att-job-owner, id-att-job-originator,
                          --   id-att-printer-name-requested,
                          --   id-att-initial-value-job,
                          --   any access-and-accounting attributes,
                          --   any job-security attributes, and
                          --   any job-status attributes.
```


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```
                        -- Any document attributes, except:
                        --   id-att-transfer-method, id-att-document-content,
                        --   id-att-initial-value-document, and
                        --   any document-status attributes
        attribute-values  [1] SET OF ANY -- DEFINED BY attribute-id -- OPTIONAL,
                              -- omitted for set-to-default
        modify-operator   [2] ModifyOperator DEFAULT replace }

ModifyOperator ::= ENUMERATED {
        replace           (0),
        add-values        (1),
        remove-values     (2),
        set-to-default    (3) }
```

If the client omits the optional **document-number** element, the client may specify both job and document attributes in the **job-attr-modification** element; the server shall apply any specified document attribute modifications to all documents in the print-job. If an error occurs, the server shall reject the abstract-operation and make no modifications.

If a client does supply a **document-number**, the server shall apply the specified document attribute modifications to that document only; if the client includes job attributes in job-attr-modification, the server shall return a **per-job-attribute-inadmissible** AttributeError.

Support for the ability to modify attributes for individual documents of a multiple document print-job is implementation-dependent. Servers not implementing this support shall return a **modify-document-unsupported** ServiceError if **document-number** is supplied, rather than modifying all the documents in the entire job.

The **JobAttrModification** type is structured to include the target attribute type and value specification; in addition, a **modify-operator** value is included to stipulate the exact effect that the supplied modification is to have on the existing attribute value.

If the client omits the values component of **JobAttrModification** and specifies a **modify-operator** value of **replace**, **remove-values**, or **add-values**, a server shall leave the value of the attribute unchanged.

No values need be supplied when the **modify-operator** is **set-to-default**; a server shall ignore any values supplied.

If the client lists a required attribute (i.e. an attribute element of the PrintArgument) in either the **job-non-compulsory-attributes** or **non-compulsory-attributes** attribute, the server shall completely ignore this particular value of the attribute.

If the client supplies a **modify-message** element as part of the request, the server shall set the value of the job's **job-message-from-administrator** attribute to the value of the **modify-message** element.

The **ModifyOperator** type defines the following values:

a) **replace** - the server replaces the existing values of the specified attribute with the supplied modification values;

b) **add-values** - the server adds the supplied modification values to the existing values of the specified attribute. If the request applies an **add-values JobAttrModification** to a single-valued attribute, the server shall report a **not-multi-valued** AttributeError. If a request supplies a **JobAttrModification** value for a multi-valued attribute that duplicates one (or more) existing values, the server shall add the value and report no warning;

c) **remove-values** - the server removes supplied modification values from the existing values of the specified attribute. If the request supplies a value that is not a member of the existing attribute values, the server shall ignore that value and report no warning or error; the server shall treat an attempt to remove the last (or only) value of an attribute as equivalent to **set-to-default**;

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d) **set-to-default** - the server replaces the existing values of the specified attribute with the default values obtained from either: (a) the initial-value-job (or initial-value-document) object specified in the job's **initial-value-job** (or **initial-value-document**) attribute, or (b) from implementation-defined default values.

8.2.2.2 Modify-job-result

The result of this abstract-operation is formally defined as follows:

```
ModifyJobResult ::= SEQUENCE {
      status          [0] SET OF Attribute OPTIONAL
                          -- any job-status or document-status attributes
    }
```

8.2.2.3 Modify-job Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server shall report a particular abstract-error are defined in clause 8.4.

8.2.3 Cancel-job

This abstract-operation allows a user to cancel one specific print-job request or one document of a multi-document job, any time after the print-job has been established, i.e. after the initial Print abstract-operation. Depending on when the print-service receives the cancel request, some pages may be printed before a job is successfully terminated.

A client may cancel individual documents of multi-document print-jobs, however:

a) the server shall not reuse the document sequence number, and

b) the server shall maintain the value of the job attribute **number-of-documents** as the total of all documents that were submitted and accepted, rather than just those that remain after any CancelJob abstract-operations.

This abstract-operation is formally defined as follows:

```
CancelJob     ::=  ABSTRACT-OPERATION
      ARGUMENT   CancelJobArgument
      RESULT     CancelJobResult
      ERRORS     { AccessError,
                   AttributeError
                   SecurityError,
                   SelectionError,
                   ServiceError,
                   UpdateError }
```

Normally only the user who initiated a print-job by means of a Print abstract-operation may cancel it. However, this is an implementation and site-specific decision, not mandated by this International Standard.

8.2.3.1 Cancel-job-argument

The argument of this abstract-operation is formally defined as follows:

```
CancelJobArgument ::= SEQUENCE {
      job-identification   [0] JobIdentifier,
      document-number      [1] PositiveInteger OPTIONAL,
                           -- required for addressing individual
                           -- documents in a multiple document print-job
      cancel-message       [2] Message OPTIONAL,
                           -- sets value of id-att-job-message-from-administrator
      retention-period     [3] DeltaTime OPTIONAL,
      common-arguments     [4] CommonArguments OPTIONAL }
```


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If the client attempts to cancel a job that is in the **completed** state (see 9.2.8.1), the server shall return the UpdateError **cancellation-not-possible**.

If the **retention-period** element is present, the server shall set the job's **job-retention-period** attribute (see 9.2.4.9) to the specified value; else the server shall not change the job's **job-retention-period** attribute. The server shall then perform the actions described in either 8.2.3.1.1 or 8.2.3.1.2, depending on whether the client specified the **document-number** parameter, or not, respectively.

8.2.3.1.1 Cancelling a specified document

If the client supplies a **document-number**, the server shall cancel the individual document specified by deleting the contained document object and its document data from the job immediately, independent of the value of the job's **job-retention-period** attribute.

If the client supplies a **document-number**, and the specified document is the only (or only remaining) document of the print-job, the server shall immediately delete the entire print-job as specified in 8.2.3.1.2, independent of the job's **job-retention-period** attribute, since the job no longer has any document data to be printed.

Support for the ability to accept requests to cancel individual documents of a print-job is implementation-dependent. When a **document-number** is supplied, servers that do not implement this support shall (1) reject the CancelJob abstract-operation (2) report a **cancel-document-unsupported** ServiceError, and (3) not affect the identified job.

8.2.3.1.2 Cancelling the entire print-job

If the client omits the optional **document-number** element, the server shall cancel the *entire* print-job as follows:

If the job's **job-retention-period** is not zero, the server shall place the job in the **retained** state (see 9.2.8.1) and set the job's **job-state-reasons** to **cancelled-by-user** or **cancelled-by-operator**, as appropriate (see 9.2.8.2).

If the job's **job-retention-period** (see 9.2.4.9) is 0 (or not implemented), the server shall delete the job, its contained document objects, and its document data; and place the job in the **completed** state (see 9.2.8.1). The server shall set the value of the job's **current-job-state** attribute to **id-val-job-state-completed** and shall set the job's **job-state-reasons** to **cancelled-by-user** or **cancelled-by-operator** as appropriate (see 9.2.8.2).

If the client supplies a **cancel-message** element as part of the request, the server shall set the value of the job's **job-message-from-administrator** attribute to the value of the **cancel-message** element.

8.2.3.2 Cancel-job-result

The result of this abstract-operation is formally defined as follows.

```
CancelJobResult ::= SEQUENCE {
      status              [0] SET OF Attribute OPTIONAL
                          -- any job-status or document-status attributes
    }
```

8.2.3.3 Cancel-job Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server will report a particular abstract-error are defined in clause 8.4.

8.2.4 List-object-attributes

This abstract-operation enables a user to obtain information from a print-server concerning jobs, printers, and other objects known to the server. By means of the specified selection criteria, this abstract-operation enables a client to request and obtain values for one or more attributes, associated with one or more DPA-Objects, belonging to some object class. The client is also able to obtain job objects in priority order.

This abstract-operation is formally defined as follows:

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```
ListObjectAttributes ::= ABSTRACT-OPERATION
      ARGUMENT        ListObjectAttributesArgument
      RESULT          ListObjectAttributesResult
      ERRORS          { AccessError,
                        AttributeError,
                        SecurityError,
                        SelectionError,
                        ServiceError }
```

8.2.4.1 List-object-attributes-argument

The argument of this abstract-operation is formally defined as follows:

```
ListObjectAttributesArgument ::= SEQUENCE {
      CHOICE {
        continuation    [0] SEQUENCE {
              context               [0] ContinuationContext,
              abort                 [1] BOOLEAN DEFAULT FALSE,
              common-arguments      [2] CommonArguments OPTIONAL },
        specification   [1] SEQUENCE {
              class                 [0] OBJECT IDENTIFIER, -- id-oc-xxx
              scope                 [1] Cardinal DEFAULT 0,
                                -- scope is contained objects in levels 0 through n
                                -- where 0 means the base object specified
                                -- by the object-identification
              selector              [2] Selector OPTIONAL,
              -- should not be omitted if class is id-oc-document
              requested-attributes  [3] SET OF AttributeId OPTIONAL,
              list-operator         [4] ListOperator DEFAULT get-attributes,
              common-arguments      [5] CommonArguments OPTIONAL } } }


ContinuationContext ::= OCTET STRING
                        -- implementation-specific information

Selector ::= SET {
      object-identification  [0] SEQUENCE OF ObjectIdentification OPTIONAL,
                             -- should not be omitted if class is id-oc-document
      object-filter          [1] Filter OPTIONAL,  -- see clause 6.4.5
      time-limit             [2] DeltaTime OPTIONAL,
      count-limit            [3] PositiveInteger OPTIONAL }

ObjectIdentification ::= CHOICE {
      job-identifier         [0] JobIdentifier,
      document-identifier    [1] DocumentIdentifier,
      object-identifier      [2] OBJECT IDENTIFIER,
      object-name            [3] DistinguishedNameString,
      font-reference         [4] FontReference,
      name-or-oid            [6] NameOrOid,
      simple-name            [7] SimpleName }

DocumentIdentifier ::= SEQUENCE {
      job-identifier         [0] JobIdentifier,
      document-number        [1] PositiveInteger OPTIONAL }
                                 -- document sequence number
```


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```
ListOperator ::= ENUMERATED {
    get-attributes              (0),
    get-ordered-jobs            (2) }
```

The ListObjectAttributesArgument is structured to enable a client to invoke a sequence of ListObjectAttributes abstract-operations in order to acquire a potentially large collection of data in the form of manageable subsets of the total. If the client supplies a **continuation** in ListObjectAttributesArgument for which the server has no further **ObjectResults** to return, the server shall return an empty **results-set** and shall omit the **continuation** element from the ListObjectAttributesResult. A conforming server may omit the **continuation** element from a ListObjectAttributeResult containing a non-empty **results-set** when it has no further **ObjectResults** to return.

For the first (or only) ListObjectAttributesArgument in a sequence, the client shall specify a **specification** of all the parameters for the desired query. Each ListObjectAttributesResult from the ListObjectAttributes abstract-operation indicates whether a limit has been reached and supplies a **continuation context** value.

The client may then supply the **continuation context** value in the **continuation** CHOICE of the next ListObjectAttributesArgument; this enables the server to resume the data collection from the point it had left off on the previous invocation. The client may supply a value for **abort** of TRUE to terminate the ListObjectAttributes operation in the server. Upon receiving an abort, the server shall return a ListObjectAttributesResult containing an empty **results-set**.

If a server receives an unrecognised **continuation context**, the server shall reject the request and report an **invalid-continuation-context** ServiceError.

Within the **specification** parameter, the client shall specify:

a) **class** - the object class to which the base objects of interest belong;

b) optionally, the **scope** of the query; that is, the number of the level of contained objects to be included in the query;

c) optionally, a **selector**, to indicate which members of the class are of interest;

d) optionally, the **requested-attributes** for which attributes are to be returned for each of the selected objects.

The **scope** element allows the client to identify the levels of contained objects to be included in the object query. Certain object classes contain other objects (e.g. job objects contain document objects). A client may specify a value of N for scope to indicate that the specified base object and all of its contained objects down to and including the Nth level are to be included in the query. For example, a scope value of 1 would indicate that the base object and its immediately contained objects are to be objects of the query.

In this part of ISO/IEC 10175, only the job object class contains objects (i.e., document objects, which are of class **id-oc-document**, but which may be of **document-type printable**, **font**, or **resource**), hence the maximum value ever needed for the **scope** element is 1, and this only when requesting the job object and its immediately contained objects.

If the **scope** element is 0 or omitted, the server shall consider the objects at level 0, i.e. the specified objects, but not any contained objects.

The **selector** provides a flexible means for the client to identify the target object, or objects, and place bounds on the search-time and volume of data to be returned. If the client omits the selector, or if the selector is present, but with no elements in the set, then the server shall select all objects of the class.

The **object-identification** element of the **selector**, if supplied, enables the client to provide an unambiguous identifier for the target object, or to supply a list of objects from which the server selects the target object(s) by means of additional **selector** parameters. The client shall specify a CHOICE alternative appropriate to the specified class. The **object-identification** encodes the value of the principal identification attribute of the specified class. If the **class** parameter is **id-oc-document**, the client shall specify an **object-identification** parameter containing a **document-identifier**. If the **document-number** element of the **document-identifier** is omitted, the server shall consider all documents of the specified job as the subject of the query.

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If the client omits the **object-identification**, the server shall select from among all objects of the designated class and object classes derived from the designated class, if any (see 6.3.17 and 8.2.4.4). A conforming server may require and shall return that component of **object-identification** with the data type of the principle identification attribute of the specified object class.

If the client supplies the **object-identification** element, but the sequence is empty, the server shall select no target objects, hence the returned **result-set** is also an empty sequence.

The **object-filter** parameter permits the client to make an ambiguous object specification, thus allowing the ListObjectAttributes abstract-operation to return attribute values for zero, one, or more objects of the specified class.

A client may specify both an **object-filter** and an **object-identification** parameter. This enables a client to identify one or more potential candidate objects for the ListObjectAttributes abstract-operation, then reduce the set of candidates by means of the **object-filter**. (For example, the **object-identification** may identify several printers as candidates for selection, and the **object-filter** may then narrow the range of the selection to those printers that possess certain specified features).

The **time-limit** element specifies the maximum time duration the client has allocated to the print-server for completion of the requested ListObjectAttributes abstract-operation. If the server has not completed listing all object attributes that satisfy the criteria, the print-server shall return the information that has been collected, and shall provide a **continuation context** value to enable the client to resume the data collection with a subsequent ListObjectAttributes abstract-operation.

If a client specifies a **time-limit** such that the server cannot assemble at least one complete **ObjectResult**, the server shall return an empty result-set, and shall set the **limit-encountered** element to **time-limit**. The server may return an **ObjectResult** on a subsequent invocation, or not, depending upon implementation.

The **count-limit** value indicates the maximum number of **ObjectResult**s for which the server shall return attributes on the abstract-operation invocation. If not all of the data have been returned that satisfy the specified criteria, the server shall return a **continuation context** to permit the client to resume data collection on a subsequent ListObjectAttributes abstract-operation invocation.

If the client omits either **time-limit** and/or **count-limit**, the server shall use an implementation-specific or site-specific default value. The server may implement server-specific values for maximum allowable time-limit and count-limit; if the client-supplied value exceeds the server maximum for either of these elements, the server maximum will take precedence.

The **requested-attributes** parameter includes the identifier of each of the attributes for which the server shall return values for the selected objects. If the client omits the **requested-attributes** element, the server shall return values for all valid attributes for all candidate objects, including any attributes defaulted by the server. However, if the client supplies the **requested-attributes** parameter with no attribute identifiers included in the set, the server shall not return any attribute values. If the server does not recognize or implement one or more of the **requested-attributes** for an object, the server shall ignore each such requested attribute and shall return only requested attributes for an object that are defined and implemented for that object.

NOTE - for a job in the **completed** state, only minimal job-status information may be available (see 9.2.8.1).

The value of the **list-operator** parameter specifies what form and class of information the server shall return for the **requested-attributes**:

a) **get-attributes:** the server shall return a SEQUENCE OF Attribute for each of the selected objects; i.e., for each of the objects that meet the specified selection criteria, the server shall return its identification, followed by the type and value setting of each of the requested attributes that are available for the selected object.

b) **get-ordered-jobs:** the server shall return a SEQUENCE of **ObjectResult** representing the jobs in the order that the server currently expects the jobs to start (or to have started) printing on the physical printer (1) specified by or (2) associated with the printer specified by the object-identification parameter. If the jobs

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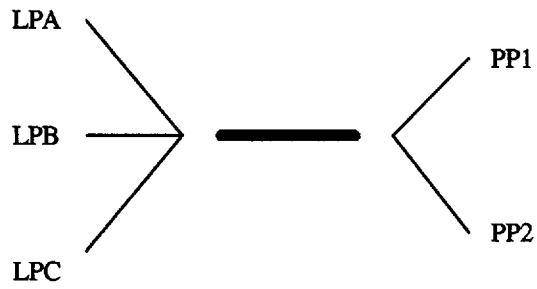
may be printed on multiple physical printers, and if those printers specify different scheduling algorithms, then the algorithm used to order the jobs is implementation-dependent. The server shall return each job's **object-identification** and the type and value settings for each of the requested attributes that are defined and implemented for the job object class; document attributes are included if they have been identified in the **requested-attributes** element.

The client shall (1) specify the **class** parameter to be **id-oc-printer** (or a class derived from **id-oc-printer**) and (2) the **object-identification** parameter to be a printer-name where printer-name may be either a logical printer or a physical printer.

If the client specifies a logical printer, the server shall return all jobs that will or have printed on any of the physical printers associated with the specified logical printer, no matter what logical or physical printer-name was specified by clients as the value of the **printer-name-requested** parameter when the jobs were submitted.

If the client specifies a physical printer, the server shall return all jobs that were submitted with a printer-name-requested parameter equal to (1) the specified physical printer or (2) any of the logical printers associated with the specified physical printer. When the client specifies a physical printer, the server may omit jobs that the scheduler would not assign to the specified physical printer because of attribute mismatch, though that might require excessive computation.

The following example illustrates all combinations of a client specifying a logical and physical printer. Assume a server 1) whose scheduling algorithm is FIFO, 2) that assigns job numbers in ascending order as they are received, and 3) has received jobs 1 to 5:



Job	printer-name-requested
1	LPA
2	LPB
3	LPC
4	PP1
5	PP2

The server shall return the following jobs for different List Object Attributes object-identifications specified by the client:

LOA object-identification	returned jobs
LPA	1, 2, 3, 4, 5
LPB	1, 2, 3, 4, 5
LPC	1, 2, 3, 4, 5
PP1	1, 2, 3, 4
PP2	1, 2, 3, 5

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The client may specify LPA, LPB, or LPC in the ListObjectAttributes and get the same results, no matter to which of the 3 LPs that the client specified as the value of the job's printer-name-requested. When the client specifies PP1 or PP2, the server shall return only the subset of the jobs that are bound to the specified PP or could be, i.e., for which the job's printer-name-requested attribute is equal to the specified physical-printer or one of the logical printer's associated with the specified physical-printer.

When the client specifies a physical printer, the server may, as an implementor option, omit returning jobs that cannot print on the specified physical printer. For example, if job 1 couldn't print on PP1, because job 1 required a medium that PP1 didn't support and job 2 required a medium that was supported by PP1, but was not ready on PP1, the server could return the following instead, depending on implementation:

LOA object-identification	returned jobs
LPA	1, 2, 3, 4, 5
LPB	1, 2, 3, 4, 5
LPC	1, 2, 3, 4, 5
PP1	2, 3, 4
PP2	1, 2, 3, 5

or:

LOA object-identification	returned jobs
LPA	1, 2, 3, 4, 5
LPB	1, 2, 3, 4, 5
LPC	1, 2, 3, 4, 5
PP1	3, 4
PP2	1, 2, 3, 5

The server shall return jobs in all job states, including **retained** and **completed**, and shall return no job more than once. The order for returning jobs in the **pending**, **processing**, or **terminating** states shall depend on the scheduling algorithm implemented. The order of returning jobs in other states is implementation-dependent. However, the server shall return jobs in the **retained** and **completed** states after those in any other state.

NOTE - As with any ListObjectAttributes request, a client may request a server to include or filter out jobs with specified attribute values. For example, a client may request the server to not return jobs that are in the **retained** or **completed** states, by specifying a filter of the form:

```
NOT (current-job-state=id-oc-job-state-retained OR
     current-job-state=id-oc-job-state-completed)
```

If the client specifies a **scope** parameter, the server shall interpret its value relative to the job class being returned (not the printer object being specified), so that a **scope** value of 1 would include the first level of contained documents in the job.

All other input parameters have their normal effect.

If the client omits the **object-identification** parameter, the server shall return jobs in order for each of the printers that the server supports. The server shall return all the jobs that (1) are competing for or (2) have competed for a printer, before stepping on to the next printer. When requesting all printers, a client should request an attribute that will help the client distinguish between jobs for different printers, such as **printer-name-requested**.

A conforming server shall implement a time-out mechanism to handle cases where a continuation context has been created (and continuation information possibly stored), but all remaining **ObjectResult**s have not been retrieved. Upon reaching an implementation defined time-out period, the server shall dispose of any stored context information

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and treat the appropriate continuation-context specifications as invalid continuation contexts and return the appropriate error.

8.2.4.2 List-object-attributes-result

The result of this abstract-operation is formally defined as follows:

```
ListObjectAttributesResult ::= SEQUENCE {
      answer-time        [1] GeneralizedTime,
      continuation       [2] ContinuationContext OPTIONAL,
      limit-encountered  [3] LimitEncountered OPTIONAL,
      result-set         [4] SEQUENCE OF ObjectResult }

LimitEncountered   ::= ENUMERATED {
      time-limit         (0),
      count-limit        (1),
      error-limit        (2) }

ObjectResult ::= SEQUENCE {
        object-identification      [0] ObjectIdentification,
        attributes                 [1] SET OF Attribute
        object-class               [2] OBJECT IDENTIFIER }, -- id-oc-xxx
```

The **answer-time** element specifies the time at which the server shall complete assembly of the information and return a response to this invocation.

Where the server has not returned all **ObjectResults** that satisfy the specification, due to a time-limit or count-limit, or encountering an error, the **ListObjectAttributesResult** shall include a **limit-encountered** component with the appropriate value. The server should always include a **continuation** context, even when an error occurs.

The server shall return the containing object first, followed by all contained objects. This order applies recursively to all levels of contained objects. The order in which the server shall return document (contained) objects is in the order in which they were created (which corresponds to the increasing **document-sequence-number**). The order in which the server shall return any other contained objects is implementation defined.

The **object-class** element in the **ObjectResult** specifies the object class (id-oc-xxx) of the object being returned, not the **class** specified as an input parameter. When the **scope** parameter is greater than 0, the value of the returned **object-class** shall be the object class of the returned object, which will be different from the **class** value specified as an input parameter when a contained object is returned.

The following table shows all possible legal combinations of parameters and the resulting candidate objects of the query:

object-class	scope	object-identification	candidates/returns
`id-oc-job`	`0`	`job-identifier`	just job object (no document objects)
`id-oc-job`	`1`	`job-identifier`	job object and all its contained documents, (**id-oc-document**, but **document-type** may be: **printable**, **font**, or **resource**).
`id-oc-document`	`0`	`document-identifier: {job M, document N}`	just document object N of job M (no job object) (**id-oc-document**, but **document-type** may be: **printable**, **font**, or **resource**).

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id-oc-document	0	**document-identifier: {job M, no document-number}**	all document objects of job M, (no job object) (**id-oc-document**, but **document-type** may be: **printable**, **font**, or **resource**).

When the **scope** parameter is greater than 0, the server shall consider each contained object together with its parent object(s) as if they were a single "concatenated" object instance. A concatenated object starts with the specified base object instance and extends down to the leaf node at the level specified by the value of the **scope** parameter. However, the server shall return only one copy of each parent object instance.

For example, consider print-job 105 containing two printable documents. Given the following input:

input parameters	input parameter value
class	**id-oc-job**
scope	**1**
object-identification	**105**
object-filter	***not specified***
requested-attributes	**job-name, document-description**

the server shall return the following objects:

ObjectResult	output parameters	output parameter value
1:	**object-identification**	**job-identifier=105**
	attributes	**job-name="Monthly reports"**
	object-class	**id-oc-job**
2:	**object-identification**	**document-identifier={105, 1}**
	attributes	**document-description="January report"**
	object-class	**id-oc-document**
3:	**object-identification**	**document-identifier={105, 2}**
	attributes	**document-description="February report"**
	object-class	**id-oc-document**

so that the job object is returned only once, not once for each document object.

When the **scope** parameter is greater than 0, the server shall apply the filter, if any, to each concatenated object instance. Each **FilterItem** in the filter shall apply to the object within the concatenated object in which the **FilterItem**'s attribute is defined and present. If an attribute is defined in more than one object of the concatenated object, then the **FilterItem** containing the attribute shall be interpreted as if it were applied to each object containing the attribute and the result ORed together in order to determine whether the filter has selected the concatenated object or not. If an attribute is not defined or is not present in any of the objects in the concatenated object, that **FilterItem** shall evaluate to FALSE for that concatenated object.

For example, consider a request to return the **job-name** job attribute value and the **document-description** document-attribute values for all the jobs belonging to user Smith:

input parameters	input parameter value
object-class	**id-oc-job**
scope	**1**
object-identification	**omitted (so get all job objects)**
object-filter	**user-name=Smith**
requested-attributes	**job-name, document-description, document-type**

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Because the **scope** is 1, the server visits each document and applies the predicate to the "concatenated object" consisting of the document and its parent job. Because the filter contains a single attribute that is a job attribute, the filter is applied to each parent job in the "concatenated object". The filter succeeds for each document belonging to a job whose user-name is equal to Smith. The server shall return each job object (with the requested job-name attribute) only once, just before returning the first document contained in the job. The server shall return each document object (with the requested document-description and document-type attributes) in the job (since the filter in the example doesn't eliminate any of the candidate document objects) in order.

The returned objects for a three-document job containing two documents of **document-type printable** and one of **document-type font** would be:

ObjectResult	output parameters	output parameter value
1:	object-identification	job-identifier=273
	attributes	job-name="Monthly reports"
	object-class	id-oc-job
2:	object-identification	document-identifier=273.1
	attributes	document-description="March report", document-type=id-val-document-type-printable
	object-class	id-oc-document
3:	object-identification	document-identifier=273.2
	attributes	document-description="April report" document-type=id-val-document-type-printable
	object-class	id-oc-document
4:	object-identification	document-identifier=273.3
	attributes	document-description="Font for Monthly report", document-type=id-val-document-type-font
	object-class	id-oc-document

If only the **document-description** for printable documents was desired, the filter expression would have been:

input parameters	input parameter value
object-class	id-oc-job
scope	1
object-identification	*omitted (so get all objects)*
object-filter	user-name=Smith AND document-type=printable
requested-attributes	job-name, document-description

Because the **scope** is 1, the server visits each document and applies the predicate to the "concatenated object" consisting of the document and its parent job. Because the user-name attribute is a job attribute and document-type is a document attribute, the **FilterItem** containing a reference to **user-name** is applied to the parent job in the "concatenated object" and the **FilterItem** containing a reference to the **document-type** is applied to the document in the concatenated object. Because the **FilterItems** are ANDed in the example, the filter succeeds if both **FilterItems** are true. The server shall return each job object (with the requested job-name attribute) at most once and only if a containing document matches. The server shall return the job object just before the first child document. The server shall return each document object (with the requested **document-description** attribute) that the filter allows in order.

If the server is returning an (implementor-defined) derived class (see 6.3.17 and 8.2.4.4), the server shall return the object identifier for the derived class as the value of the **object-class** element, no matter whether the input **class**

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parameter had been the ISO/IEC 10175 base class object identifier or the (implementor-defined) derived class object identifier.

The correspondence between attributes of a print-job and the associated printer and server attributes is defined in Annex G.

The other parameters and sub-parameters are defined in previous clauses.

8.2.4.3 List-object-attributes Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server will report a particular abstract-error are defined in clause 8.4.

8.2.4.4 Listing Objects of Derived Classes

This sub-clause illustrates the requirements for listing objects defined by implementors using the object-oriented design approach of implementor classes that are derived from other classes (see 6.3.15) using a comprehensive example.

For example, the ISO DPA **printer** class is a generic base class. However, an implementor might choose to add attributes that are relevant to PCL printers and other attributes that are relevant to PostScript(TM) printers and define two new object classes that are derived from the ISO DPA base printer object class. If the implementor defines new object classes, the implementor shall assign an implementor-defined OID for each such derived class, say, **id-oc-printer-ps** and **id-oc-printer-pcl**.

> NOTE - An implementor is not required to use class inheritance (and define a new id-oc-xxx OID), when adding attributes to an ISO DPA object class. An implementor may continue to use the ISO DPA base class and ISO DPA id-oc-xxx OID and add implementor-defined attributes to the base class. The advantage of deriving classes, comes when the implementor adds several different sets of attributes for different kinds of specialization, such as for PostScript and PCL printers. Then the additional attributes that belong only to the PostScript printers are not mixed up with the PCL printers, and vice versa. Such class inheritance reduces the number of attributes for a (derived) object class that are irrelevant to the particular object.

Further, the implementor may define additional derived classes that inherit their specification from a derived class, such as a PostScript Level 1 and a PostScript Level 2 printer class. Again the implementor shall assign additional implementor-defined OIDs for such classes, say, **id-oc-printer-ps-level1** and **id-oc-printer-ps-level2**.

> NOTE - the OID names do not need to reflect the inheritance chain, but reflecting the inheritance chain in the OID name may help implementors and users.

Consider the following example of derived object class definitions:

The ISO DPA base class **printer** (**id-oc-printer**) has the following attribute:

```
printer-name
```

The derived class **printer-ps** (**id-oc-printer-ps**) has all the attributes of the ISO DPA (base) **printer** class, plus the additional attributes:

```
ps-features-supported

ppd-file-specification
```

and the derived class **printer-pcl** (**id-oc-printer-pcl**) has all the attributes of the ISO DPA (base) **printer** class, plus has the additional attributes:

```
pcl-features-supported    pjl-defaults
```

Further, suppose that the derived class **printer-ps-level1** (**id-oc-printer-ps-level1**) has all the attributes of the Postscript printer class (**id-oc-printer-ps**), plus the additional attribute:

```
level-1-defaults
```


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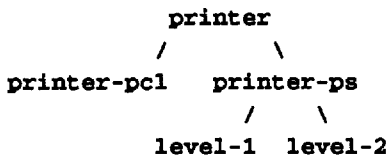
and the derived class **printer-ps-level2** (**id-oc-printer-ps-level2**) has all the attributes of the Postscript printer class (**id-oc-printer**), plus the additional attribute:

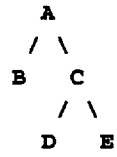
```
level-2-device-string
```

For this example, we have the following class inheritance diagram:



NOTE - Clients will operate correctly, without being aware of the derived classes of object instances. In the above example, a client (and its users) have access to all objects and attributes even when only specifying the id-oc-printer object class in any ListObjectAttributes operation.

Suppose that printers A, B, C, D, E are ISO DPA (base), PCL, PostScript, PostScript level 1 and PostScript level 2 printer objects, respectively, giving the following object instance picture showing the same class inheritance:



8.2.4.4.1 Listing specified object instances

When a ListObjectAttributes request is submitted for all attributes (requested-attributes element is omitted) for the indicated object class and object instance, the server shall return the following results:

input class	input instance	output class	returned attributes
printer	A	printer	printer-name
printer-pcl	A	server shall return: `unknown-identification` error	
printer-ps	A	server shall return: `unknown-identification` error	
printer-ps-level1	A	server shall return: `unknown-identification` error	
printer-ps-level2	A	server shall return: `unknown-identification` error	
printer	B	printer-pcl	printer-name, pcl-features-supported, pjl-defaults
printer-pcl	B	printer-pcl	printer-name, pcl-features-supported, pjl-defaults
printer-ps	B	server shall return: `unknown-identification` error	
printer-ps-level1	B	server shall return: `unknown-identification` error	
printer-ps-level2	B	server shall return: `unknown-identification` error	
printer	C	printer-ps	printer-name, ps-features-supported, ppd-file-specification
printer-pcl	C	server shall return: `unknown-identification` error	
printer-ps	C	printer-ps-level1	printer-name, ps-features-supported, ppd-file-specification
printer-ps-level1	C	server shall return: `unknown-identification` error	
printer-ps-level2	C	server shall return: `unknown-identification` error	

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printer	D	printer-ps-level1	printer-name, ps-features-supported, ppd-file-specification, level-1-defaults
printer-pcl	D	server shall return: `unknown-identification` error	
printer-ps	D	printer-ps-level1	printer-name, ps-features-supported, ppd-file-specification, level-1-defaults
printer-ps-level1	D	printer-ps-level1	printer-name, ps-features-supported, ppd-file-specification, level-1-defaults
printer-ps-level2	D	server shall return: `unknown-identification` error	
printer	E	*same results as printer* D	

If the client specifies **ps-features-supported** in the **requested-attributes** parameter, for either printer A or printer B, the server shall not return the **ps-features-supported** attribute, since the **ps-features-supported** attribute is not defined for the A and B objects. Similarly, if the client specifies **pjl-defaults** in the **requested-attributes** parameter, for printer A or printers C, D, or E, the server shall not return the **pjl-defaults** attribute.

8.2.4.4.2 Listing all objects of a specified object class

When the client submits a ListObjectAttributes request for all attributes (**requested-attributes** element is omitted) for the indicated object class, but specifies no object instance, meaning that the server is to return all objects of the specified object class and all attributes of each returned object, the server shall return the following results:

input class	returned instances	output class	returned attributes
`printer`	`A`	`printer`	`printer-name`
	`B`	`printer-pcl`	`printer-name, pcl-features-supported, pjl-defaults`
	`C`	`printer-ps`	`printer-name, ps-features-supported, ppd-file-specification`
	`D`	`printer-ps-level1`	`printer-name, ps-features-supported, ppd-file-specification, level-1-defaults`
	`E`	`printer-ps-level2`	`printer-name, ps-features-supported, ppd-file-specification, level-2-device-string`
`printer-pcl`	`B`	`printer-pcl`	`printer-name, pcl-features-supported, pjl-defaults`
`printer-ps`	`C`	`printer-ps`	`printer-name, ps-features-supported, ppd-file-specification`
	`D`	`printer-ps-level1`	`printer-name, ps-features-supported, ppd-file-specification, level-1-defaults`
	`E`	`printer-ps-level2`	`printer-name, ps-features-supported, ppd-file-specification, level-2-device-string`
`printer-ps-level1`	`D`	`printer-ps-level1`	`printer-name, ps-features-supported, ppd-file-specification, level-1-defaults`

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printer-ps-level2	E	printer-ps-level2	printer-name, ps-features-supported, ppd-file-specification, level-2-device-string

8.3 DP-Administration Port Abstract-Operation Definitions

Clients may use the abstract-operations described in the following clauses to administer and control the flow of print-jobs through printers. Specific print-server implementations may limit usage of one or more of these abstract-operations to users with sufficient access rights, and/or may vary the facilities provided by a given abstract-operation depending upon the access rights assigned to the individual users served by the print-server.

The following ASN.1 productions make use of datatypes described in sub-clauses of clause 6.4. Clause 11 describes the steps a print-server shall perform for each operation.

8.3.1 Promote-job

This abstract-operation allows an administrative user (e.g., a system administrator) to direct a server to schedule a specified job for printing on the next available requested printer. The mechanism used to provide this functionality is implementation-specific.

This abstract-operation is formally defined as follows:

```
PromoteJob ::=  ABSTRACT-OPERATION
      ARGUMENT      PromoteJobArgument
      RESULT        PromoteJobResult
      ERRORS        { AccessError,
                      AttributeError,
                      SecurityError,
                      SelectionError,
                      ServiceError }
```

8.3.1.1 Promote-job-argument

The argument of this abstract-operation is formally defined as follows:

```
PromoteJobArgument ::= SEQUENCE {
      job-identification   [0] JobIdentifier,
      promote-message      [1] Message OPTIONAL,
                           -- sets value of id-att-job-message-from-administrator
      common-arguments     [2] CommonArguments OPTIONAL }
```

8.3.1.2 Promote-job-result

The result of this abstract-operation is formally defined as follows:

```
PromoteJobResult ::= SEQUENCE {
      job-status      [0] SET OF Attribute OPTIONAL
                      -- may include any job-status attributes -- }
```

8.3.1.3 Promote-job Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server will report a particular abstract-error are defined in clause 8.4.

8.3.2 Interrupt-job

This abstract-operation allows an administrator to interrupt a currently printing job or printer to print another job on the printer. If a printer is specified, the server shall interrupt the job currently printing on that printer. The server

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shall automatically resume processing of the interrupted job at the point of the interrupt checkpoint, upon completion of the interrupting job.

Clients shall not use this abstract-operation to interrupt a job that has already interrupted another job. Should a client attempt to do so, a conforming server shall reject the abstract-operation, and report a **cannot-interrupt-job** AccessError.

A client may not use this abstract-operation to interrupt a job that is not currently printing. Should a client attempt to interrupt a job that is not currently printing, the server shall reject the abstract-operation and report an **inappropriate-object-state** AccessError.

This abstract-operation is formally defined as follows:

```
InterruptJob ::= ABSTRACT-OPERATION
      ARGUMENT      InterruptJobArgument
      RESULT        InterruptJobResult
      ERRORS        { AccessError,
                      AttributeError,
                      SecurityError,
                      SelectionError,
                      ServiceError }
```

NOTE - Normally only an appropriately authorized user (such as an operator or system administrator) may interrupt a print-job or printer. However, this is a site and/or enterprise-specific policy decision, not mandated by this International Standard.

8.3.2.1 Interrupt-job-argument

The argument of this abstract-operation is formally defined as follows:

```
InterruptJobArgument ::= SEQUENCE {
      interrupted-job   [0] CHOICE {
          job-identifier        [0] JobIdentifier,
          printer-name          [1] SimpleName },
      interrupt-message [1] Message OPTIONAL,
                        -- sets value of id-att-job-message-from-administrator
      interrupting-job  [2] JobIdentifier,
      common-arguments  [3] CommonArguments OPTIONAL
```

If the client supplies an **interrupt-message** element as part of the request, the server shall set the value of the job's **job-message-from-administrator** attribute to the value of the **interrupt-message** element.

8.3.2.2 Interrupt-job-result

The result of this abstract-operation is formally defined as follows:

```
InterruptJobResult ::= SEQUENCE {
      interrupted-job-identifier   [0] JobIdentifier,
      job-status                   [1] SET OF Attribute OPTIONAL
                                   -- may include any job-status attributes -- }
```

The server may return job-status attributes of the *interrupted* job.

8.3.2.3 Interrupt-job Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server shall report a particular abstract-error are defined in clause 8.4.

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8.3.3 Pause-job

This abstract-operation allows an administrator to pause an idle or currently printing job. The client may resume the job by issuing the Resume abstract-operation to return it to its pre-paused state.

If the server is currently **processing** the job (i.e., **current-job-state** value for the job is **processing**), the client may specify the job by either: 1) the job's **job-identifier**, or 2) the **printer-name** of the physical printer on which the job is printing. Pausing a **processing** job stops the printing of the job on its assigned printer(s), leaves the printer(s) active, and allows other jobs to be assigned to the printer(s).

If the server is not currently **processing** the job, the client shall specify the job by its **job-identifier**.

If the job is in the **held**, **pending**, or **processing** state, the server shall set the job's **current-job-state** to **paused** (see 9.2.8.1); otherwise, the server shall reject the PauseJob abstract-operation and return an **inappropriate-object-state** AccessError.

This abstract-operation is formally defined as follows:

```
PauseJob ::= ABSTRACT-OPERATION
      ARGUMENT   PauseJobArgument
      RESULT     PauseJobResult
      ERRORS     { AccessError,
                   AttributeError,
                   SecurityError,
                   SelectionError,
                   ServiceError }
```

NOTE - Normally only an appropriately authorized user (such as an operator or system administrator) may pause a print-job. However, this is a site and/or enterprise-specific policy decision, not mandated by this International Standard.

A server may have a limit on the number of jobs that may be paused on a given printer. If a client pauses a job that causes the server to exceed its limit, the server shall return a **pause-limit-exceeded** ServiceError.

When a client specifies a printer in the PauseJob abstract-operation, a server that allows jobs to be printed on more than one printer may pause either all job components on all printers or only the job component on the specified printer.

8.3.3.1 Pause-job-argument

The argument of this abstract-operation is formally defined as follows:

```
PauseJobArgument ::= SEQUENCE {
      paused-job          [0] CHOICE {
          job-identifier        [0] JobIdentifier,
          printer-name          [1] SimpleName },
      pause-message       [1] Message OPTIONAL,
                          -- sets value of id-att-job-message-from-administrator
      common-arguments    [2] CommonArguments OPTIONAL }
```

When the client supplies a **pause-message**, the server shall replace the **job-message-from-administrator** attribute of the paused job with the supplied parameter.

8.3.3.2 Pause-job-result

The result of this abstract-operation is formally defined as follows:

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```
PauseJobResult ::= SEQUENCE {
      paused-job-identifier  [0] JobIdentifier,
      checkpoint             [1] SET OF PrintCheckpoint,
      job-status             [2] SET OF Attribute OPTIONAL
                                 -- may include any job-status attributes -- }
```

The server shall supply checkpoint information as part of the result to indicate where the client may later resume the job (see 9.2.8.17, **print-checkpoint**). The client subsequently provides this information to the print-server to enable it to resume job processing. A server should encode the checkpoint information in such a way as to protect against clients submitting ResumeJob operations after tampering with the checkpoint information. The server shall identify the format of the **context-info** element of each **checkpoint** value in the checkpoint- **format** element. When a paused job with checkpoint information is resumed, the server may assign the job to a different physical printer provided the checkpoint information can be honored.

The server may return job-status attributes of the *paused* job.

8.3.3.3 PauseJob Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server shall report a particular abstract-error are defined in clause 8.4.

8.3.4 Resume-job

This abstract-operation allows an administrator to resume a currently paused job.

If the job is in the **paused** state, the server shall set the job's **current-job-state** to **held** or **pending**, depending on the state of the job when the PauseJob abstract-operation was performed (see 9.2.8.3, **previous-job state**); otherwise, the server shall reject the ResumeJob abstract-operation and return the **inappropriate-object-state** AccessError.

This abstract-operation is formally defined as follows:

```
ResumeJob ::= ABSTRACT-OPERATION
      ARGUMENT        ResumeJobArgument
      RESULT          ResumeJobResult
      ERRORS          { AccessError,
                        AttributeError,
                        SecurityError,
                        SelectionError,
                        ServiceError }
```

Normally only an appropriately authorized user (such as an operator or system administrator) may resume a print-job.

As a result of modifications to a paused print-job, or changes in the print-system, when resuming a job the server may place the job into a state that is different from the state it was in when it was paused. When a paused job with checkpoint information is resumed, the server may schedule the job to a different physical printer than the one it was previously assigned provided the checkpoint information can be honoured.

8.3.4.1 Resume-job-argument

The argument of this abstract-operation is formally defined as follows:

```
ResumeJobArgument ::= SEQUENCE {
      resumed-job        [0] JobIdentifier,
      resume-message     [1] Message OPTIONAL,
                         -- sets value of id-att-job-message-from-administrator
      checkpoint         [2] SET OF PrintCheckpoint OPTIONAL,
      common-arguments   [3] CommonArguments OPTIONAL }
```


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When the client supplies a **resume-message**, the server shall replace the **job-message-from-administrator** attribute of the resumed job with the supplied parameter.

If the server does not support the specified **checkpoint-format** of any value of the **checkpoint** element, the server shall reject the request and return an **invalid-checkpoint** ServiceError.

8.3.4.2 Resume-job-result

The result of this abstract-operation is formally defined as follows:

```
ResumeJobResult ::= SEQUENCE {
      job-status   [0] SET OF Attribute OPTIONAL
                   -- may include any job-status attributes -- }
```

The server may return job-status attributes of the *resumed* job.

8.3.4.3 ResumeJob Abstract-errors

Should the request fail, the server shall report one of the listed abstract-errors. The circumstances under which the server shall report a particular abstract-error are defined in clause 8.4.

8.4 Abstract-Errors

This clause defines the abstract-errors associated with using the abstract-operations at the DP-Server ports.

If the server reports an error as the result of an abstract-operation, this means that the abstract-operation has not been performed.

Associated with each error is a problem parameter. This parameter is a refinement of the related error; it may be either a **standard-problem** (that is, a value defined in this International Standard) or an **extended-problem** (that is, an implementation-defined value), in which case it is defined as an object identifier. In addition to the **problem** parameter, the server shall return the attributes indicated in the ASN.1 to further describe the error.

Also associated with each error is an **error-message** element. A server shall provide in the **error-message** element a fully composed and properly translated human readable message describing the error condition.

The server shall return the **error-message** element in the locale requested by the client in the **operation-locale** attribute, if supplied and supported; otherwise, the server shall return the error message in the server's locale (as specified by the server's **locale** attribute) and shall convert the coded character set to that requested by the client, if supported.

Depending on implementation, a client may choose to use:

a) the fully composed **error-message** directly and output its text string value to the user or

b) the **problem** element to select an appropriate message from a catalog in the locale of the user, format the values of the returned attributes, substitute them into the catalog message text, and output the merged text to the user.

c) a combination of 1 and 2, perhaps outputting the **error-message** only if the user requests more help from the client in understanding the error.

Any message the server provides in the **error-message** element shall require no further processing such as insertion of additional error information, translation, character set conversion, etc.

The following ASN.1 productions make use of data types described in 6.4.

8.4.1 Access-error

An **AccessError** reports a problem encountered when attempting to access a DPA-object specified in the argument of an abstract-operation.

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```
AccessError ::= ABSTRACT-ERROR
    PARAMETER AccessErrorSequence

AccessErrorSequence ::= SEQUENCE OF SEQUENCE {
      object-identification     [0] ObjectIdentification, -- see 8.2.4.1
      problem                   [1] AccessProblem
      error-message             [2] ErrorMessage }

AccessProblem ::= CHOICE {
    standard-problem  ENUMERATED {
      inappropriate-object-class          (1),
      insufficient-access-rights          (2),
      cannot-interrupt-job                (3),
      inappropriate-object-state          (4) },
    extended-problem          OBJECT IDENTIFIER }
```

An **AccessProblem** may be one of the following:

a) **inappropriate-object-class**: a client may not use this abstract-operation on this object;

b) **insufficient-access-rights:** a DP-User who does not have sufficient access rights to a DPA-Object or the attributes has made an attempt to access attribute values;

c) **cannot-interrupt-job:** a client has made an attempt to interrupt a job that has already interrupted another job;

d) **inappropriate-object-state:** a client has made an attempt to perform an abstract-operation on an object that is not in an appropriate state for that operation.

8.4.2 Attribute-error

An **AttributeError** reports one or more problems encountered by the DP-Server while attempting to process an abstract-operation or to list or modify attributes of one or more objects.

NOTE - The use of the Attribute datatype on the attribute element of AttributeError allows the same code that processes Attributes in an abstract-operation to be used for error handling.

```
AttributeError ::= ABSTRACT-ERROR
    PARAMETER AttributeErrorSequence

AttributeErrorSequence ::= SEQUENCE {
      object-identification  [0] ObjectIdentification OPTIONAL,
      problems               [1] SEQUENCE OF SEQUENCE {
          problem                  [0] AttributeProblem,
          attribute                [1] Attribute,
          error-message            [2] ErrorMessage } }
```


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```
AttributeProblem ::= CHOICE {
    standard-problem    ENUMERATED {
      invalid-attribute-syntax                          (2),
      undefined-attribute-type                          (3),
      inappropriate-matching                            (4),
      constraint-violation                              (5),
      unsupported-attribute-type                        (6),
      illegal-modification                              (7),
      inconsistent-with-other-attributes                (8),
      undefined-attribute-value                         (9),
      unsupported-attribute-value                       (10),
      invalid-non-compulsory-attribute-modification     (11),
      per-job-attribute-inadmissible                    (12),
      not-multi-valued                                  (13),
      mandatory-attribute-omitted                       (14),
      attribute-illegal-for-object-class                (15) },
    extended-problem OBJECT IDENTIFIER }
```

The **object-identification** parameter is absent in an AttributeError in the following cases:

- when a **Print** abstract-operation caused the error and the server encountered an **AttributeProblem** when processing the **job-attributes** component of the abstract-operation's argument;
- when a **ListObjectAttributes** abstract-operation caused the error and the server encountered an **AttributeProblem** when processing the **selector** component of the abstract-operation's argument.

The **problem** parameter specifies the AttributeProblem encountered. Each problem (identified below) is accompanied by an indication of the AttributeId and, if necessary to avoid ambiguity, the attribute-value that caused the problem:

a) **invalid-attribute-syntax:** A purported attribute value, specified as an argument of the abstract-operation, does not conform to the attribute syntax of the attribute type;

b) **undefined-attribute-type:** A client provided an attribute type as an argument to an abstract-operation that the server did not recognize and could not be ignored because it was compulsory, i.e., was not listed in the **job-non-compulsory-attributes** or **non-compulsory-attributes** attributes;

c) **inappropriate-matching:** A client made an attempt, e.g. in a filter, to use a matching rule not defined for the attribute syntax specified for the attribute type concerned;

d) **constraint-violation:** A client supplied an attribute value in the argument of an abstract-operation that does not conform to the static constraints imposed by a functional standard or by the attribute definition (e.g. the value exceeds the maximum size allowed);

e) **unsupported-attribute-type:** A client specified a compulsory attribute that was understood but not supported by the server. The server should return the attribute value(s) in the AttributeError parameter as submitted;

f) **illegal-modification:** A client made an attempt to modify an attribute (i.e. to add or remove the entire attribute or some of its values), which has some specific behavior in DPA, that is, either a DP-Server assigned attribute, or an attribute which, once assigned by the DP-User, may not be modified in the way specified in the abstract-operation;

g) **inconsistent-with-other-attributes:** A client made an attempt to specify an attribute in a way inconsistent with other attributes of the same print-job. In the ModifyJob abstract-operation, an inconsistency with some existent attribute is not reported if the inconsistency is eliminated by further modifications specified in the same abstract-operation. If two attributes enter in conflict, the DP-Server may report an AttributeProblem for either of them, or for both;

h) **undefined-attribute-value:** A client specified a compulsory attribute value that is not understood by the DP-Server;

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i) **unsupported-attribute-value:** A client specified a compulsory attribute with a value that is not supported by the DP-Server or the specified logical printer. The server should return the value(s) in the AttributeError parameter that is(are) not supported;

j) **invalid-non-compulsory-attribute-modification:** A client attempted to change a non-compulsory job or document attribute to compulsory (by removing the attribute-type object identifier from the job's **job-non-compulsory-attributes** attribute or the document's **non-compulsory-attributes** attribute) and the server or the printer does not support that attribute-type and/or one or more of its values;

k) **per-job-attribute-inadmissible:** A client submitted a compulsory per-job attribute (attribute-type object identifier not present in the job's **job-non-compulsory-attributes** attribute), in the argument of a Print abstract-operation following the first Print abstract-operation of the job;

l) **not-multi-valued:** A client made an attempt to supply more than one element for, or to add another value to, the value component of a single-valued attribute;

m) **mandatory-attribute-omitted:** a client omitted an attribute that is required for the abstract-operation;

n) **attribute-illegal-for-object-class**: the client supplied a job attribute in the **job-att-modification** element of **ModifyJobArgument** when the client also supplied a document-number. Only document attributes are allowed when specifying a document-number.

8.4.3 Document-access-error

A **DocumentAccessError** reports a problem occurring when the server attempts to access the document referenced in the print-job. This applies to internal as well as to external references.

```
DocumentAccessError ::= ABSTRACT-ERROR
    PARAMETER DocumentAccessErrorSequence

DocumentAccessErrorSequence ::= SEQUENCE {
      problem                [0] DocumentAccessProblem,
      object-identification  [1] ObjectIdentification,  -- See 8.2.4.1
      error-message          [2] ErrorMessage }

DocumentAccessProblem ::= CHOICE {
    standard-problem        ENUMERATED {
      document-not-available    (1),
      referent-modified         (2),
      access-denied             (3),
      unknown-document          (4),
      no-documents-in-job       (5) },
    extended-problem       OBJECT IDENTIFIER  }
```

A **DocumentAccessProblem** may be one of the following:

a) **document-not-available:** The client specified a document number in the abstract-operation's argument that is not available at that moment because of some (temporary) access problem (e.g. when attempting to read the content of the document);

b) **referent-modified:** The client specified a document in the abstract-operation's argument that is identified by means of a DOR (distinguished-object-reference). However, the referenced document was modified after the **produce-time** indicated in the **QoS-level** component of the DOR; [See ISO/IEC 10031-2.]

c) **access-denied:** The server has attempted to read a document on behalf of a DP-User with insufficient access rights to read the referenced document;

d) **unknown-document:** The client specified a document in the abstract-operation's argument that has been deleted ("dangling reference");

e) **no-documents-in-job:** The client attempted to access or create a print-job that contained no documents.

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NOTE - A document-access-error is most likely to occur after the server returns control to the client. However, this International Standard does not define an asynchronous method for reporting events/errors. Therefore clients must query periodically to determine job status, by means of the ListObjectAttributes abstract-operation.

8.4.4 Printer-error

A **PrinterError** reports a problem occurring when the server attempts to access the selected printer during the processing of the abstract-operation in which it occurs.

```
PrinterError ::= ABSTRACT-ERROR
    PARAMETER PrinterErrorSequence

PrinterErrorSequence  ::= SEQUENCE {
      problem                [0] PrinterProblem,
      object-identification  [1] ObjectIdentification,  -- see 8.2.4.1
      error-message          [2] ErrorMessage }

PrinterProblem ::= CHOICE {
    standard-problem    ENUMERATED {
      printer-error                     (1),
      printer-needs-attention           (2),
      printer-needs-key-operator        (3) },
    extended-problem         OBJECT IDENTIFIER  }
```

A **PrinterProblem** may be one of the following:

a) **printer-error:** the printer allocated to that print-job has reported an error;

b) **printer-needs-attention:** the printer allocated to that print-job needs operator attention;

c) **printer-needs-key-operator:** the printer allocated to that print-job needs key operator attention.

8.4.5 Security-error

A **SecurityError** reports a problem occurring when a DP-User presents credentials to a DP-Server. This may occur either when binding or when executing a DPA abstract-operation bearing (proxy) credentials.

```
SecurityError ::= ABSTRACT-ERROR
    PARAMETER SecurityErrorSequence

SecurityErrorSequence ::= SEQUENCE {
      problem           [0] SecurityProblem,
      error-message     [1] ErrorMessage }

SecurityProblem ::= CHOICE {
    standard-problem  ENUMERATED {
      inappropriate-authentication          (1),
      invalid-credentials                   (2),
      insufficient-operation-rights         (3),
      invalid-pac                           (4) },
    extended-problem         OBJECT IDENTIFIER  }
```

A SecurityProblem may be one of the following:

a) **inappropriate-authentication:** The level of security associated with the requester's credentials is inconsistent with the level of protection requested; e.g., simple credentials are supplied where certified credentials are required;

b) **invalid-credentials:** The client supplied invalid credentials in the DpBindArgument;

c) **insufficient-operation-rights:** The client does not have the right to carry out the requested abstract-operation (e.g. Interrupt), independently of the DPA-Object involved in the abstract-operation;

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d) **invalid-pac:** The client supplied an invalid PAC in CommonArguments.

8.4.6 Selection-error

A **SelectionError** reports a problem related to the identification of an instance or instances of a DPA-Object specified in the argument of an abstract-operation. The DPA-Object instance(s) which caused the problem is reported as it was specified, accompanied by an indication of the problem(s) encountered.

```
SelectionError ::= ABSTRACT-ERROR
    PARAMETER SelectionErrorSequence

SelectionErrorSequence ::=  SEQUENCE OF
      SEQUENCE {
        problem                    [0] SelectionProblem,
        attribute                  [1] Attribute  OPTIONAL,
        object-identification      [2] ObjectIdentification,  -- see 8.2.4.1
        error-message              [3] ErrorMessage }

SelectionProblem ::= CHOICE {
    standard-problem  ENUMERATED {
      invalid-identification    (1),
      unknown-identification    (2) ,
      object-already-exists     (3) }
    extended-problem       OBJECT IDENTIFIER }
```

A **SelectionProblem** may be one of the following:

a) **invalid-identification**: The client specified a syntactically incorrect identifier;

b) **unknown-identification**: The server was unable to find the specified object.

c) **object-already-exists:** The client invoked an operation that attempted to create an object with the same object identification as an existing object;

NOTE - Abstract-operations in Part 3 may generate this error. For example, creating a printer object that already exists

8.4.7 Service-error

A **ServiceError** reports a problem related to the provision of the service, which is not due to an incorrect abstract-operation request or the requester's access rights.

```
ServiceError ::= ABSTRACT-ERROR
    PARAMETER ServiceErrorSequence

ServiceErrorSequence ::= SEQUENCE OF
      SEQUENCE {
        problem                [0] ServiceProblem,
        attribute              [1] Attribute OPTIONAL,
        object-identification  [2] ObjectIdentification,  -- see 8.2.4.1
        error-message          [3] ErrorMessage }
```


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```
ServiceProblem ::= CHOICE {
    standard-problem  ENUMERATED {
      server-busy                                    (1),
      server-unavailable                             (2),
      operation-too-complex                          (3),
      resource-limit-exceeded                        (4),
      unclassified-server-error                      (5),
      too-many-items-in-list                         (6),
      compulsory-resource-not-available              (7),
      cancel-document-unsupported                    (8),
      modify-document-unsupported                    (9),
      print-multiple-documents-unsupported           (10),
      unsupported-parameter-value                    (11),
      invalid-checkpoint                             (12),
      invalid-continuation-context                   (13),
      pause-limit-exceeded                           (14),
      unsupported-operation                          (15) },
    extended-problem          OBJECT IDENTIFIER  }
```

A **ServiceProblem** reported may be one of the following:

a) **server-busy:** The DP-Server is presently too busy to perform the requested abstract-operation, but may be able to do so after a short while;

b) **server-unavailable:** The DP-Server is currently unavailable;

c) **operation-too-complex:** The client requested an abstract-operation that is too complex either syntactically or semantically;

d) **resource-limit-exceeded:** The server has exceeded its resource allocations while attempting to process a request; this may happen when a very large object is to be created or copied in the DP-Server;

e) **unclassified-server-error:** This is a place-holder for "any other" errors, primarily those due to software bugs in a yet unstable DP-Server implementation, to make it nevertheless possible to access it remotely before it becomes robust;

f) **too-many-items-in-list:** The client specified an abstract-operation that provided more items in a list than is supported by the server;

g) **compulsory-resource-not-available:** The client specified a compulsory attribute that cannot be satisfied because the value requested is not available;

h) **cancel-document-unsupported:** A client requested to cancel an individual document within a multiple document job of a server that does not support this capability;

i) **modify-document-unsupported:** A client requested to modify the parameters associated with an individual document within a multiple document job of a server that does not support this capability;

j) **print-multiple-documents-unsupported:** A client requested to print multiple documents within a single job of a server that does not support this capability;

k) **unsupported-parameter-value:** A client specified a component of an argument to an abstract-operation, that is not an attribute, with a value not supported by the server. For example, a server may not support the **printer-name** element of the **PauseJobArgument** of the Pause-job operation;

l) **invalid-checkpoint:** A client supplied an invalid checkpoint to the ResumeJob abstract-operation. A checkpoint value is invalid if altered or corrupted;

m) **invalid-continuation-context:** A client supplied an invalid continuation context to the ListObjectAttributes abstract-operation. A continuation context is invalid if altered;

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n) **pause-limit-exceeded:** A client made either a PauseJob or InterruptJob request to a server that had exceeded the number of jobs that may be paused. The server may define this limit on a per printer or per server basis.

o) **unsupported-operation**: A client made a request that is not supported (or is not recognized) by the server.

8.4.8 Update-error

An **UpdateError** reports a problem encountered when a client attempts to modify (update), explicitly, an existing DPA-Object. Cancellation of a print-job is also considered here as a modification.

```
UpdateError ::= ABSTRACT-ERROR
    PARAMETER UpdateErrorSequence

UpdateErrorSequence ::= SEQUENCE {
      problem                [0] UpdateProblem,
      object-identification  [1] ObjectIdentification,  -- see 8.2.4.1
      error-message          [2] ErrorMessage }

UpdateProblem ::= CHOICE {
    standard-problem    ENUMERATED {
        no-modifications-allowed                (1),
        insufficient-update-rights              (2),
        previous-operation-incomplete           (4),
        cancellation-not-possible               (5) },
    extended-problem    OBJECT IDENTIFIER }
```

An **UpdateProblem** may be one of the following:

a) **no-modifications-allowed:** The client referenced a print-job in the abstract-operation's argument that is processing and cannot be modified now;

b) **insufficient-update-rights:** A DP-User with insufficient access rights to a DP-Object made an attempt to modify that object;

c) **previous-operation-incomplete:** A client made an attempt to modify an object that is currently being processed by another operation. New operations are not allowed until the previous ones finish;

d) **cancellation-not-possible:** A client made an attempt to cancel a print-job that was in a state for which the server implementation does not support cancellation, such as while the job is printing (most implementations should permit cancellation while printing) or was already complete.

8.4.9 Error Precedence

Should several error conditions occur simultaneously for the same DPA abstract-operation only one of them is reported to the requester. The precedence of these error conditions is as follows beginning with the most important:

```
SecurityError
ServiceError
AccessError
PrinterError
SelectionError
DocumentAccessError
AttributeError
UpdateError
```

8.5 Abstract-Events

This clause defines the abstract-event classes and types that may occur during the course of an abstract-operation invoked via a DP-Server port. Clause 9.2.3 defines the job-event-handling attributes that are utilized to convey the event information.

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Each different kind of event is defined as an event-type, identified by a unique object identifier. Each event-type is defined to belong to one of five event-classes, each of which is also identified by an object identifier.

8.5.1 Event-aborted class

An abort event occurs when a print-job or document is aborted. The following event types are defined to indicate the originator of the abort;

a) **id-val-event-job-aborted-by-server:** The server aborted the print-job;

b) **id-val-event-job-cancelled-by-operator:** The operator cancelled the print-job;

c) **id-val-event-job-cancelled-by-user:** The user cancelled the print-job.

d) **id-val-event-document-aborted-by-server:** The server aborted the document;

e) **id-val-event-document-cancelled-by-operator:** The operator cancelled the document;

f) **id-val-event-document-cancelled-by-user:** The user cancelled the document.

8.5.2 Event-error class

An error event occurs whenever (and in addition to an Abstract-error) an error occurs. In general, an error event signals a condition that may prevent the job from completing successfully, depending upon the settings of other parameters. The following error event types are defined:

a) **id-val-event-error-past-deadline:** The deadline time for the print-job (established by the **job-deadline-time** attribute of the Print or ModifyJob abstract-operation) has passed, but the print-job has not been completed;

b) **id-val-event-error-past-discard:** The discard time for the print-job (established by the **job-discard-time** attribute of the Print or ModifyJob abstract-operation) has passed, but the print-job has not been completed;

c) **id-val-event-error-printer-shutdown:** The printer the job was printing on shut down before the job completed;

d) **id-val-event-error-no-resource:** A needed resource is not available or has become unavailable. This will include resources that are expected to become available after the deadline time established for the print-job. Resources whose time for becoming available again is 'unknown' will always be unavailable;

e) **id-val-event-error-unrecognized-resource:** A resource specified to be required for the print-job is not known to the server;

f) **id-val-event-error-no-document:** A document specified to be printed for this print-job is not accessible or available to the server;

g) **id-val-event-error-job-submission-not-complete:** The server has not received the final Print abstract-operation of a job within some predetermined time interval;

h) **id-val-event-error-page-select:** The client specified a page in PageSelect that could not be found in the document;

i) **id-val-event-error-document-content:** The server detected an error in the document content during printing, e.g. a syntactic error in the page description language;

j) **id-val-event-error-other:** The server has encountered some error condition not categorized as one of the others.

8.5.3 Event-warning class

A warning event occurs whenever a condition arises which affects the processing of the user's print-job. In general, a warning event signals a condition that will not prevent completion of the job, but may indicate that some action is needed on the part of the user or operator. The following warning event types are defined:

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a) **id-val-event-warning-resource-needs-attention:** A resource (e.g., a printer, input-tray, etc.) needs the attention of a person, not necessarily a key operator. Which conditions need a key operator (a trained person for the particular resource) vs. an untrained person are implementation-dependent and may vary from resource to resource;

b) **id-val-event-warning-resource-needs-operator:** A resource (e.g., a printer, input-tray, etc.) needs the attention of a key operator. Which conditions need a key operator vs. an untrained person are implementation-dependent and may vary from resource to resource;

c) **id-val-event-warning-printer-shutdown:** The printer to be used for this job was shut down before the job was started;

d) **id-val-event-warning-job-modified:** The print-job was modified by the user or an operator using the ModifyJob abstract-operation;

e) **id-val-event-warning-close-to-deadline:** The deadline time (specified by the print-job's **job-deadline-time**) for printing the job is close. The amount of time remaining which triggers this event is implementation-dependent;

f) **id-val-event-warning-close-to-discard-time:** The retention period (specified by the print-job's **job-retention-period** or **job-discard-time**) is near an end. The amount of time remaining that triggers this event is implementation-dependent;

g) **id-val-event-warning-criterion-exceeded:** The event that a previously specified criterion threshold value has been exceeded;

h) **id-val-event-warning-duplicate-attribute-ignored:** A particular attribute has been duplicated in the argument of an abstract-operation. The later attribute takes precedent, and earlier instances of the attribute are ignored;

i) **id-val-event-warning-attribute-ignored:** The server has ignored a non-compulsory attribute or value;

j) **id-val-event-warning-job-paused:** The print-job has been paused by the user or operator by means of the PauseJob abstract-operation;

k) **id-val-event-warning-job-interrupted:** The print-job has been interrupted by the user or operator by means of the InterruptJob abstract-operation;

l) **id-val-event-warning-other:** The server has encountered some warning condition not categorized as one of the others.

8.5.4 Event-report class

A report event occurs whenever a significant point in the processing of the job occurs. The following report event types are defined:

a) **id-val-event-report-job-completed:** The print-job has completed successfully;

b) **id-val-event-report-checkpoint-taken:** The server has taken a job checkpoint;

c) **id-val-event-report-resource-message:** A message about a resource which is used by this job should be read;

d) **id-val-event-report-job-discarded:** The server discarded a print-job because the time specified by the print-job's **job-retention-period** had expired or the time specified by **job-discard-time** had passed (the job must have printed successfully; otherwise, an event-error would occur);

e) **id-val-event-report-file-transferred:** The client or server has completed a file transfer. This event may be indicated by a client or third party transfer service for files transferred to a print-service, or by the print-service or a third party transfer service for files transferred to a print-client;

f) **id-val-event-report-job-promoted:** The user or operator has promoted the print-job by means of the PromoteJob abstract-operation;

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g) **id-val-event-report-job-resumed:** The user or operator has resumed the print-job by means of the ResumeJob abstract-operation;

h) **id-val-event-report-processing-started:** The server has begun processing the print-job.

i) **id-val-event-report-printing-started**: The server has begun printing the job (making marks on the medium).

8.5.5 Event-state-changed class

A state-change event occurs whenever the state of a job, printer or server changes. The states of jobs, printers, and servers are defined in clauses 9.2.8.1, 9.4.9, and 9.5.4, respectively. The following state-change event types are defined:

a) **id-val-event-state-changed-job:** The state of the job has changed;

b) **id-val-event-state-changed-printer:** The state of the printer has changed;

c) **id-val-event-state-changed-server:** The state of the server has changed.

8.5.6 Event Class identifiers

An event-class identifier is used in the Notification Profile or the Logging Profile to indicate that the user (or designate) requires that if *any* event type of that class occurs, it is to be noted, i.e., by log-file entry or notification to the user, as specified by the user. The following event-classes are defined:

a) **id-val-event-class-aborted:** The user wants to be notified of and/or the server to log all abort events;

b) **id-val-event-class-error:** The user wants to be notified of and/or the server to log all error events;

c) **id-val-event-class-warning:** The user wants to be notified of and/or the server to log all warning events;

d) **id-val-event-class-report:** The user wants to be notified of and/or the server to log all report events;

e) **id-val-event-class-state-changed:** The user wants to be notified of and/or the server to log all state-change-events.

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Section 3 - Print-service attributes

9 Print-service attributes

This clause specifies the standard attributes that are contained in DPA objects.

9.1 Overview of the attribute concept

An attribute is a characteristic of an object. The attribute concept, introduced in 6.4, permits the open-ended definition and use of new characteristics. By modeling argument and result parameters as attributes, implementors of print-server and print-client software are able to incorporate new features readily, and hence, to make available new and/or implementation-specific features for access by users in a timely fashion.

The attribute definition consists of an **attribute-id** component (an identifier of the attribute), an indication of whether the attribute has one or multiple values, and an **attribute-values** type specification. The **attribute-id** component carries a class of information that has meaning to the user of a print-service, and serves to indicate exactly which aspect of the printing function the value component applies to. The **attribute-values** component consists of an interpretation and the actual value specified as an ASN.1 SET OF. The interpretation indicates what datatype the actual value conforms to, and may be either simple (e.g., BOOLEAN, INTEGER) or structured. Attributes are defined by means of the ATTRIBUTE macro. See 6.4.

9.1.1 Non-compulsory and compulsory attributes

For various reasons, a client may be unable to determine whether a user-requested feature is supported on a particular server or printer. In addition, some requested resource may become unavailable before a print-request is completed. In some cases, the user does not want the job to be printed if it cannot be completed exactly as specified; however, in many other cases, the user simply wants the job to be printed in *some* form, even if some requested features cannot be supplied, or one or more resource substitutions may be made in order to complete the job.

The compulsory/non-compulsory attribute mechanism enables the client to indicate which attributes shall be honored by the server, and which are simply preferences that the server may ignore or alter if necessary to complete the job (see 6.4.6). Non-compulsory attributes are thus an aid to interworking in a diverse network environment.

The job and document objects contain the attributes **job-non-compulsory-attributes** and the **non-compulsory-attributes**, respectively. The values of these two attributes shall contain the attribute-ids of job and document attributes, respectively, that the server shall treat as *non-compulsory*. The server shall treat all other attributes as *compulsory*.

The purpose of permitting the client to specify non-compulsory attributes is to maximize the percentage of print-jobs that produce usable output, without being rejected or terminating prematurely, even when the job is resubmitted to another printer on the same or a different server. The server may also specify non-compulsory attributes in initial-value-job and initial-value-document objects (see the **printer-initial-value-job** and **printr-initial-value-document** attributes).

9.1.2 Empty attribute-values versus the "none" attribute-value and server defaulting

An attribute with an empty value shall indicate that the attribute does not currently have any values, though the server may assign values later to the attribute. An attribute with no values is represented as an ASN.1 **SET OF** with no values. An attribute with no values shall not be represented using the ASN.1 **NULL** type.

In contrast, the client may wish to specify an attribute that is never to have a value assigned or the associated action performed. An explicit generic **ObjectIdentifier** value, **id-val-generic-none**, is provided for this purpose for those attributes whose syntax is **objectIdentifierSyntax** or **nameOrOidSyntax**. Attributes whose value is a string (**Text**,

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OCTET STRING, etc.) shall use a zero length string attribute-value as the indicator that the server shall never supply a value for the attribute and shall not perform any action implied by the attribute.

When a client submits a print-job and specifies attributes with no values, the server shall treat those attributes in the same way as if the client had not submitted those attributes at all; namely, the server may supply a default value. When the server supplies default values for attributes, the server may supply such default values (1) when the job is submitted using the job's **initial-value-job** attribute, if any, or the specified (logical or physical) printer's **printer-initial-value-job** or (2) later when the job is printed using the physical printer's **printer-initial-value-job** attribute. The former defaulting may be referred to as "early defaulting" and the latter defaulting as "late defaulting".

> NOTE – There is no way for the client to specify whether the server is to perform "early defaulting" or "late defaulting"; that is specified by the server's system administrator by means of, respectively, the logical printer's or the physical printer's **printer-initial-value-job** and **printer-initial-value-document** attributes.

When a server receives an attribute that has no values and the server or the intended printer does not support that attribute, the server shall treat that attribute as non-compulsory and ignore that attribute (whether that attribute's attribute-id is present in the **job-non-compulsory-attributes** or the document's **non-compulsory-attributes** or not). See 9.1.1 and 6.4.6.

The specified (logical or physical) printer's initial-value-job object (see the **printer-initial-value-job** attribute) may also have attributes with no values, indicating that the server shall not assign values to those attributes when the job is *submitted*, if the client supplies no values for them. The server may then assign values subsequently using the physical printer's **printer-initial-value-job** attribute.

A physical printer's initial-value-job object may also have attributes with no values, indicating that the server shall not assign values to those attributes when the job is *printed*, even if the client and (the logical printer's) initial-value-job object had supplied no values for them. Such cases may arise for attributes set automatically by the printer hardware and for attributes not supported by the printer.

9.1.3 SINGLE VALUE and MULTI VALUE attributes

Each attribute definition indicates whether the attribute shall be either SINGLE VALUE or MULTI VALUE.

SINGLE VALUE attributes shall have one value or may have no values (see 9.1.2).

MULTI VALUE attributes shall have one or more values or may have no values (see 9.1.2).

9.1.4 Conformance to the attribute definitions

But while the attribute concept permits a high degree of flexibility in the ability to incorporate new features in a server, and in the client to access these new features, it can exacerbate the problem of consistent interoperability. For this reason, Annex E defines two different levels of server functionality in terms of the abstract-operations and attributes that shall be supported by server implementations that purport to conform to one or the other of the two levels. Additional sublevels indicate those abstract-operations and attributes that shall be supported by any server that supports multidocument jobs.

The definition of each attribute in this clause of ISO/IEC 10175-1 is written as if the server had implemented the attribute. However, many attributes are not required for conformance to ISO/IEC 10175. Also many OPTIONAL components of defined types are not required for conformance. See Annex E of this part of ISO/IEC 10175 for levels of conformance and ISO/IEC 10175-2 for static and dynamic conformance requirements. Therefore, where the attribute definition states:

"This attribute indicates that the server shall ..."

shall be interpreted to mean:

"This attribute indicates that the server shall, if the server implements this attribute, ..."

Annex C contains the complete ASN.1 for the attribute definitions. The ASN.1 for each attribute is also duplicated here in this clause and in the same order as in the Annex. In case there is a discrepancy between the ASN.1 in

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Annex C and the ASN.1 in this clause, the ASN.1 in Annex C shall prevail, since it has been compiled with an ASN.1 compiler.

9.1.5 Common attribute syntaxes and datatypes

The attribute syntaxes and datatypes defined in this clause may be used in the definitions of attributes wherever appropriate. One primary reason to use attribute syntaxes defined in this manner, rather than the more conventional ASN.1 built-in types or type productions is to enhance the extensibility of the abstract-service. These attribute syntaxes are identified by means of **ObjectIdentifiers** (see ANNEX H).

9.1.5.1 Text and textSyntax

Text provides a human-readable text associated with a user or application.

ISO/IEC 10175 specifies a small number of standard character sets for use in attribute values:

a) **VisibleString** - defined in ISO/IEC 8824 as the 94-character International Reference Version (IRV) set of ISO/IEC 646 : 1991, plus SPACE

b) **T61String** - defined in ISO/IEC 8824 as the CCITT Telematic coded character sets, including ISO/IEC 6937

c) **Latin1String** - defined in ISO/IEC 10175-1 as the 190-character 8-bit coded character set, plus SPACE, specified in ISO 8859-1 as Latin Alphabet Nr 1 and commonly referred to as Latin1

d) **UCS2Level2String** - defined in ISO/IEC 10175-1 as the two-octet conformance level 2 representation of the Basic Multilingual Plane (BMP) of the coded character set specified in ISO/IEC 10646 and named UCS-2

The conformance requirements in ANNEX E require that conforming clients and server shall implement at least the **VisibleString** type.

ISO/IEC character set standards specify that characters from different coded character sets with the same name shall be considered equivalent (see ISO/IEC 10367). The ISO/IEC standard coded character sets specified by ISO/IEC 646, ISO/IEC 6937, ISO 8859-1, and ISO/IEC 10646 all use the same character names for the characters coded as decimal 32 (hex 20 = the **SPACE** character) to decimal 126 (hex 7e = the **TILDE** character), inclusive. Therefore, for purposes of filtering and matching, characters in this range of these coded character sets with the same coded value shall match.

A server shall perform coded character set conversion between the coded character set representation for characters that are common to:

a) VisibleString, T61String, Latin1String, and UCS2Level2String:

code points 32 to 126 decimal, inclusive

b) Latin1String and UCS2Level2String:

code points 160 to 255 decimal, inclusive

when accepting attribute values from the client and when returning attribute values to the client in order to match a client's requested coded character set (see the **operation-locale** attribute), whether the requested locale is supported or not (and see the **Text**, **DescriptiveName**, **Descriptor**, **Message**, **ErrorMessage**, **SimpleName**, and **DistinguishedNameString**, data types).

```
Latin1String ::= OCTET STRING
    -- ISO 8859-1 8-bit Latin Alphabet Nr 1
    -- (consists of octets 20 to 7E hex and 80 to FF hex)

UCS2Level2String ::= OCTET STRING
```


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```
    -- UCS2Level2String shall contain coded characters that conform to
    -- ISO/IEC 10646-1, two-octet form (UCS-2), implementation level 2
    -- conformance (i.e., no CombiningCharactersB-2) and no control
    -- characters (no C0 and no C1 control characters, i.e., no CR, LF,
    -- etc.).

    -- ISO/IEC 8824 : 1994 contains a more precise method of specifying the
    -- subset of ISO/IEC 10164-1, using sub-typing.  However,
    -- ISO/IEC 8824 : 1994 also forbids (1) mixing this new syntax with
    -- older ASN.1 that contains macros in the same ASN.1 module and
    -- (2) importing types defined by the new syntax into modules containing the
    -- older syntax. Since the attributes in ISO/IEC 10175 are defined
    -- using ASN.1 macros, ISO/IEC 10175 cannot use the new syntax
    -- for defining UCS2Level2String.   Thus ISO/IEC 10175 must
    -- use the old syntax for defining UCS2Level2String.

    -- If ISO/IEC 10175 could have used the new sub-typing syntax of
    -- ISO/IEC 8824 : 1994, UCS2Level2String would have been defined as follows:
    --
    --    IMPORTS CombiningCharactersB-2
    --        ASN1-CHARACTER-MODULE {joint-iso-ccitt asn1(1) specification(0)
    --                               modules(0) characters(0)} ;
    --    UCS2Level2String ::= BMPString (FROM
    --                                    (ALL EXCEPT (CombiningCharactersB-2
    --                                            {0,0,0,0}..{0,0,0,31}
    --                                            {0,0,0,128}..{0,0,0,159})))

    --  The resulting binary encoding when using the Binary Encoding Rules
    --  (BER) defined in ISO/IEC 8825 interchanged in the ISO/IEC 10175 protocol
    --  would have been the same were this new syntax definition of the
    --  UCS2Level2String to be used, since ISO/IEC 10175 ASN.1 uses
    --  IMPLICIT TAGS.

    --  NOTE - However, the old syntax does NOT yield the same binary encoding
    --  as this new syntax would when other binary encoding rules are used,
    --  such as PER (a new, more efficient encoding).

Text ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-text-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-text-string)),
        iso-latin1      [2] Latin1String(SIZE(0..ub-text-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-text-string)) }

textSyntax ATTRIBUTE-SYNTAX
        Text
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-text
```

9.1.5.2 DescriptiveName and descriptiveNameSyntax

Attribute value types that contain human-readable descriptive names employ this generic data type and syntax in their definition.

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```
DescriptiveName  ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-name-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-name-string)),
        iso-latin-1     [2] Latin1String(SIZE(0..ub-name-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-name-string)) }

descriptiveNameSyntax  ATTRIBUTE-SYNTAX
        DescriptiveName
        MATCHES FOR EQUALITY
        ::= id-syn-descriptive-name
```

A server shall accept, store, and forward **DescriptiveName** data whether the server supports the coded character set specified or not.

DescriptiveName data is intended to be in the locale of the creator of the name. In ISO/IEC 10175-1, attribute-type, attribute-values, value-classes, object-classes, and syntax OIDs are given descriptive names in English, since ISO/IEC 10175-1 is written in English.

> NOTE – This version of ISO/IEC 10175-1 does not address the representation of the **DescriptiveName** data type in languages other than English. See Annex H.

When returning a **DescriptiveName** type to the client, the server shall convert the coded character set to that requested by the client (in part of **operation-locale**), if any, and if the server supports the specified coded character set.

9.1.5.3 Descriptor and descriptorSyntax

Attribute value types that contain human readable descriptions employ this generic data type and syntax in their definition.

```
Descriptor ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-descriptor-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-descriptor-string)),
        iso-latin1      [2] Latin1String(SIZE(0..ub-descriptor-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-descriptor-string)) }

descriptorSyntax ATTRIBUTE-SYNTAX
        Descriptor
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-descriptor
```

Descriptor data is intended to be in the locale of the creator of the descriptor. In ISO/IEC 10175-1, attribute-type, attribute-values, value-classes, object-classes, and syntax OIDs are given descriptor text in English, since ISO/IEC 10175-1 is written in English.

> NOTE – This version of ISO/IEC 10175-1 does not address the representation of the **Descriptor** data type in languages other than English. See Annex H.

A server shall accept, store, and forward **Descriptor** data whether the server supports the coded character set specified or not.

When returning a **Descriptor** type to the client, the server shall convert the coded character set to that requested by the client (in part of **operation-locale**), if any, and if the server supports the specified coded character set.

9.1.5.4 Message and messageSyntax

Attribute value types that contain human readable messages generated by users for other users employ this generic data type and syntax in their definition.

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```
Message ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-message-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-message-string)),
        iso-latin1      [2] Latin1String(SIZE(0..ub-message-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-message-string)) }

messageSyntax ATTRIBUTE-SYNTAX
        Message
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-message
```

A server shall accept, store, and forward **Message** data whether the server supports the coded character set specified or not.

When returning a **Message** type to the client, the server shall convert the coded character set to that requested by the client (in part of **operation-locale**), if any, and if the server supports the specified coded character set.

9.1.5.5 ErrorMessage and errorMessageSyntax

Attribute value types that contain human readable error messages generated by the server for users to employ this generic data type and syntax in their definition.

```
ErrorMessage ::= SEQUENCE {
        data            [0] CHOICE {
            iso-646-irv     [0] VisibleString(SIZE(0..ub-message-string)),
            ccitt-t-61      [1] T61String(SIZE(0..ub-message-string)),
            iso-latin-1     [2] Latin1String(SIZE(0..ub-message-string)),
            iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-message-string)),
            other-code-set  [4] OCTET STRING(SIZE(0..ub-message-string)) },
        locale          [1] Locale OPTIONAL }

errorMessageSyntax  ATTRIBUTE-SYNTAX
        ErrorMessage
        MATCHES FOR EQUALITY
        ::= id-syn-error-message
```

The **other-code-set** element shall be used to represent coded character set data other than **VisibleString** (ASCII), **T61String**, **Latin1String**, **UCS2Level2String**, if other coded character sets are required, in which case the **locale** element shall be present to indicate the locale (which includes the specification of the coded character set).

When **VisibleString**, **T61String**, **Latin1String**, and **UCS2Level2String** are present, the coded character set element of the **locale** shall be ignored (but should be the OID assigned to these four standard character sets, respectively; see the **default-character-set** attribute and ANNEX A).

When returning an **ErrorMessage** type to the client, the server shall return the **ErrorMessage** type in the locale requested by the client in the **operation-locale** attribute, if supplied and supported; otherwise, the server shall return the **ErrorMessage** type in the server's locale (as specified by the server's **locale** attribute) and shall convert the coded character set to that requested by the client (in **operation-locale**), if supported.

When returning an **ErrorMessage** type to the client, the server shall provide explicit locale identification in the **locale** element, except the server need not when the client explicitly requests a locale (in **operation-locale**) and the server returns the **ErrorMessage** in the requested locale.

9.1.5.6 SimpleName and simpleNameSyntax

Attribute value types that encode a short human readable string representation of a simple name for an object created by an administrator use this generic syntax or datatype in their definition.

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```
SimpleName ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-name-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-name-string)),
        iso-latin1      [2] Latin1String(SIZE(0..ub-name-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-name-string)) }

simpleNameSyntax ATTRIBUTE-SYNTAX
        SimpleName
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-simple-name
```

9.1.5.7 DistinguishedNameString and distinguishedNameStringSyntax

Attribute value types that specify the name of an object, file, or person as a string that can be either (1) a simple name by itself or (2) a simple name qualified with a path name employ this generic data type and syntax. If the path name is included, an optional **name-syntax** element may be used to specify the syntax of the path name, i.e., to identify the name syntax of the service being used. If the **name-syntax** element is omitted, the server shall assume the name-syntax identified by the server's **default-dist-name-syntax** attribute.

```
DistinguishedNameString ::= SEQUENCE {
    name            [0] Text,
    name-syntax     [1] NameOrOid OPTIONAL }

distinguishedNameStringSyntax ATTRIBUTE-SYNTAX
        DistinguishedNameString
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-dist-name-string
```

The following standard values are defined for use in the **name-syntax** element to identify the syntax of names:

Descriptive Name	Object Identifier	Descriptor Text
automatic	id-val-dn-syntax-automatic	server recognizes the syntax
X-500	id-val-dn-syntax-x-500	ISO/IEC 9594 Directory Service
XFN	id-val-dn-syntax-xfn	X/OPEN Federated Names
DCE	id-val-dn-syntax-dce	Distributed Computing Environment - includes X.500 and CDS
CDS	id-val-dn-syntax-cds	Cell Directory Service - part of DCE
NIS	id-val-dn-syntax-nis	Network Information Service
DNS	id-val-dn-syntax-dns	Domain Name Service
DEC-NS	id-val-dn-syntax-dec-ns	Digital Name Service
Internet-mail	id-val-dn-syntax-internet-mail	Internet Mail address
XNS	id-val-dn-syntax-xns	Xerox Network System
Bindery	id-val-dn-syntax-bindery	
NDS	id-val-dn-syntax-nds	Novell Directory Service
URL	id-val-dn-syntax-url	HTTP Universal Resource Locator

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POSIX	id-val-dn-syntax-posix	POSIX file name (ISO/IEC 9945-1)
UNIX	id-val-dn-syntax-unix	UNIX(TM) file name
OS/2	id-val-dn-syntax-os2	OS/2 file name
PC-DOS	id-val-dn-syntax-pc-dos	PC DOS file name
NT	id-val-dn-syntax-nt	NT file name
MVS	id-val-dn-syntax-mvs	MVS file name
VM	id-val-dn-syntax-vm	VM file name
OS/400	id-val-dn-syntax-os400	OS/400 file name
VMS	id-val-dn-syntax-vms	VMS file name
UNC	id-val-dn-syntax-unc	Microsoft Universal Name Convention
NetWare	id-val-dn-syntax-netware	NetWare file path name

As with any **NameOrOid**, implementors may use their own object identifiers or simple names (if they have not assigned an OID) for implementation-defined name-syntaxes.

9.1.5.8 DistinguishedNameStringSequence and distinguishedNameStringSequenceSyntax

Attribute value types that encode sequences of distinguished-name-string values employ this generic syntax or datatype in their definitions.

```
DistinguishedNameStringSequence ::= SEQUENCE OF DistinguishedNameString

distinguishedNameStringSequenceSyntax ATTRIBUTE-SYNTAX
        DistinguishedNameStringSequence
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-dist-name-string-sequence
```

9.1.5.9 Delta time and deltaSyntax

Delta time provides an integer value for a period of elapsed time, measured in seconds.

```
DeltaTime ::= INTEGER (0..ub-integer)

deltaTimeSyntax ATTRIBUTE-SYNTAX
        DeltaTime
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-delta-time
```

9.1.5.10 Generalized time and generalizedTimeSyntax

Generalized time provides a value for calendar date and time of day, as defined in ISO/IEC 8824.

```
generalizedTimeSyntax ATTRIBUTE-SYNTAX
        GeneralizedTime
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-generalized-time
```

When matching values of type **GeneralizedTime**, the values shall first be converted to the equivalent **UTCTime** form (see ISO/IEC 8824) before the comparison is performed.

Servers shall assign an empty value (see 9.1.2) to attributes employing the **generalizedTimeSyntax** to indicate that neither the client nor the server has supplied a time.

9.1.5.11 Integer and integerSyntax

Attribute value types that encode integer values employ this generic syntax or datatype in their definitions.

```
Integer ::= INTEGER (lb-integer..ub-integer)
```


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```
integerSyntax ATTRIBUTE-SYNTAX
        Integer
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-integer
```

9.1.5.12 IntegerSequence and integerSequenceSyntax

Attribute value types that encode sequences of integer values employ this generic syntax or datatype in their definitions.

```
IntegerSequence ::= SEQUENCE OF Integer

integerSequenceSyntax ATTRIBUTE-SYNTAX
        IntegerSequence
        MATCHES FOR EQUALITY
        ::= id-syn-integer-sequence
```

9.1.5.13 Cardinal and cardinalSyntax

Attribute value types that encode non-negative integer values employ this generic datatype or syntax in their definitions.

```
Cardinal ::= INTEGER (0..ub-integer)

cardinalSyntax ATTRIBUTE-SYNTAX
        Cardinal
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-cardinal
```

9.1.5.14 CardinalSequence and cardinalSequenceSyntax

Attribute value types that encode sequences of *non-negative* integer values employ this generic syntax or datatype in their definitions.

```
CardinalSequence ::= SEQUENCE OF Cardinal

cardinalSequenceSyntax ATTRIBUTE-SYNTAX
        CardinalSequence
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-sequence
```

9.1.5.15 PositiveInteger and positiveIntegerSyntax

Attribute value types that encode non-zero positive integer values employ this generic syntax or datatype in their definitions.

```
PositiveInteger ::= INTEGER (1..ub-integer)

positiveIntegerSyntax ATTRIBUTE-SYNTAX
        PositiveInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-positive-integer
```

9.1.5.16 IntegerRange and integerRangeSyntax

Attribute value types that encode a range of integer values employ this generic syntax or datatype in their definitions.

```
IntegerRange ::= SEQUENCE {
        lower-bound  Integer,
        upper-bound  Integer }
```


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```
integerRangeSyntax ATTRIBUTE-SYNTAX
        IntegerRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-integer-range
```

The SET-COMPARISON matching rule for integerRangeSyntax is:

the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1.

9.1.5.17 CardinalRange and cardinalRangeSyntax

Attribute value types that encode a range of *non-negative integer* values employ this generic syntax or datatype in their definitions.

```
CardinalRange ::= SEQUENCE {
        lower-bound  Cardinal,
        upper-bound  Cardinal }

cardinalRangeSyntax ATTRIBUTE-SYNTAX
        CardinalRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-cardinal-range
```

The SET-COMPARISON matching rule for cardinalRangeSyntax is:

the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1.

9.1.5.18 MaximumInteger and maximumIntegerSyntax

Attribute value types that encode the maximum allowable value of an entity with integer datatype employ this generic syntax or datatype in their definitions.

```
MaximumInteger ::= Integer

maximumIntegerSyntax ATTRIBUTE-SYNTAX
        MaximumInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-maximum-integer
```

9.1.5.19 MinimumInteger and minimumIntegerSyntax

Attribute value types that encode the minimum allowable value of an entity with integer datatype employ this generic syntax or datatype in their definitions.

```
MinimumInteger ::= Integer

minimumIntegerSyntax ATTRIBUTE-SYNTAX
        MinimumInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-minimum-integer
```


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9.1.5.20 Integer64 and integer64Syntax

Attribute value types that encode *64-bit* integer values employ this generic syntax or datatype in their definitions.

```
Integer64 ::= INTEGER (lb-integer64..ub-integer64)

integer64Syntax ATTRIBUTE-SYNTAX
        Integer64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-integer64
```

9.1.5.21 Integer64Sequence and integer64SequenceSyntax

Attribute value types that encode sequences of *64-bit* integer values employ this generic syntax or datatype in their definitions.

```
Integer64Sequence ::= SEQUENCE OF Integer64

integer64SequenceSyntax ATTRIBUTE-SYNTAX
        Integer64Sequence
        MATCHES FOR EQUALITY
        ::= id-syn-integer64-sequence
```

9.1.5.22 Cardinal64 and cardinal64Syntax

Attribute value types that encode non-negative *64-bit* integer values employ this generic datatype or syntax in their definitions.

```
Cardinal64 ::= INTEGER (0..ub-integer64)

cardinal64Syntax ATTRIBUTE-SYNTAX
        Cardinal64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-cardinal64
```

9.1.5.23 Cardinal64Sequence and cardinal64SequenceSyntax

Attribute value types that encode sequences of *non-negative* integer values employ this generic syntax or datatype in their definitions.

```
Cardinal64Sequence ::= SEQUENCE OF Cardinal64

cardinal64SequenceSyntax ATTRIBUTE-SYNTAX
        Cardinal64Sequence
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal64-sequence
```

9.1.5.24 PositiveInteger64 and positiveInteger64Syntax

Attribute value types that encode non-zero positive *64-bit* integer values employ this generic syntax or datatype in their definitions.

```
PositiveInteger64 ::= INTEGER (1..ub-integer64)

positiveInteger64Syntax ATTRIBUTE-SYNTAX
        PositiveInteger64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-positive-integer64
```


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9.1.5.25 Integer64Range and integer64RangeSyntax

Attribute value types that encode a range of *64-bit* integer values employ this generic syntax or datatype in their definitions.

```
Integer64Range ::= SEQUENCE {
        lower-bound  Integer64,
        upper-bound  Integer64 }

integer64RangeSyntax ATTRIBUTE-SYNTAX
        Integer64Range
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-integer64-range
```

The SET-COMPARISON matching rule for integer64RangeSyntax is:

the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1

9.1.5.26 Cardinal64Range and cardinal64RangeSyntax

Attribute value types that encode a range of *64-bit non-negative integer* values employ this generic syntax or datatype in their definitions.

```
Cardinal64Range ::= SEQUENCE {
        lower-bound  Cardinal64,
        upper-bound  Cardinal64 }

cardinal64RangeSyntax ATTRIBUTE-SYNTAX
        Cardinal64Range
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-cardinal64-range
```

The SET-COMPARISON matching rule for cardinal64RangeSyntax is:

the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1

9.1.5.27 MaximumInteger64 and maximumInteger64Syntax

Attribute value types that encode the maximum allowable value of an entity with *64-bit* integer datatype employ this generic syntax or datatype in their definitions.

```
MaximumInteger64 ::= Integer64

maximumInteger64Syntax ATTRIBUTE-SYNTAX
        MaximumInteger64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-maximum-integer64
```


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9.1.5.28 MinimumInteger64 and minimumInteger64Syntax

Attribute value types that encode the minimum allowable value of an entity with *64-bit* integer datatype employ this generic syntax or datatype in their definitions.

```
MinimumInteger64 ::= Integer64

minimumInteger64Syntax ATTRIBUTE-SYNTAX
        MinimumInteger64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-minimum-integer64
```

9.1.5.29 Real and realSyntax

Attribute value types that encode numeric quantities that may have non-integer values employ this generic syntax or datatype in their definitions.

```
Real ::= REAL

realSyntax ATTRIBUTE-SYNTAX
        Real
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-real
```

9.1.5.30 RealSequence and realSequenceSyntax

Attribute value types that encode sequences of real values employ this generic syntax or datatype in their definitions.

```
RealSequence ::= SEQUENCE OF Real

realSequenceSyntax ATTRIBUTE-SYNTAX
        RealSequence
        MATCHES FOR EQUALITY
        ::= id-syn-real-sequence
```

9.1.5.31 NonNegativeReal and nonNegativeRealSyntax

Attribute value types that encode numeric quantities that may have non-negative, non-integer values employ this generic syntax or datatype in their definitions.

```
NonNegativeReal ::= REAL(0..PLUS-INFINITY)

nonNegativeRealSyntax ATTRIBUTE-SYNTAX
        NonNegativeReal
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-real
```

9.1.5.32 RealRange and realRangeSyntax

Attribute value types that encode the range of allowable values that a numeric entity of Real datatype employ this generic syntax or datatype in their definitions.

```
RealRange ::= SEQUENCE {
        lower-bound  Real,
        upper-bound  Real }

realRangeSyntax ATTRIBUTE-SYNTAX
        RealRange
        MATCHES FOR EQUALITY  SET-COMPARISON
        ::= id-syn-real-range
```

The SET-COMPARISON matching rule for realRangeSyntax is:

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the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1

9.1.5.33 NonNegativeRealRange and nonNegativeRealRangeSyntax

Attribute value types that encode the range of allowable values that a numeric entity of NonNegativeReal datatype employ this generic syntax or datatype in their definitions.

```
NonNegativeRealRange ::= SEQUENCE {
        lower-bound  NonNegativeReal,
        upper-bound  NonNegativeReal }

nonNegativeRealRangeSyntax ATTRIBUTE-SYNTAX
        NonNegativeRealRange
        MATCHES FOR EQUALITY  SET-COMPARISON
        ::= id-syn-non-negative-real-range
```

The SET-COMPARISON matching rule for nonNegativeRealRangeSyntax is:

the asserted value range is defined as a subset of the attribute value range if the following relationships are true:

a) the lower bound of the asserted range must be greater than or equal to the lower bound of the attribute value

and

b) the upper bound of the asserted range must be less than or equal to the upper bound of the attribute value. See 6.4.5.1

9.1.5.34 Boolean and booleanSyntax

Attribute value types that encode Boolean values employ this data type or generic syntax in their definitions.

```
Boolean ::= BOOLEAN

booleanSyntax ATTRIBUTE-SYNTAX
        BOOLEAN
        MATCHES FOR EQUALITY
        ::= id-syn-boolean
```

9.1.5.35 Percent and percentSyntax

Attribute value types that encode percentage values employ this generic datatype or syntax in their definitions.

```
Percent ::= INTEGER (0..100)

percentSyntax ATTRIBUTE-SYNTAX
        Percent
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-percent
```

9.1.5.36 ObjectIdentifier and objectIdentifierSyntax

Attribute value types that encode the ASN.1 object identifier type (specified in ISO/IEC 8824) values employ this data type and generic syntax in their definitions.

```
ObjectIdentifier ::= OBJECT IDENTIFIER
```


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```
objectIdentifierSyntax ATTRIBUTE-SYNTAX
        ObjectIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-object-identifier
```

9.1.5.37 ObjectIdentifierSequence and objectIdentifierSequenceSyntax

Attribute value types that encode sequences of object identifier values employ this generic syntax or datatype in their definitions.

```
ObjectIdentifierSequence ::= SEQUENCE OF ObjectIdentifier

objectIdentifierSequenceSyntax ATTRIBUTE-SYNTAX
        ObjectIdentifierSequence
        MATCHES FOR EQUALITY
        ::= id-syn-object-identifier-sequence
```

9.1.5.38 NameOrOid and nameOrOidSyntax

Attribute value types that encode identifiers that may have either a global-form or a local-form employ this generic syntax or datatype in their definitions.

The global-form is of the object identifier type, and is expected to be used wherever such a value has been defined for the object in question. The local-form is intended for local implementation convenience, for use when a global-form is not available or has not been defined for the object to be identified.

```
NameOrOid ::= CHOICE {
        global-form   [0] OBJECT IDENTIFIER,
        local-form    [1] SimpleName }

nameOrOidSyntax ATTRIBUTE-SYNTAX
        NameOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-name-or-oid
```

NOTE – It must be stressed that the **local-form** is not guaranteed to be unique, since there are no procedures in place to control the creation and usage of simple-name types. It is possible for two different sites to create and use the same simple-name to identify two different entities. If those two sites are interconnected subsequently, unexpected results can occur because of this duplication of simple-names. For this reason, the **local-form** is to be used only for purely local or temporary purposes; the **global-form** must be used in all other cases.

9.1.5.39 NameOrOidSequence and nameOrOidSequenceSyntax

Attribute value types that encode sequences of NameOrOid values employ this generic syntax or datatype in their definitions.

```
NameOrOidSequence ::= SEQUENCE OF NameOrOid

nameOrOidSequenceSyntax ATTRIBUTE-SYNTAX
        NameOrOidSequence
        MATCHES FOR EQUALITY
        ::= id-syn-name-or-oid-sequence
```

9.1.5.40 DistinguishedName and distinguishedNameSyntax

The **DistinguishedName** datatype is defined in ISO/IEC 9594-2:1990 to enable the creation of unambiguous identifiers. Objects named in accordance with this datatype may, but need not, be represented by collections of information stored in, and accessible from, a Directory Server.

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The **distinguishedNameSyntax** is defined here for use in the definition of DPA attributes which are intended to encode such identifiers.

```
distinguishedNameSyntax  ATTRIBUTE-SYNTAX
        DistinguishedName
        MATCHES FOR EQUALITY
        ::= id-syn-distinguished-name
```

NOTE – **DistinguishedName** is imported from the Directory Standard: the matching rule is defined there.

9.1.5.41 RDNSequence and rdnSequenceSyntax

Attribute value types that specify named objects using relative distinguished names (RDN) employ the **RDNSequence** data type and the **rdnSequenceSyntax**. These definitions are adapted from ISO/IEC 9594 (Directory).

```
AttributeType               ::= OBJECT IDENTIFIER
AttributeValue              ::= ANY
NameComponent               ::= SEQUENCE { AttributeType, AttributeValue }

RelativeDistinguishedName   ::= SET OF NameComponent
RDNSequence                 ::= SEQUENCE OF RelativeDistinguishedName
DistinguishedName           ::= RDNSequence

rdnSequenceSyntax ATTRIBUTE-SYNTAX
        RDNSequence
        MATCHES FOR EQUALITY
        ::= id-syn-rdn-sequence
```

9.1.5.42 Realization and realizationSyntax

Attribute value types that indicate whether a particular object is classified as a logical or a physical object employ this generic syntax or datatype in their definitions. In some instances, an object may be considered as both logical and physical, in which case the value shall be **logical-and-physical**.

```
Realization ::= ENUMERATED {
        logical                 (0),
        physical                (1),
        logical-and-physical    (2) }

realizationSyntax ATTRIBUTE-SYNTAX
        Realization
        MATCHES FOR EQUALITY
        ::= id-syn-realization
```

9.1.5.43 MediumDimensions and mediumDimensionsSyntax

Attribute value types that specify the size of a medium in millimetres employ this generic data type and syntax in this definition.

```
MediumDimensions ::= SEQUENCE {
        x-size   NonNegativeReal,
        y-size   NonNegativeReal }

mediumDimensionsSyntax ATTRIBUTE-SYNTAX
        MediumDimensions
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-medium-dimensions
```


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The SET-COMPARISON matching rule for mediumDimensionsSyntax is:

> the asserted value area is defined as a subset of the attribute value area if that asserted area is completely contained within the area defined by the attribute. See 6.4.5.1

9.1.5.44 Dimension and dimensionSyntax

Attribute value types that specify a single linear dimension either (1) in millimetres or (2) as a name-or-OID with an optional tolerance in millimetres employ this generic data type and syntax in this definition. The tolerance shall be interpreted as plus or minus.

```
Dimension ::= SEQUENCE {
        value       CHOICE {
            numeric-valued [0] NonNegativeReal,
            named-value    [1] NameOrOid },
        tolerance      [2] NonNegativeReal OPTIONAL }

dimensionSyntax ATTRIBUTE-SYNTAX
        Dimension
        MATCHES FOR EQUALITY
        ::= id-syn-dimension
```

9.1.5.45 XYDimensions and xyDimensionsSyntax

Attribute value types that specify a rectangular area either (1) in millimetres or (2) as a name-or-oid with an optional tolerance in millimetres employ this generic data type and syntax in this definition. The tolerance shall be interpreted as plus or minus.

```
XYDimensions ::= SEQUENCE {
        value       CHOICE {
            numeric-valued [0] SEQUENCE {
                x-dimension    [0] NonNegativeReal,
                y-dimension    [1] NonNegativeReal },
            named-valued   [1] NameOrOid },
        tolerance    [2] NonNegativeReal OPTIONAL }

xyDimensionsSyntax ATTRIBUTE-SYNTAX
        XYDimensions
        MATCHES FOR EQUALITY
        ::= id-syn-x-y-dimensions
```

The SET-COMPARISON matching rule for xyDimensionsSyntax is:

> the asserted value area is defined as a subset of the attribute value area if that asserted area is completely contained within the area defined by the attribute. See 6.4.5.1.

9.1.5.46 Locations and locationsSyntax

Attribute value types that specify a sequence of locations as distances from a reference edge in millimetres with an optional tolerance in millimetres employ this generic data type and syntax in this definition. The tolerance shall be interpreted as plus or minus.

```
Locations ::= SEQUENCE {
        value       CHOICE {
            numeric-valued [0] SEQUENCE OF NonNegativeReal,
            named-value    [1] NameOrOid },
        tolerance      [2] NonNegativeReal OPTIONAL }
```


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```
locationsSyntax ATTRIBUTE-SYNTAX
        Locations
        MATCHES FOR EQUALITY
        ::= id-syn-locations
```

9.1.5.47 Area and areaSyntax

Attribute value types that specify the size and placement of two dimensional objects with respect to the Reference Coordinate System (RCS) employ this generic data type and syntax in their definitions, such as the assured reproduction area.

```
Area ::= SEQUENCE {
        minimum-x     NonNegativeReal,
        maximum-x     NonNegativeReal,
        minimum-y     NonNegativeReal,
        maximum-y     NonNegativeReal }

areaSyntax ATTRIBUTE-SYNTAX
        Area
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-area
```

The SET-COMPARISON matching rule for areaSyntax is:

> the asserted value area is defined as a subset of the attribute value area if that asserted area is completely contained within the area defined by the attribute. See 6.4.5.1

9.1.5.48 AreaSequence and areaSequenceSyntax

Attribute value types that encode a sequence of area values employ this generic syntax in their definitions.

```
AreaSequence ::= SEQUENCE OF Area

areaSequenceSyntax ATTRIBUTE-SYNTAX
        AreaSequence
        MATCHES FOR EQUALITY
        ::= id-syn-area-sequence
```

9.1.5.49 Edge and edgeSyntax

Distinguished edges of a medium are identified by values of the **Edge** datatype. These values are keyed to the reference-coordinate-system in the following way:

a) the bottom reference-edge coincides with the x-axis of the RCS;

b) the left reference-edge coincides with the y-axis of the RCS.

c) the top reference-edge is the edge opposite the bottom reference edge

d) the right reference edge is the edge opposite the left reference edge.

The **Edge** datatype is used in finishing-object attributes, or wherever it is necessary to refer to a particular medium-edge unambiguously.

```
Edge ::= ENUMERATED {
        bottom-edge     (0),
        right-edge      (1),
        top-edge        (2),
        left-edge       (3) }
```


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```
edgeSyntax ATTRIBUTE-SYNTAX
        Edge
        MATCHES FOR EQUALITY
        ::= id-syn-edge
```

9.1.5.50 FontReference and fontReferenceSyntax

Attribute value types that identify a font employ this generic syntax and datatype in their definition. The **FontReference** type permits a choice of a **SimpleName** or **Global-Name** from ISO/IEC 9541-2, thus supporting fonts that conform to ISO/IEC 9541 and those that do not.

```
FontReference ::= CHOICE {
        simple-font-name     [0] SimpleName,
        iso-9541-font-name   [1] Global-Name }

fontReferenceSyntax ATTRIBUTE-SYNTAX
        FontReference
        MATCHES FOR EQUALITY
        ::= id-syn-font-reference
```

9.1.5.51 CardinalOrOid and cardinalOrOidSyntax

Attribute value types that can specify a value as either a Cardinal or an OID (that normally names a Cardinal) employ this generic data type and syntax in this definition.

```
CardinalOrOid ::= CHOICE {
        cardinal-value     [0] Cardinal,
        oid-value          [1] OBJECT IDENTIFIER }

cardinalOrOidSyntax ATTRIBUTE-SYNTAX
        CardinalOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-or-oid
```

9.1.5.52 OidCardinalMap and oidCardinalMapSyntax

Attribute value types that can specify a value as a Cardinal and also have an OID that acts as alias for the Cardinal employ this generic data type and syntax in this definition.

```
OidCardinalMap ::= SEQUENCE {
        oid-name           [0] OBJECT IDENTIFIER OPTIONAL,
        cardinal-value     [1] Cardinal }

oidCardinalMapSyntax ATTRIBUTE-SYNTAX
        OidCardinalMap
        MATCHES FOR EQUALITY
        ::= id-syn-oid-cardinal-map
```

NOTE - For an example of how this type is used, see the two attributes **printer-resolutions-supported** and **default-printer-resolution**.

9.1.5.53 CardinalOrNameOrOid and cardinalOrNameOrOidSyntax

Attribute value types that can specify a value as either a Cardinal or a NameOrOid (that normally names a Cardinal) employ this generic data type and syntax in this definition.

```
CardinalOrNameOrOid ::= CHOICE {
        cardinal-value             [0] Cardinal,
        name-or-oid-value          [1] NameOrOid }
```


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```
cardinalOrNameOrOidSyntax ATTRIBUTE-SYNTAX
        CardinalOrNameOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-or-name-or-oid
```

A **name-or-oid-value** element shall be any string of characters that can be represented by the specified coded character set and which does not satisfy the syntax rules for a string representing a **Cardinal** value. For example, neither "**8**", "**+8**", nor "**08**" shall be allowed as names, because they satisfy the syntax rules for a string representing a **Cardinal** value. **Cardinal** values shall be represented using the **cardinal-value** element.

9.1.5.54 PositiveIntegerOrOid and positiveIntegerOrOidSyntax

Attribute value types that encode identifiers that may be either an object identifier or a positive integer employ this generic syntax or data type in their definitions.

```
PositiveIntegerOrOid  ::= CHOICE {
        object-identifier      [0] OBJECT IDENTIFIER,
        positive-integer       [1] PositiveInteger }

positiveIntegerOrOidSyntax ATTRIBUTE-SYNTAX
        PositiveIntegerOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-positive-integer-or-oid
```

9.1.5.55 EventHandlingProfile and eventHandlingProfileSyntax

Attribute value types that specify event handling profiles employ this generic syntax or data type in their definitions.

```
RPCAddress ::= CHOICE {
        name-binding [0] Text,  --for an implementation that uses the name
                                -- service, e.g., DCE;  ONC should use
                                -- onc-binding, but may use name-binding
        onc-binding  [1] SEQUENCE {  -- for ONC only
            host-name              [0] Text,
            program-number         [1] Cardinal,
            version-number         [2] Carcinal,
            procedure-number       [3] Cardinal,
            authentication-name    [4] Text } }

DeliveryAddress ::= CHOICE {
        mhs-address         [0] ORAddressAndOrDirectoryName, -- ISO/IEC 10021-4
        distinguished-name  [1] DistinguishedName,           -- ISO/IEC 9594-2
        text                [2] Text,
        dor                 [3] DOR,                         -- ISO/IEC 10031-2
        octet-string        [4] OCTET STRING(SIZE(0..ub-octet-string)),
        dist-name-string    [5] DistinguishedNameString, }
        rpc-address         [6] RPCAddress }        -- for notification service
```

NOTE – **ORAddressAndOrDirectoryName** is imported from ISO/IEC 10021-4, **DistinguishedName** is imported from ISO/IEC 9594-2 and **DOR** is imported from ISO/IEC 10031-2.

```
EventHandlingProfile ::= SEQUENCE {
        event-identifiers       [0] SET OF OBJECT IDENTIFIER OPTIONAL,
        delivery-method         [1] OBJECT IDENTIFIER OPTIONAL,
        event-comment           [2] Message OPTIONAL,
        delivery-address        [3] DeliveryAddress OPTIONAL,
        locale                  [4] Locale OPTIONAL }
```


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```
eventHandlingProfileSyntax ATTRIBUTE-SYNTAX
        EventHandlingProfile
        MATCHES FOR EQUALITY
        ::= id-syn-event-handling-profile
```

The **event-identifiers** element is a set of identifiers of event types and event classes of interest that may occur during the processing and printing of the print-job. If the **event-identifiers** element is omitted, the server shall supply a default value in an implementation-defined manner, possibly from an appropriate attribute value of an initial-value-job object. If an empty set is supplied, all event types and classes are designated. Standard event-identifier values are defined in 8.5.

Standard values for **delivery-method** are defined in specification of the **delivery-method-identifier** attribute of the delivery-method object class. Some of the values indicated may require other components of the **EventHandlingProfile** type to become mandatory.

The omission of **delivery-method** from an **EventHandlingProfile** type indicates the standard delivery-method of a particular implementation is to be used (e.g., electronic mail).

The **event-comment** element is a human-readable string supplied by the client, and it may be inserted within the notification message that the recipient gets via electronic mail, via some notification mechanism, or via some file. It is intended to supply additional information to the notification recipient, who may or may not be the person who submitted the job (e.g. "This event occurred during Bill's job.", or "The suspended job is really urgent, so please fix the problem.", or "The suspended job was submitted by the XYZ program."). The **event-comment** is not intended to contain information that would normally be in the **delivery-address**. The **event-comment** does not appear on a job sheet because notifications and loggings never produce hard-copy results.

The **delivery-address** element is programmatically interpretable data that fully specifies the address of the recipient of notifications (e.g. an e-mail address or a file path-name). The structure and content of a **delivery-address** is specific to the **delivery-method**.

For some notification mechanisms, the **delivery-address** may be ignored because the direct recipient is not something that the client specifies, but is, instead, a notification server that registers with the (spooling) server and then receives all or selected notification messages. Such a notification server would forward to clients all messages that the client had registered an interest in with the notification server. If a notification server controls the events it receives from a (spooling), then the client does not need to use this notification-profile at all for receiving events via a notification server. Instead, the client registers its interest with the notification server. Such an architecture may allow a client to receive notification about printer problems even when its job is not printing.

If the **delivery-address** element is omitted from an ***xxx*-profile** attribute value, the server shall select a value from the **default-delivery-address** attribute, if supplied by the client for the specified **delivery-method**; otherwise, the server shall not use this value of the **EventHandlingProfile** for notification or logging.

The **locale** element is the specification of the language, country, and coded character set that the server shall use when constructing or writing notification messages. If this element is omitted, the server shall use the locale specified in the **operation-locale** attribute of CommonArguments, if specified, and if not then use the value of the server's **locale** attribute.

9.1.6 Generic attributes, their datatypes, and syntaxes

Many attributes associated with different object classes share a common form and set of values. This clause defines attribute syntaxes, datatypes and standard values used in the definitions of attributes, and a set of generic attributes that are used with several object classes. The remaining subclauses of clause 9 specify the attributes for particular object classes. Those subclauses also contain a table indicating which generic attributes may be contained in objects of the object class.

The client may specify generic attributes in:

a) Print: **id-att-notification-profile, id-att-logging-profile**

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b) ModifyJob: **id-att-notification-profile, id-att-logging-profile**

c) ListObjectAttributes: all

9.1.6.1 Object-class

This attribute identifies the object class to which the associated object belongs.

```
object-class ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-object-class  -- see ISO/IEC 9594-2 9.5.4
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
generic	id-oc-generic	A generic object class for the purpose of defining attributes that may be contained in objects belonging to several other object classes.
job	id-oc-job	A print-job object class where each object represents a distinct set of job attributes and contains one or more document objects, plus possibly font and resource objects.
document	id-oc-document	A printable document object class where each object represents a distinct set of document attributes and contains a series of electronic page images.
printer	id-oc-printer	A printer object class where each object represents a logical, a physical, or both a logical and a physical printer.
server	id-oc-server	A server object class where each object represent a server that accept protocol requests conforming to ISO/IEC 10175.
medium	id-oc-medium	A medium object class where each object represent a logical medium, a physical medium, or both a logical and a physical medium.
font	id-oc-font	A font object class where each object contains font attributes and a collection of glyph images having the same basic design.
resource	id-oc-resource	A resource object class where each object contains resource attributes and data that the server uses to print a document, such as an overlay, logo, etc.
transfer-method	id-oc-transfer-method	A transfer-method object class where each object represents the attributes of a specific method for transferring electronic documents to the server.
delivery-method	id-oc-delivery-method	A delivery-method object class where each object represents the attributes of a specific method for a server to deliver printed documents, logs, and notifications.
auxiliary-sheet-package	id-oc-auxiliary-sheet-package	An auxiliary-sheet object class where each object contains attributes that specify a set of auxiliary-sheets to be placed at specific positions in a print-job.
auxiliary-sheet	id-oc-auxiliary-sheet	An auxiliary-sheet object class where each object represents a specific type of additional sheet that the server may print before and/or after each printed document or between them.

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finishing	id-oc-finishing	A finishing object class where each object represents a sequence of additional operations that the server may apply to printed output to produce complete documents.
output	id-oc-output	An output object class where each object represents a different additional operations that the server may apply to the printed output, such as sorting or collating.
imposition	id-oc-imposition	An imposition object class where each object represents processing functions that alter the electronic document prior to imaging and rendering, such as placing multiple page images on a single side of a medium.
scheduler	id-oc-scheduler	A scheduler object class where each object represents a different scheduling algorithm and policy that the server implements for scheduling jobs on a printer.
initial-value-job	id-oc-initial-value-job	An initial-value-job class where each object represents a set of default values for job attributes.
initial-value-document	id-oc-initial-value-document	An initial-value-document class document where each object represents a set of default values for document attributes.
resource-context	id-oc-resource-context	A resource-context class where each object encapsulates the details about the server's environment that, when use with a resource name, uniquely identify a resource in the server's environment.

9.1.6.2 Descriptor

This attribute provides a description of a DP-object in the form of human-readable text. The text is not an unambiguous identification of the DP-object, but identical text for different DP-objects is intended to be uncommon.

```
descriptor ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX descriptorSyntax
        SINGLE VALUE
        ::= id-att-descriptor
```

9.1.6.3 Descriptive-name

This attribute provides a descriptive name of a DP-object in the form of human-readable text. This string is used for reporting to the client, which the client can in turn display to its human user. It also provides some consistency between client implementations for the communication between the client and its human user.

```
descriptive-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX descriptiveNameSyntax
        SINGLE VALUE
        ::= id-att-descriptive-name
```

9.1.6.4 State

This attribute identifies the current state of the object

```
state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-state
```

These generic state values do not apply to all object classes (e.g., job, document, or printer classes). State values for these objects are defined with the other attributes that pertain to these objects.

The following standard values are defined:

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Descriptive Name	Object Identifier	Descriptor Text
ready	id-val-state-ready	Indicates that the object is ready to be used without human intervention
initializing	id-val-state-initializing	Indicates that the object is being initialized
on-request	id-val-state-on-request	Indicates that the object requires human intervention in order to be used
unavailable	id-val-state-unavailable	Indicates that the object is not available for use even with human intervention
busy	id-val-state-busy	Indicates that the object is temporarily inaccessible due to dynamic constraints, but will become ready without human intervention
terminating	id-val-state-terminating	Indicates that the object is being terminated
unknown	id-val-state-unknown	Indicates that the state of the object is not known

9.1.6.5 Message

This attribute specifies a human readable string associated with an object that may be presented as a message when the user requests this object.

```
message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-message
```

This attribute may be used to indicate to users, for example, why an object is unavailable or when it is expected to be ready or on-request.

9.1.6.6 Availability

This attribute indicates the current availability of an object.

```
availability ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-availability
```

This attribute may be used to indicate the load of servers, printers, etc. and it may also be used to indicate the supply of media, font resources, etc.

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
high	id-val-availability-high	Indicates that the availability of the object is high, e.g., a server is not busy, or there is plenty of the given media
normal	id-val-availability-normal	Indicates that the availability of the object is normal, e.g. the load on the server is reasonable or as expected
low	id-val-availability-low	Indicates that the availability of the object is low, e.g., a server is busy, or a supply of media is low
none	id-val-availability-none	Indicates that the object is not available, see 9.1.2
unknown	id-val-availability-unknown	Indicates that availability cannot be determined

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9.1.6.7 List-of-managers

This attribute contains the list of managers responsible for the maintenance and operation of the object. This information may be provided to users to assist in the resolution of system problems.

```
list-of-managers ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-list-of-managers
```

The manager indicated may not necessarily identify an individual (for example, it may identify a group of users or a programmatic object).

9.1.6.8 Notification-profile

This attribute is a specification of events about which the user and/or designate are to be notified. In addition, this attribute specifies how the event notifications are to be delivered.

```
notification-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX eventHandlingProfileSyntax
        MULTI VALUE
        ::= id-att-notification-profile
```

Servers may produce the same information for notification and logging or they may produce different information, depending on implementation. The server should provide notification information in the language that an average user can understand. The server should provide logging information to enough depth for an expert administrator or implementor to find useful.

9.1.6.9 Logging-profile

This attribute is a specification of events which are to be logged. In addition, this attribute specifies how the logs are to be delivered. The exact structure and content of the logs is implementation-dependent.

```
logging-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX eventHandlingProfileSyntax
        MULTI VALUE
        ::= id-att-logging-profile
```

Servers may produce the same information for notification and logging or they may produce different information, depending on implementation. The server should provide notification information in the language that an average user can understand. The server should provide logging information to enough depth for an expert administrator or implementor to find useful.

9.1.6.10 Associated-server

This attribute indicates the name of the server with which this object is currently associated.

> NOTE – In some print-systems, the server and printer are one and the same. For these systems, when this attribute is used on the printer object, the printer identifier and the **associated-server** identifier may be the same. In other systems, many individual printers may be accessed through a single server. In these systems, when this attribute is used on the printer objects, the printer identifiers might not be the same as the associated-server identifier. The exact configuration is implementation-dependent.

```
associated-server ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-associated-server
```


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9.1.7 Internet-related attributes

The Internet Assigned Numbers Authority (IANA) is the central coordinator for the assignment of unique parameter values for Internet protocols.

The IANA is chartered by the Internet Society (ISOC) and the Federal Network Council (FNC) to act as the clearinghouse to assign and coordinate the use of numerous Internet protocol parameters.

The common use of the Internet protocols by the Internet community requires that the particular values used in these parameter fields be assigned uniquely. It is the task of the IANA to make those unique assignments as requested and to maintain a registry of the currently assigned values.

Standard values of several attributes defined in this International Standard are derived from lists of values that have been assigned by the IANA. The objective of this form of attribute value definition is interoperability; the particular attribute value sets in question are used by Internet Standards that are closely related to ISO/IEC 10175, in particular, the Printer MIB (RFC 1759 at the time of this writing). By aligning these two standards in this manner, implementation of print-server and printer software is facilitated, since many such implementations are expected to support both ISO/IEC 10175 and RFC 1759 (and its successors).

Access to the assigned values maintained by the IANA is available on the Internet by means of anonymous FTP. The full ftp address is:

ftp.isi.edu/in-notes/iana/assignments

Each different class of assignment, e.g., coded character sets, is grouped in a subdirectory of the iana/assignments directory. Within this clause, the relevant iana/assignments subdirectory is indicated for each of the attribute definitions whose values are derived from such an IANA subdirectory.

9.2 Job Object attributes

A job object contains a set of job attributes and one or more document objects. The server shall create a printable job object in response to a client that invokes one or more **Print** abstract-operations (see 8.2.1). In addition, initial-value-job objects are created in a server by means outside the scope of this part of ISO/IEC 10175 in order to represent complete sets of default values for job attributes (see the **initial-value-job** object class). This subclause of ISO/IEC 10175 specifies the job attributes for both job and initial-value-job objects. Subclause 9.3 specifies the document attributes for document objects.

In addition to the attributes specifically defined for the job and initial-value-job objects, certain of the generic attributes may also be associated with these objects. For example, when requesting a list of attribute values for an object of these classes, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Sub-clause	Generic attribute name
9.1.6.1	object-class
9.1.6.8	notification-profile
9.1.6.9	logging-profile

9.2.1 Job-information attributes

These attributes provide information to identify a print-job. (e.g., for searching and for printing on auxiliary-sheets).

The client may specify job-information attributes in:

a) Print: all, except **id-att-job-identifier** and **id-att-job-identifier-on-printer**

b) ModifyJob: all, except **id-att-job-identifier**, **id-att-job-identifier-on-printer**, **id-att-job-identifier-on-client**, **id-att-job-originator**, **id-att-job-owner**, **id-att-initial-value-job**, and **id-att-job-password**

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c) ListObjectAttributes: all

9.2.1.1 Job-identifier

This attribute provides the job-identifier for this job on the server. The server shall generate a job-identifier value that is unique on that server, but need not be unique across the distributed environment.

```
JobIdentifier ::= PrintableString (SIZE (1..255))

jobIdentifierSyntax ATTRIBUTE-SYNTAX
        JobIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-job-identifier

job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier
```

The value of the **job-identifier** attribute shall be returned by the server as part of the **PrintResult** in the first **Print** abstract-operation for the job (see 8.2.1). The client shall pass its value as part of the **PrintArgument** in subsequent **Print** abstract-operations for the same job.

9.2.1.2 Job-identifier-on-printer

This attribute provides the job-identifier for this job to uniquely identify it on the printer or next server downstream, and it shall be assigned by that printer or server.

```
job-identifier-on-printer ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier-on-printer
```

The value of the **job-identifier-on-printer** attribute shall be the job-identifier that the printer or the next server downstream generates at the time the server submits the job to the printer or the next server downstream. If the printer or the next server downstream does not generate its own job identifier, the server shall leave the value of this attribute unspecified.

NOTE – This attribute is intended for jobs submitted to other servers, such as a gateway to a legacy server, or to printers which have their own internal queue and assign their own job identifiers.

9.2.1.3 Job-identifier-on-client

This attribute provides the job-identifier for this job to uniquely identify the job on the client submitting the job, and the value shall be assigned by that client.

```
job-identifier-on-client ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier-on-client
```

The client shall supply the value of the **job-identifier-on-client** attribute at the time that the client submits the job to the server, if such client has its own job-identifier for the job.

NOTE 1 – This attribute is intended for jobs submitted from legacy servers which have their own job-identifier for the job.

If a job passes through a chain of servers between the client initiating the job and the output device, the value of the job attribute **job-identifier-on-client** shall be the value of the job's **job-identifier** on the immediate upstream server and the value of the job attribute **job-identifier-on-printer** shall be the value of the job's **job-identifier** on the immediate downstream server or printer.

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NOTE 2 – A job has attributes for identifying itself on the current server, on the immediate upstream server (where the job came from), and on the immediate downstream server or printer (where the job went). These attributes are **job-identifier**, **job-identifier-on-client,** and **job-identifier-on-printer**, respectively.

9.2.1.4 Job-client-id

This attribute supplies a human-readable descriptor for the job. This descriptor may be printed by the server on auxiliary-sheets to help identify the user's printed output, and discriminate between different jobs.

```
job-client-id ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-job-client-id
```

Use and treatment of this attribute is implementation and site specific.

If the client specifies the value of the job attribute **job-client-id**, no server shall change it. If the client does not specify the value of the job attribute **job-client-id**, the first server shall set it to the value of the job attribute **job-identifier**, so that no downstream server shall change it. These rules ensure that if an implementation prints the value of the **job-client-id** on an auxiliary-sheet, it has a value that is meaningful to the client originally submitting the job, no matter how many servers the job passes through.

For example, client A submits a job to server B and does not specify a value for the job attribute **job-client-id**. Server B assigns a **job-identifier** of **123** to the job, and forwards this job to server C. Server C assigns a **job-identifier** of **456** to the job and forwards this job to printer D. Printer D is not a DPA server, but it has its own queue and assigns a job-id of **789** to the job. The following table shows the value of the relevant job attributes in the two servers B and C:

	job-client-id	job-identifier-on-client	job-identifier	job-identifier-on-printer
server B	123	unspecified	123	456
server C	123	123	456	789*

* If printer D did not assign a job-id to its jobs, then the value of the job attribute **job-identifier-on-printer** for server C would be unspecified.

9.2.1.5 Job-name

This attribute supplies a human readable string for the print-job. This string is used for naming the print-job in human-readable "free-form" fashion.

```
job-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-job-name
```

This attribute is intended for enabling a user or the user's application to convey a job name that may be printed on a start sheet, returned in a ListObjectAttributes result, or used in notification or logging messages.

If this attribute is not specified, no job name is assumed, but implementation specific defaults are allowed, such as the value of the **document-name** attribute of the first document in the job.

9.2.1.6 Job-originator

This attribute supplies the name of the human or programmatic originator of the print-job.

```
job-originator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-job-originator
```


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If this attribute is not specified, no value for job originator is assumed, but implementation specific defaults are allowed.

NOTE – This attribute may be different from **job-owner** (1) when a program submits the print-job on behalf of a user or (2) when an operator must resubmit a misprinted job on behalf of the original job owner. However, an operation to resubmit a print-job is outside the scope of this part of ISO/IEC 10175. See part 3 of ISO/IEC 10175 for a description of the resubmit abstract-operation.

9.2.1.7 Job-owner

This attribute supplies the name of the human owner of the print-job.

```
job-owner ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-job-owner
```

The value of **job-owner** will often be the same as **job-originator**. The **job-owner** will be different from **job-originator** when the job has been submitted by the originator on behalf of the owner. This attribute is not to take the place of the security parameters or the access-and-accounting attributes.

If this attribute is not specified, the value of **user-name** or **job-originator** should be used for any circumstances which require a value for **job-owner**.

9.2.1.8 Job-comment

This attribute supplies an arbitrary human-readable text string associated with the print-job.

```
job-comment ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-comment
```

This attribute is intended for enabling a user to convey a text string that may be printed on a job start sheet, for example, in an implementation-dependent manner.

9.2.1.9 Job-start-message

This attribute supplies a human-readable message string associated with the print-job.

```
job-start-message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-start-message
```

This message is forwarded to the operator (in an implementation-dependent manner) when job processing starts. If job-start-wait is TRUE, this message shall be forwarded to the operator at the beginning of the wait period.

9.2.1.10 Job-end-message

This attribute supplies a human-readable message string associated with the print-job.

```
job-end-message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-end-message
```

This message is forwarded to the operator (in an implementation-dependent manner) when job processing ends.

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9.2.1.11 Job-non-compulsory-attributes

This attribute identifies the attribute-type **ObjectIdentifier** of those job attributes that the server shall consider as *non-compulsory* (see 6.4.6 and 9.1.1). If a server does not recognize and/or support (1) a job attribute or (2) some of the values of the job attribute supplied by a client in a **Print** abstract-operation, the server shall either:

a) If the **ObjectIdentifier** of that attribute-type is present in the value of **job-non-compulsory-attributes**, the server shall ignore that attribute and/or its unsupported values and copy them to the value of the job's **ignored-attributes**.

b) If the **ObjectIdentifier** of that attribute-type is not present in the value of **job-non-compulsory-attributes**, the server shall reject the job (see 8.2.1).

```
job-non-compulsory-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-non-compulsory-attributes
```

9.2.1.12 Initial-value-job

This attribute identifies an initial-value-job object (see the **initial-value-job** object class) in the server that contains default attributes to be used when constructing the job object during print-job submission.

If the client specifies the **initial-value-job** attribute with a value, the server shall use the specified initial-value-job object to initialize any job attribute not specified (or specified with no value) by the client in the **Print** abstract-operation, instead of using the initial-value-job object specified by the printer's **printer-initial-value-job** attribute. Thus, the **initial-value-job** attribute provides the client with the ability to specify a different set of default attribute values than the set the server normally provides with the specified printer. See the **printer-initial-value-job** attribute for a description of the server defaulting of job attributes when the print-job is submitted and when the print-job is printed.

```
initial-value-job ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-job
```

If this attribute is unspecified (or specified with no values) at the time a print-job is created, the server shall copy the value from the specified printer's **printer-initial-value-job** attribute (if supported) as the value for this attribute.

Modifying the value of the **initial-value-job** attribute of a job object using the ModifyJob operation shall have no effect (since the server has lost track of whether the job's other attribute-values were supplied by (1) the client explicitly, (2) the initial-value-job object specified by the client as the value of the **initial-value-job** attribute), or (3) the initial-value-job object specified by the printer as the value of the printer's **printer-initial-value-job** attribute).

9.2.2 Job-results-handling attributes

These attributes specify the actions to be undertaken after printing of a job has been completed. This includes assembly of documents into job sets, finishing operations applied to job sets, and delivery of the completed job sets.

The client may specify job-results-handling attributes in:

a) Print: all

b) ModifyJob: all

c) ListObjectAttributes: all

9.2.2.1 Results-profile

The hardcopy output of a print-job consists of one or more *job sets*, each of which may be specified to be delivered to, or held for, one particular recipient who is not necessarily the job creator. Each job set may be specified to contain

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one or more *job copies*. Each job copy shall contain one or more copies of each of the documents specified by means of the **Print** abstract-operations that compose the job.

The **results-profile** attribute specifies the job sets that compose the job's output. This attribute may contain one or more **ResultsProfile** components, each of which specifies the composition and disposition of one job set. Each **ResultsProfile** may include the specification of a delivery-method and address for delivery of the hardcopy print output of the job set, a human readable comment for an operator or the recipient of the job set, the printer's output-bin which is to receive the hardcopy output, and the number of copies of the entire job to be delivered to the recipient. The number of copies of an individual document to be included in a job copy is specified in the print argument for that document by the document's **copy-count** attribute.

```
ResultsProfile ::= SEQUENCE {
        delivery-method      [0] OBJECT IDENTIFIER OPTIONAL,
        results-set-comment  [1] Message OPTIONAL,
        delivery-address     [2] DeliveryAddress OPTIONAL,
        job-copies           [3] PositiveInteger DEFAULT 1,
        output-bin           [5] NameOrOid OPTIONAL }

resultsProfileSyntax ATTRIBUTE-SYNTAX
        ResultsProfile
        MATCHES FOR EQUALITY
        ::= id-syn-results-profile

results-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX ResultsProfileSyntax
        MULTI VALUE
        ::= id-att-results-profile
```

The server shall ensure that the state of the printer is reset between job copies, and upon completion of the entire job.

Standard values for **delivery-method** are defined with the Delivery-Method Object attributes (see the **delivery-method** object class). Some of the values indicated may require other components of the **ResultsProfile** type to become mandatory.

The omission of a value for **delivery-method** in a **ResultsProfile** type indicates the default delivery-method of a particular implementation is to be used (e.g., pick-up).

The **results-set-comment** component is a human-readable string supplied by the client. The job attribute **job-comment** may convey similar information, except that the **results-set-comment** may be different for each result-set. The **results-set-comment** is intended to help in the delivery of the hard-copy results of the job or give information about it. The **results-set-comment** may be printed on job-sheets or document-sheets. It may provide information to an operator that is beyond what the delivery address supplies (e.g. "Please deliver before 2pm." or "Please use an XYZ overnight package delivery service", "Please insert this into a envelope." or "Please staple this document."), or it may supply information to a recipient of the hard-copy results (e.g. "please, read this by tomorrow" or "read the enclosed documents in order"). It is not intended to contain information that would normally be in the delivery-address. It is ignored when results are delivered electronically (e.g. if the **delivery-method** is **doc-file**).

The **delivery-address** component is programmatically interpretable data that fully specifies the address of the recipient of results. The structure and content of **delivery-address** is specific to the delivery-method. For example, **delivery-address** can be used as a postal mail address, printed on the start sheet(s) and/or end sheet(s), etc. If no value is specified for **delivery-address**, no address is assumed, but implementation specific defaults are allowed.

For each job result set defined in the job's **results-profile** attribute, the server shall produce the specified number of **job-copies**; each job copy shall be composed of the specified document sets, produced in ascending order based on the **document-sequence-number** of the contained document objects. See 3.2 for definitions of job result set, job copy, document set and document copy.

The server shall deliver all output for each job result set as a single unit.

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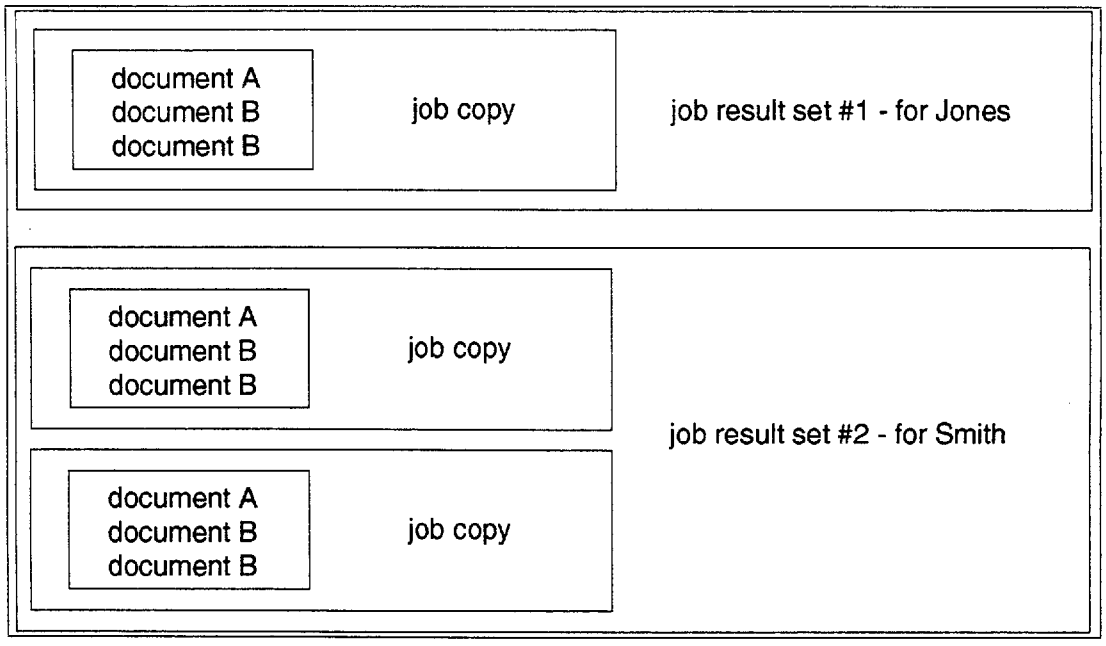
A server may produce the output of a job result set on more than one printer, as long as the final job result set is collated by some means, either automatically or by hand, and is finally delivered as a unit.

Because the **results-profile** does not specify the order of the job sets, the order in which the job sets are printed within the whole job is implementation-dependent.

For example, consider the following job being submitted:

```
results-profile: {delivery-address=Jones, job-copies=1},
                 {delivery-address=Smith, job-copies=2}
documentA with copy-count=1
documentB with copy-count=2
```

A server shall produce document copies in the following order within each job result set. The result set for Jones may precede or follow the result set for Smith. The two result sets could be produced simultaneously if the specified logical printer has two or more associated physical printers.



The **output-bin** element specifies the output receptacle for the media on which the job-result-set is to be printed. The **NameOrOid** type provides two choice types for use in system implementations that (1) use a simple-named bin identification and (2) for those that use named bins that are identified with object identifiers.

The **output-bin** element specifies the output receptacle for the media on which the job-result-set is to be printed. The **NameOrOid** type provides two choice types for use in system implementations that (1) use a simple-named bin identification (which may consist of a simple-name or solely of numeric digits for numbered bins, including leading 0 digits), and (2) for those that use named bins that are identified with object identifiers.

The correspondence between the integer name of an output-bin and the actual output-bin in the printer is printer-dependent, and an output-bin named by a simple-name may also have an object identifier that names the output-bin as well.

A server may try to convert a simple-name received from a client to one of the server's OIDs, depending on implementation. However, a server shall always return an output-bin as an OID to the client if the server identifies the output-bin using an OID.

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Examples: Output-bins may be represented as (1) simple-name strings: **mail-box** or **top**, or the digit strings: **2** or **02** representing output-bin: 2, or (2) the OID value: **id-val-output-bin-top** (which the user might specify as **top** to the client).

If the **results-profile** attribute is supplied, but the OPTIONAL **output-bin** attribute is omitted, the server shall use the default output-bin of the actual printing device.

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
top	id-val-output-bin-top	This value specifies the output bin which, when facing the printer, is best identified as the "top" bin with respect to the printer and the other output bins supported by the printer.
middle	id-val-output-bin-middle	This value specifies the output bin which, when facing the printer, is best identified as the "middle" bin with respect to the printer and the other output bins supported by the printer.
bottom	id-val-output-bin-bottom	This value specifies the output bin which, when facing the printer, is best identified as the "bottom" bin with respect to the printer and the other output bins supported by the printer.
side	id-val-output-bin-side	This value specifies the output bin which, when facing the printer, is best identified as the "side" bin with respect to the printer and the other output bins supported by the printer.
left	id-val-output-bin-left	This value specifies the output bin which, when facing the printer, is best identified as the "left" bin with respect to the printer and the other output bins supported by the printer.
right	id-val-output-bin-right	This value specifies the output bin which, when facing the printer, is best identified as the "right" bin with respect to the printer and the other output bins supported by the printer.
face-up	id-val-output-bin-face-up	This value specifies an output bin in which sheets shall be placed face up in the bin. If the document is printed two-sided the front-side is face-up.
face-down	id-val-output-bin-face-down	This value specifies an output bin in which sheets shall be placed face down in the bin. If the document is printed two-sided the front-side is face-down.
large	id-val-output-bin-large	This value specifies the output bin with the largest capacity (in terms of number of sheets).
private	id-val-output-bin-private	This value specifies the output bin which is identified with the **job-originator**.
collator	id-val-output-bin-collator	This value specifies that individual document copies are to be placed in the sequential slots of a collating device (sometimes called a sorter).

9.2.2.2 Job-finishing

This attribute identifies a finishing-object or a sequence of one or more finishing-processes to be applied to each job-copy of the printed output.

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Finishing encompasses the operations that may be applied to the media output of a print-job. Examples include stapling, saddle-stitching, hole-drilling, binding with tape, etc. The **Finishing** type permits a client to specify job-finishing by either of two means:

a) one server-defined named-finishing object may be specified by supplying its name or OID in the **job-finishing** attribute; the specified finishing object may consist of any number of individual finishing processes which shall be applied to each job copy; the individual finishing processes shall be applied in the sequence defined by the specified finishing object;

b) one or more individual finishing processes may be specified in the **job-finishing** attribute; each of the individual processes may also be specified in one of two ways:

   1) by identifying a server-defined finishing object, as in a) above; the identified finishing object shall be appropriate to the finishing process for which it is specified (e.g., it is an error to identify a stitching finishing object in a punching process specification, or to identify a finishing object comsisting of more than one finishing process).

   2) by including appropriate parameter values for each of the individual finishing process specifications included in the **job-finishing** attribute.

   For either method of specification, the individual finishing processes shall be applied in the sequence specified in the **job-finishing** attribute.

See the **finishing** object class for the definition of the **Finishing** type.

```
finishingSyntax ATTRIBUTE-SYNTAX
        Finishing
        MATCHES FOR EQUALITY
        ::= id-syn-finishing

job-finishing ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-job-finishing
```

Standard values for this attribute are defined in the specification of the **finishing-identifier** attribute of the finishing object class.

See the related per-document **finishing** attribute that applies finishing objects to each document separately.

9.2.2.3 Finishing-includes-job-sheets

This attribute specifies whether a **job-copy-start-sheet** and a **job-copy end-sheet**, if printed, shall be included in job-finishing operations. A value of **TRUE** means that such a **job-copy-start-sheet** and a **job-copy-end-sheet** shall be included in the sheets controlled by the job-finishing operations; a value of **FALSE** means that such sheets shall be excluded from the job-finishing operations.

```
finishing-includes-job-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-finishing-includes-job-sheets
```

9.2.2.4 Job-sheets

This attribute specifies the auxiliary-sheets that the server shall insert into the job. This job attribute uses a **NameOrOid** attribute value type to reference an **auxiliary-sheet-package** object, which specifies the auxiliary-sheets and each of their positions within the job. There are 6 possible positions within a job and an **auxiliary-sheet-package** object may contain any combination of them. Three of the positions relate to job (result) sets and three to job copies. For each of these two kinds of job components (job result set and job copies), the auxiliary- sheets may

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precede the component, follow the component or separate two adjacent components of the same kind. See the **results-profile** attribute (9.2.2.1) for a description of these job component concepts.

```
job-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        SINGLE VALUE
        ::= id-att-job-sheets
```

See 9.11 for more about **auxiliary-sheet-package** objects and 9.12 for more about **auxiliary-sheet** objects.

NOTE – For some sites, the **job-sheets-supported** attribute may allow only one choice so that only the system administrator has complete control over the sheets surrounding a job. For some legacy print-systems, where the job/document hierarchy is not supported, the **job-sheets-supported** attribute may allow only **none** (i.e. **id-val-generic-none**) which means there are no job-sheets. That is, the client can choose auxiliary-sheets only at the document level.

9.2.2.5 Document-sheets

This attribute specifies the auxiliary-sheets that the server shall insert into the job. This job attribute uses a **NameOrOid** attribute value type to reference an **auxiliary-sheet-package** object, which specifies the auxiliary-sheets and each of their positions within a document. There are 6 possible positions within a document and an **auxiliary-sheet-package** object may contain any combination of them. Three of the positions relate to document sets and three to document copies. For each of these two kinds of document components (document sets and document copies), the auxiliary-sheets may precede the component, follow the component or separate two adjacent components of the same kind. See the **results-profile** attribute (9.2.2.1) for a description of these document component concepts.

```
document-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        SINGLE VALUE
        ::= id-att-document-sheets
```

See 9.11 for more about **auxiliary-sheet-package** objects and 9.12 for more about **auxiliary-sheet** objects.

9.2.3 Job-event-handling attributes

These attributes provide information for the actions to be undertaken when significant events occur during the processing of the print-job.

The client may specify job-event-handling attributes in:

a) Print: all

b) ModifyJob: all

c) ListObjectAttributes: all

9.2.3.1 Job-abort-criteria

Specifies a list of limit values, any of which, when exceeded, force the abort of the print-job. Job-abort-criteria applies to "downstream errors", i.e., errors that occur after the final (or only) **Print** abstract-operation of a job has been accepted by the server and a normal return has been made to the client.

```
Criteria ::= SEQUENCE {
        criterion-type          CriterionType,
        criterion-threshold     ANY DEFINED BY criterion-type }

CriterionType ::=  AttributeId
```


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```
criteriaSyntax ATTRIBUTE-SYNTAX
        Criteria
        MATCHES FOR EQUALITY
        ::= id-syn-criteria

job-abort-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-job-abort-criteria
```

criterion-type normally specifies a count- or time-related attribute associated with the processing of a print-job. Three job-status attributes are defined for this purpose: **error-count**, **warning-count**, and **processing-time**. In addition to, or instead of, these, the client is free to specify other attributes as criterion-types, provided that the datatype of the attribute is appropriate, i.e., has an ordering relation. If the client supplies an inappropriate attribute, the server shall return an **inappropriate-matching** AttributeError.

criterion-threshold provides a value to be used by the server in determining when to abort a print-job; if the actual value of the identified attribute exceeds the specified threshold value, the server shall abort the job. The server may abort a job before the indicated criterion is exceeded, if the server cannot proceed further, depending on implementation and **document-format**.

9.2.3.2 Job-warning-criteria

Supplies a list of limit specifications, any of which, when exceeded the first time, cause a warning to be created for the print-job. Job-warning-criteria applies to "downstream errors", i.e., errors that occur after the final (or only) **Print** abstract-operation of a job has been accepted by the server and a normal return has been made to the client.

```
job-warning-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-job-warning-criteria
```

criterion-type normally specifies a count- or time-related attribute associated with the processing of a print-job. Three job-status attributes are defined for this purpose: **error-count**, **warning-count**, and **processing-time**. In addition to, or instead of, these, the client is free to specify other attributes as criterion-types, provided that the datatype of the attribute is appropriate, i.e., has an ordering relation. If the client supplies an inappropriate attribute, the server shall return an **inappropriate-matching** AttributeError.

criterion-threshold provides a value to be used by the server in determining when to issue a warning; if the actual value of the identified attribute exceeds the specified threshold value, the server shall issue the warning. The server may issue the warning before the indicate criterion is exceeded, if the server cannot proceed further, depending on implementation and **document-format**.

9.2.3.3 Document-abort-criteria

This attribute specifies a list of limit values, any of which, when exceeded, force the abort of the printing of one document of a print-job. The **document-abort-criteria** values apply to "downstream errors", i.e., errors that occur, or are discovered, after the offending **Print** abstract-operation has been accepted by the server, and a normal return has been made to the client.

```
document-abort-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-document-abort-criteria
```

criterion-type normally specifies a count- or time-related attribute associated with the processing of a document. Three job-status attributes are defined for this purpose: **error-count**, **warning-count**, and **processing-time**. In addition to, or instead of, these, the client is free to specify other attributes as criterion-types, provided that the

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datatype of the attribute is appropriate, i.e., has an ordering relation. If the client supplies an inappropriate attribute, the server shall return an **inappropriate-matching** AttributeError

criterion-threshold provides a value to be used by the server in determining when to abort a (copy of a) document in a print-job; if the change in the value of the identified attribute attributable to the document exceeds the specified threshold value, the server shall abort the document. The server may abort a document before the indicated criterion is exceeded, if the server cannot proceed further, depending on implementation and **document-format**. The effect of this condition in combination with collation of documents within a job is implementation-dependent.

9.2.4 Job-scheduling-instruction attributes

These attributes provide additional hints for the scheduling of a print-job. How a print-service uses this information in scheduling jobs is implementation-specific.

The client may specify job-scheduling-instruction attributes in:

a) Print: all

b) ModifyJob: all

c) ListObjectAttributes: all

9.2.4.1 Job-start-wait

This attribute specifies whether the processing of the print-job is to await operator action before commencing or not.

```
job-start-wait ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-start-wait
```

When the value is **TRUE**, the server shall pause the printer and put the printer into the **job-start-wait** state at the start of printing this job. The server shall continue the job and printer when a user or operator 'resumes' the printer (using an operation that is outside the scope of this part of ISO/IEC 10175). When the value is **FALSE**, the server shall not pause the printer at the start of printing the job.

A job-start-wait is expected to occur once the job is scheduled to be printed on a specific printer. This wait allows operator intervention on behalf of the job (e.g., for changing media and other resources). The **job-start-message** may be sent to the operator at this time to request the necessary intervention.

> NOTE – It is desired that **job-start-wait** not significantly impede the progress of other jobs; i.e., a print-server should be able to time out and pause a waiting job if action is not taken. This is an implementation-specific issue.

9.2.4.2 Job-end-wait

This attribute specifies whether the processing of the print-job is to await operator action before concluding or not.

```
job-end-wait ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-end-wait
```

When the value is **TRUE**, the server shall pause the printer and put the printer into the **job-end-wait** state at the end of printing this job. The server shall continue the job and printer when a user or operator 'resumes' the printer (using an operation that is outside the scope of this part of ISO/IEC 10175). When the value is **FALSE**, the server shall not pause the printer at the end of printing the job.

A job-end-wait is expected to occur once the job has completed printing. This wait allows operator intervention on behalf of the job (e.g., for restoring media and other resources). The **job-end-message** may be sent to the operator at this time to request the necessary intervention.

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NOTE – It is desired that **job-end-wait** not significantly impede the progress of other jobs; i.e., a print-server should be able to time out and complete a waiting job if action is not taken. This is an implementation-specific issue.

9.2.4.3 Job-hold

This attribute specifies whether the print-job is a candidate for scheduling for printing or not, when the server would otherwise place the job in the pending or processing states. The PauseJob and ResumeJob operations may be used independently of the value of this attribute.

```
job-hold ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-hold
```

When the value is **FALSE**, the server shall not hold the job from being scheduled for printing, unless there are other reasons (see the **current-job-state** and the **job-state-reasons** job-status attributes).

When the value is **TRUE**, the server shall place the job in the **held** state and add the **job-hold-set** value to the job's **job-state-reasons** attribute and shall not schedule the print-job for printing. If the job enters the held state because its **job-hold** attribute was TRUE, a client shall reset the job's **job-hold** attribute to **FALSE** by means of the ModifyJob operation before the server can schedule the job for printing. When the value is set to **FALSE** as a result of the ModifyJob operation, the server shall remove the **job-hold-set** value from the **job-state-reasons** attribute and, if no other reasons remain, shall change the job's **current-job-state** to **pending** so that the job becomes a candidate for being scheduled on printer(s).

9.2.4.4 Job-password

This attribute provides a password that shall be entered before the print-job commences.

```
JobPassword ::= OCTET STRING (SIZE(0..ub-octet-string))

jobPasswordSyntax ATTRIBUTE-SYNTAX
        JobPassword
        MATCHES FOR EQUALITY
        ::= id-syn-job-password

job-password ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobPasswordSyntax
        SINGLE VALUE
        ::= id-att-job-password
```

If a **job-password** is provided, the server shall pause the printer and put the printer into the **job-password-wait** state at the start of printing this job. The server shall resume the job and printer when a user or operator enters a password that matches the value of this attribute (using an operation that is outside the scope of this part of ISO/IEC 10175).

NOTES

1 The server action when the **job-password** attribute is supplied is independent of **job-start-wait** and shall occur whether or not the **job-start-wait** attribute is set to **TRUE**.

2 It is desired that a **job-password-wait** not significantly impede the progress of other jobs; i.e., a print-server should be able to time out and pause a waiting job if action is not taken. This is an implementation-specific issue.

3 The encryption scheme to be used for this attribute is defined in the application-context.

9.2.4.5 Job-print-after

This attribute specifies the calendar date and time of day after which the print-job shall become a candidate to be scheduled for printing.

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```
job-print-after ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-print-after
```

If the value of this attribute is in the future, the server shall set the value of the job's **current-job-state** to **held** and add the **job-print-after-specified** value to the job's **job-state-reasons** attribute and shall not schedule the print-job for printing until the specified date and time has passed. When the specified date and time arrives, the server shall remove the **job-print-after-specified** value from the job's **job-state-reason** attribute and, if no other reasons remain, shall change the job's **current-job-state** to **pending** so that the job becomes a candidate for being scheduled on printer(s).

The server shall assign an empty value (see 9.1.2) to the **job-print-after** attribute when no print after time has been assigned, so that the job shall be a candidate for scheduling immediately.

9.2.4.6 Job-priority

This attribute specifies a priority for scheduling the print-job. It is used by servers that employ a priority-based scheduling algorithm.

```
job-priority ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX prioritySyntax
        SINGLE VALUE
        ::= id-att-job-priority
```

A higher value specifies a higher priority. The value **1** is defined to indicate the lowest possible priority (a job which a priority-based scheduling algorithm shall pass over in favour of higher priority jobs). The value **100** is defined to indicate the highest possible priority. Priority is expected to be evenly or 'normally' distributed across this range. The mapping of vendor-defined priority over this range is implementation-specific. The omission of this attribute implies that the user places no constraints concerning priority on the scheduling of the print-job.

9.2.4.7 Job-deadline-time

This attribute specifies the calendar date and time of day by which the user desires the print-job to be completed. This attribute is treated as a scheduling hint only. If the specified deadline time arrives before completion of the job, the server shall generate the **error-past-deadline** event for the job, but the current-job-state shall not be changed. This attribute is intended for use by servers that implement some form of deadline scheduling.

```
job-deadline-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-deadline-time
```

The server shall assign an empty value (see 9.1.2) to the **job-deadline-time** attribute when there is no deadline for the job.

9.2.4.8 Job-discard-time

This attribute specifies the calendar date and time of day at which the print-job should be discarded, whether or not the job has printed.

```
job-discard-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-discard-time
```

If this attribute is supported and the discard time has not arrived, the server shall retain job and document attributes and status; the server is not required to retain job document files if the job has completed processing and has exceeded the job's **job-retention-period**. When the **job-discard-time** arrives, the server shall set the job's **job-**

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retention-period to zero and shall perform a CancelJob operation on the specified job. Whether or not the print-job is discarded if the **error-past-discard** event occurs while the job is being printed is implementation-dependent.

The server shall assign an empty value (see 9.1.2) to the **job-discard-time** attribute when there is no discard time for the job.

9.2.4.9 Job-retention-period

This attribute specifies the minimum period of time following the completion of job processing and printing that the server shall keep job attributes, document attributes, and document data. The server may keep these attributes and data longer than the value of the **job-retention-period** attribute.

```
job-retention-period ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-job-retention-period
```

Job-retention-period specifies a lower bound on how long job attributes, document attributes and document data shall be retained by a server after printing has completed, whilst **job-discard-time** sets an upper bound on retention of the job and document attributes independent of whether the job is ever scheduled for, starts or completes printing.

In addition to providing status information to a user after a job has completed printing, the **job-retention-period** also provides the mechanism for retaining job's document data after it has been printed, so that the job may be printed again, possibly with modified attributes, such as the **job-copies** component of the **job-results** attribute.

> NOTE - The mechanism to reprint the job is outside the scope of this part of ISO/IEC 10175; part 3 of this International Standard (in preparation) includes a Resubmit abstract-operation to enable this function.

9.2.4.10 Job-message-to-operator

This attribute carries a message from the user to the operator to indicate something about the processing of this print-job. This message, unlike the **job-start-message,** is not necessarily related to other job-scheduling attributes. The server shall make this message available to the operator when the job has been accepted.

```
job-message-to-operator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-message-to-operator
```

9.2.4.11 Job-scheduling

This attribute indicates whether or not the user desires the server to schedule the job for printing before all of the print-requests for the job have been received by the server.

```
job-scheduling ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-scheduling
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
after-complete	id-val-job-scheduling-after-complete	Server shall wait until all print-requests for the job are received
before-complete	id-val-job-scheduling-before-complete	Server shall schedule the job before all print-requests for the job are received

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either	id-val-job-scheduling-either	Server's option to schedule the job or to wait until all print-requests for the job are received

9.2.4.12 Job-validate

This attribute specifies whether the print-job is to be processed normally, or whether it has been submitted for validation only. By means of this attribute, a client can request a server to determine whether all the job and document attributes specified, particularly those identified as *compulsory*, can be satisfied by the server (or the printer), without actually printing the job.

```
job-validate ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-validate
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
and-print	id-val-job-validate-and-print	Server to process the job normally, printing the document(s) as specified by all the job attributes
submit-only	id-val-job-validate-submit-only	Server to determine whether or not the job would be completed without errors or warnings; no printing is requested

9.2.5 Printer-selection attributes

These attributes provide information to help select a particular printer. If more than one printer-selection attribute is specified, the server shall select a printer that meets all of the criteria.

The client may specify printer-selection attributes in:

a) Print: all, except the value of **printer-name-requested** (which shall be passed as an explicit parameter of the first PrintArgument, rather than as an attribute)

b) ModifyJob: all, except **printer-name-requested**

c) ListObjectAttributes: all

9.2.5.1 Printer-name-requested

This attribute identifies the printer to be used for printing the job. The client shall specify the value of this attribute with the first invocation of the **Print** abstract-operation for the print-job as the explicit **printer-name** component of the **PrintArgument**, rather than as an attribute (see 8.2.1.1).

```
printer-name-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-printer-name-requested
```

NOTES

1 To cause a server to select a printer according to other attributes, the system administrator should define a logical printer that supports ALL of the physical printers supported by the server.

2 For the server that supports only a single printer, the logical printer name may be the same as the server name, as long as they cannot be confused for each other in the name service directory.

3 Initial-value-job objects should have the value of their **printer-name-requested** attribute specified as an empty value in order to indicate that no printer-name is defaulted.

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9.2.5.2 Physical-printers-requested

This attribute identifies the physical printer or printers that shall be the only candidates for printing the job.

```
physical-printers-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-physical-printers-requested
```

The value of this attribute shall be a subset of the value of the **physical-printers-supported** for the logical printer specified as the explicit **printer-name-requested** component of the **PrintArgument** (else the server shall reject the job or ignore this attribute, depending on whether this attribute is specified as compulsory or non-compulsory).

NOTE – This attribute is provided for implementations and/or system administration policies that require that clients submit only to logical printers, i.e., that require that the **printer-name-requested** component of **PrintArgument** be a logical printer, since ISO/IEC 10175 permits **printer-name-requested** to be a logical or physical printer.

9.2.5.3 Printer-locations-requested

This attribute identifies the location of the printer to be used for printing the job. If more than one location is specified, the server shall select a printer at one of the locations specified.

```
printer-locations-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-locations-requested
```

9.2.5.4 Printer-models-requested

This attribute specifies the make and model of the printer to be used for printing the job. If more than one value is specified, the server shall select a printer which meets one of the values specified.

```
printer-models-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-models-requested
```

9.2.5.5 Printer-types-requested

This attribute specifies the "type" of the printer to be used for printing the job. If more than one value is specified, the server shall select a printer whose "type" meets one of the values specified.

```
printer-types-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-types-requested
```

Standard values for this attribute are listed in the specification of the **printer-type** printer attribute.

9.2.5.6 Printer-speed-range-requested

This attribute specifies a range of printer speeds which are acceptable for printing the job. The server shall select a printer whose maximum speed is within the range specified.

```
printer-speed-range-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX integerRangeSyntax
        SINGLE VALUE
        ::= id-att-printer-speed-range-requested
```


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The values for minimum speed and maximum speed are in pages per minute (to the nearest integer value). The values specified are inclusive. If minimum speed is **0** then there is no lower bound specified. If maximum speed is **0** then there is no upper bound specified.

NOTE – A speed of **0** does *not* mean that the job should not print.

9.2.6 Access-and-accounting attributes

These attributes specify access control and accounting information used during the processing of the print-job. This information is directly related to the print-job and is used for authorization and accounting rather than authentication.

The client may specify access-and-accounting attributes in:

a) Print: all

b) ModifyJob: none

c) ListObjectAttributes: all

9.2.6.1 User-name

This attribute specifies the name of the user requesting access to print-service operations.

```
user-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-user-name
```

The usage of this attribute may be mandatory, depending upon the local security policy used.

9.2.6.2 Accounting-information

This attribute specifies information required by accounting services (e.g. the account to be charged for any services rendered).

```
accounting-information ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX OCTET STRING (SIZE(0..ub-octet-string))
        SINGLE VALUE
        ::= id-att-accounting-information
```

Accounting information is intended to be interpreted by an accounting system, and may be opaque to the print-service.

9.2.7 Job-security-handling

ISO/IEC 10175 addresses two aspects of security related to printing. First, that aspect related to matching the security requirements of a job to be printed with the security characteristics of the printer. This in turn has two aspects, confidentiality and integrity. Second, that aspect related to providing a label indicating the security of the job on the human-readable, paged, hardcopy output. Other security requirements, such as those dealing with audits, system and printer security management personnel, memory reuse, etc. are considered beyond the scope of ISO/IEC 10175.

Confidentiality levels measure information's sensitivity: the damage that might occur if an adversary obtained the information. For example, in the US Department of Defense (DoD) the confidentiality levels are "Unclassified", "Confidential", "Secret", "Top Secret". These levels might be assigned the integers 0 through 3 respectively. In a business, levels might be "Non proprietary", "Internal Use Only", "Confidential", and "Restricted Distribution". These levels might be assigned the integers 1, 3, 5, and 7, respectively, allowing for intermediate levels to be defined in the future.

Confidentiality categories are areas of sensitive information. In the US DoD, categories are things like "NATO", "Nuclear". In business, categories might be "Personnel" and "Finance". Each of these categories is represented as an integer.

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Integrity levels measure the damage that could occur if information were tampered with. They define who can influence (who can tamper with) what data. As an example, integrity levels could be defined as "Unreliable", "Somewhat Unreliable", "Fairly Reliable", "Highly Reliable". Each of these levels is associated with an integer.

Integrity categories define the kinds of reliance placed on information; an example might be "Census Data".

Levels have a total ordering: given two levels A and B, one can easily tell whether A>B, A=B, or A<B. Levels generally begin at 0 indicating the lowest level of security.

Each confidentiality-level, confidentiality-category, integrity-level, and integrity-category has an associated organization-identifier which identifies the security policy in which the given categories or levels are defined. While in general an organization will only use one organization-identifier, some may need several; for example a government security agency could use one set of definitions internally (US DoD), and another set in communications with allied governments (NATO).

In order to allow printing documents in a secure environment without having to know much about the actual printing environment and its security characteristics, the following standard value for the organization-identifier component of security datatypes is defined:

id-val-security-policy-disclosable - There are no mandatory restrictions on disclosure. If this organization identifier is used any associated value specified for level or category is ignored. This value does not mean the information is public: discretionary restrictions on disclosure would still apply. Only a person granted access to information may disclose it. For example, in the US government, unclassified information might get this value and still be private.

The client may specify job-security-handling attributes in:

a) Print: all

b) ModifyJob: none

c) ListObjectAttributes: all

9.2.7.1 Job-security-confidentiality-level

This attribute specifies the job's confidentiality level and the organization associated with the level.

```
JobLevel ::= SEQUENCE {
        organization-identifier   OBJECT IDENTIFIER,
        level                     Cardinal }

jobLevelSyntax ATTRIBUTE-SYNTAX
        JobLevel
        MATCHES FOR EQUALITY
        ::= id-syn-job-level

job-security-confidentiality-level ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobLevelSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-level
```

A text description of the confidentiality level of the job may be printed on the job start and end sheets and each sheet of a job if requested by the submittor (see the **job-security-label** attribute) or required by site policy (see the **printer-security-label** attribute that may be specified in an initial-value-job object for a printer as a default).

9.2.7.2 Job-security-confidentiality-category

This attribute specifies the job's set of confidentiality categories and the organization associated with these categories.

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```
JobCategories ::= SEQUENCE {
        organization-identifier  OBJECT IDENTIFIER,
        categories               SET OF Cardinal }

jobCategoriesSyntax ATTRIBUTE-SYNTAX
        JobCategories
        MATCHES FOR EQUALITY
        ::= id-syn-job-categories

job-security-confidentiality-category ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobCategoriesSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-category
```

A text description of the confidentiality categories of the job may be printed on the job start and end sheets and each sheet of a job if requested by the submittor or required by site policy.

9.2.7.3 Job-security-confidentiality-policy

This attribute specifies the security policy for confidentiality to be used to handle the job.

```
job-security-confidentiality-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-policy
```

A confidentiality policy specifies rules for determining what is permitted based on confidentiality levels and categories. It defines how to compare the security confidentiality requirements of the job with the security confidentiality characteristics of the printer.

A printer shall support only one confidentiality policy.

The job shall not be printed if the policy for the job does not match the policy for the printer. If the policies match, the organization identified by the attributes job-security-confidentiality-level and job-security-confidentiality-category shall be one known by the printer and then the level and categories specified shall meet the requirements specified by the security policy for confidentiality.

The following standard value is defined:

id-val-confidentiality-policy-b-and-l - The security confidentiality policy defined by Bell and Lapadula, which is the currently accepted policy for handling confidentiality. The Bell and Lapadula model specifies that a job can be printed on a printer only if the following are satisfied:

printer-confidentiality-level-minimum	<=	job-security-confidentiality-level
AND		
printer-confidentiality-level-maximum	>=	job-security-confidentiality-level
AND		
printer-confidentiality-category-minimum	<=	job-security-confidentiality-category
AND		
printer-confidentiality-category-maximum	>=	job-security-confidentiality-category

9.2.7.4 Job-security-integrity-level

This attribute specifies the job's integrity level and the organization associated with the level.

```
job-security-integrity-level ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobLevelSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-level
```


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A text description of the integrity level of the job may be printed on job start and end sheets and each sheet of the job if requested by the submittor or required by site policy.

9.2.7.5 Job-security-integrity-category

This attribute specifies the job's set of integrity categories and the organization associated with the categories.

```
job-security-integrity-category ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobCategoriesSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-category
```

A text description of the integrity categories of the job may be printed on the job start and end sheets and each sheet of the job if requested by the submittor or required by site policy.

9.2.7.6 Job-security-integrity-policy

This attribute specifies the security policy for integrity to be used to handle the job.

```
job-security-integrity-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-policy
```

An integrity policy specifies rules for determining what is permitted based on integrity levels and categories. It defines how to compare the security integrity requirements of the job with the security integrity characteristics of the printer.

The job shall not be printed if the policy for the job does not match the policy for the printer. If the policies match, the organization identified by the attributes job-security-integrity-level and job-security-integrity-category shall be one known by the printer and then the level and categories specified shall meet the requirements specified by the security policy for integrity.

The following standard value is defined:

id-val-integrity-policy-biba - The security integrity policy defined by Biba, which is the currently accepted policy for handling integrity. The Biba model of security integrity parallels the Bell and Lapadula model of security confidentiality. The Biba model specifies that a job can be printed on a printer only if the following are satisfied:

printer-integrity-level-minimum	<=	job-security-integrity-level
AND		
printer-integrity-level-maximum	>=	job-security-integrity-level
AND		
printer-integrity-category-minimum	<=	job-security-integrity-category
AND		
printer-integrity-category-maximum	>=	job-security-integrity-category

9.2.7.7 Job-security-label

This attribute specifies the location(s) of the security label that shall be applied to each sheet of the hardcopy output of the job. This label shall identify the job's confidentiality level, confidentiality categories, integrity level, and integrity categories.

```
job-security-label ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-security-label
```

Specifying this attribute overrides any setting of the attribute printer-security-label-default.

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The following standard values for the label location are defined:

id-val-security-label-sheet-top - A label which includes the job's confidentiality level, confidentiality categories, integrity level, and integrity categories shall be printed across the top of every sheet of the job (and both sides of the sheet if a document it is printed duplex). If necessary the printer can truncate the label, but shall use a distinct notation to indicate that truncation has occurred.

id-val-security-label-no-sheet-top - A security label shall not be printed at the top of each sheet.

id-val-security-label-sheet-bottom - A label which includes the job's confidentiality level, confidentiality categories, integrity level, and integrity categories shall be printed across the bottom of every sheet of the job (and both sides of the sheet if a document it is printed duplex). If necessary the printer can truncate the label, but shall use a distinct notation to indicate that truncation has occurred.

id-val-security-label-no-sheet-bottom - A security label shall not be printed at the bottom of each sheet.

id-val-security-label-job-start-sheet: a label which includes the job's confidentiality level, confidentiality categories, integrity level, and integrity categories shall be printed on the job start sheet.

id-val-security-label-job-end-sheet: a label which includes the job's confidentiality level, confidentiality categories, integrity level, and integrity categories shall be printed on the job end sheet.

These values can also be used to specify the default labeling applied by a printer (which may be overridden by the job-security-label attribute submitted with the job), or as the labeling policy of the printer (which cannot be overridden by the job attribute). The printer/print server completely defines the job-start-sheet and -end-sheet; therefore, use of the values label-job-start-sheet and label-job-end-sheet only makes sense for the printer-security-label-policy printer attribute.

9.2.8 Job-status

These attributes specify the job status before, during and after the processing of the print-job by the server. The server shall create the job object with these attributes (if implemented) and shall assign appropriate values to each such job-status attribute.

The client may specify job-status attributes in:

a) Print: none

b) ModifyJob: none

c) ListObjectAttributes: all

9.2.8.1 Current-job-state

This attribute identifies the current state of the job (pending, printing, held, etc.)

```
current-job-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-current-job-state
```

The following job state standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
unknown	id-val-job-state-unknown	The job state is not known, or is indeterminate.

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pre-processing	id-val-job-state-pre-processing	The job has been created on the server by the **create-job** sub-operation of the print-request, but a print-request with a **TRUE** value for the **job-submission-complete** component of the PrintArgument has not yet been received and no document has started processing. The job maybe in the process of being checked by the server for attributes, defaults being applied, a printer being selected, etc.
held	id-val-job-state-held	The job is waiting to be released for scheduling for any number of reasons as specified by the value of the job's **job-state-reasons** attribute.
pending	id-val-job-state-pending	The job's **job-submission-complete** attribute is **TRUE** since the server has received a print-request with the **job-submission-complete** parameter **TRUE** and the job is waiting to start processing on a printer.
processing	id-val-job-state-processing	The server is processing the job, or has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because the job is queued in the output device or some other spooler, awaiting the output device to print it.
printing	id-val-job-state-printing	The server has completed processing the job and the output device is currently printing the job on at least one printer. That is, a print engine is either printing pages of the job, or failing in its attempt to print pages of the job because of some wait state, such as, start-wait, end-wait, needs-attention, etc. The complete job state includes the detailed status represented in the printers' **printer-state** attribute(s).
paused	id-val-job-state-paused	The job has been paused as a result of a PauseJob operation.
interrupted	id-val-job-state-interrupted	The job was interrupted by the InterruptJob request for an intervening job, and shall resume processing automatically once the intervening job has completed.
terminating	id-val-job-state-terminating	The job has been cancelled by a CancelJob request or aborted by the server and is in the process of terminating. The job's **job-state-reasons** attribute contains the reasons that the job is being terminated.
retained	id-val-job-state-retained	The job is being retained at the server as a result of the job's **job-retention-period** being non-zero. The job has (1) completed successfully or with warnings or errors, (2) been aborted while printing by the server, or (3) been cancelled by the CancelJob request before or during processing. The job's **job-state-reasons** attribute contains the reasons that the job has been retained. While in the retained state, all of the job's document data (and resources, if any) shall be retained by the server; thus a job in the **retained** state could be reprinted, using some means outside the scope of ISO/IEC 10175-Part 1.

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completed	id-val-job-state-completed	The job has: (1) completed successfully or with warnings or errors, (2) been aborted by the server while printing, or (3) been cancelled by the **CancelJob** request, AND the job's: (1) **job-retention-period** was zero or has expired, or (2) **job-discard-time** has arrived. The job's **job-state-reasons** attribute contains the reason(s) that the job has been completed. While in the **completed** state, a job's document data (and resources if any) need not be retained by the server; thus a job in the **completed** state could not be reprinted. The length of time that a job may be in this state, before transitioning to **unknown**, is implementation-dependent. However, servers that implement the **completed** job-state shall retain, as a minimum, the following attributes for any job in the completed state: **job-identifier**, **job-owner**, **job-name**, **current-job-state**, **printers-assigned**, and **job-state-reasons**.

Print clients and DP-Servers shall be prepared to receive all the standard job states. DP-Servers are not required to generate all job states, only those which are appropriate for the particular implementation.

If a server implementation or policy is to start processing documents before the last print-request (with a **TRUE** value for the **job-submission-complete** parameter) and the value of the job's **job-scheduling** attribute is not **after-complete**, the server shall change the job's **current-job-state** from **pre-processing** directly to the **processing** state when the server begins processing any of the job's documents.

9.2.8.1.1 Job state transition

The legal job state transitions are shown in the state transition diagram presented in Figure 9-1.

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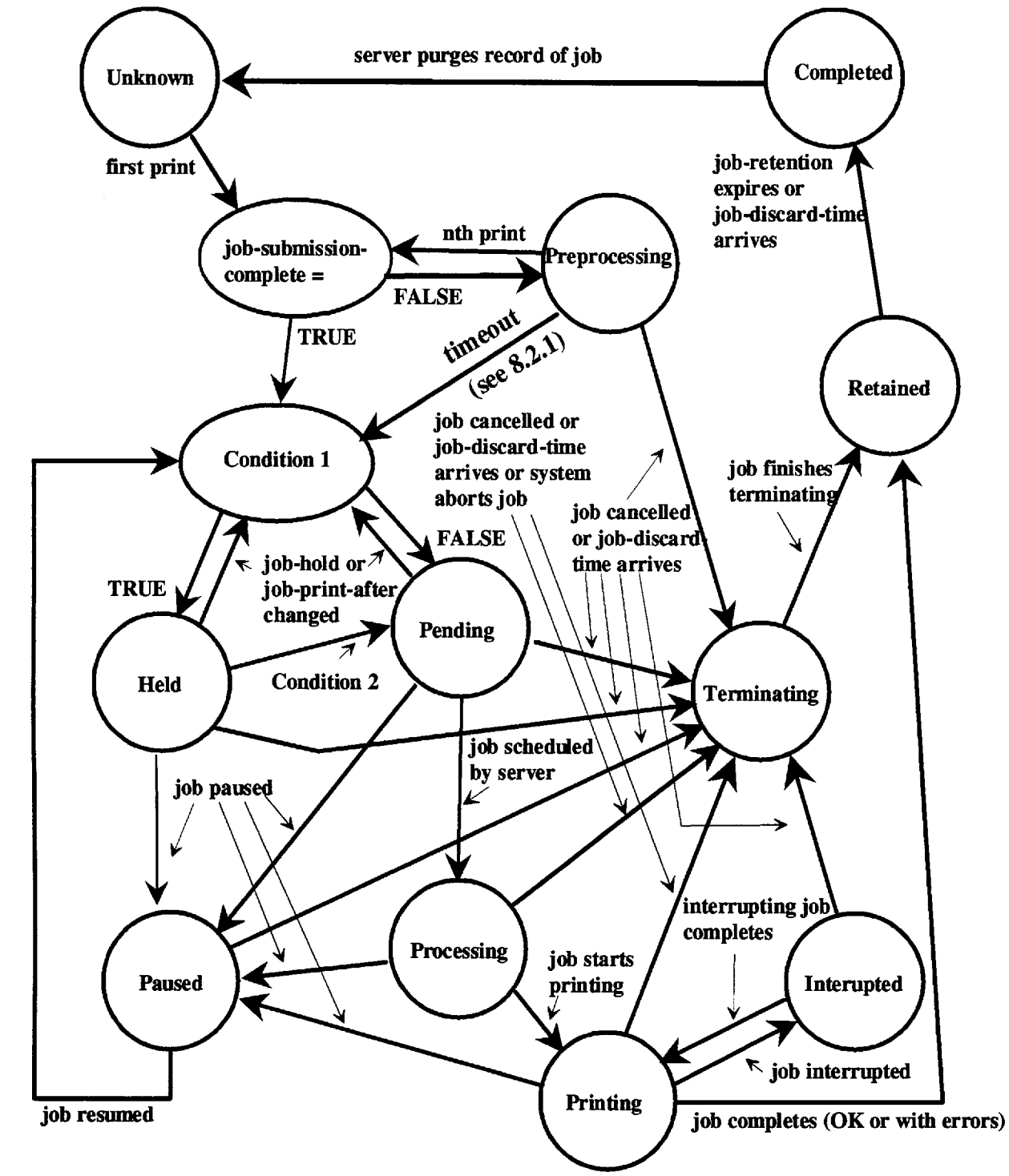

Condition 1: job-hold = TRUE OR job-print-after > current-time
OR documents needed OR resource not ready
Condition 2: job-print-after-time arrives OR all documents transferred
OR all resources ready

Figure 9-1 - Job state transition diagram

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9.2.8.2 Job-state-reasons

This attribute identifies the reason or reasons that the job is in the **held, terminating**, **retained**, or **completed** state. The server shall indicate the particular reason(s) by setting the value of the **job-state-reasons** attribute. When the job is not in any of these states, the server shall set the value of the **job-state-reasons** attribute to the empty set.

```
job-state-reasons ATTRIBUTE
    WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
    MULTI VALUE
    ::= id-att-job-state-reasons
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
documents-needed	id-val-reasons-documents-needed	The complete job has been accepted by the server (the value of the **job-submission-complete** element was **TRUE** in the last print-request for the job), but the server is waiting for its files to be transferred before the job can be scheduled to be printed.
job-hold-set	id-val-reasons-job-hold-set	The value of the job's **job-hold** attribute is **TRUE**.
job-print-after-specified	id-val-reasons-job-print-after-specified	The value of the job's **job-print-after** attribute has specified a time specification that has not yet occurred.
required-resources-not-ready	id-val-reasons-required-resources-not-ready	At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not ready on any of the physical printer's for which the job is a candidate.
successful completion	id-val-reasons-successful completion	The job completed successfully.
completed-with-warnings	id-val-reasons-completed-with-warnings	The job completed with warnings.
completed-with-errors	id-val-reasons-completed-with-errors	The job completed with errors (and possibly warnings too).
cancelled-by-user	id-val-reasons-cancelled-by-user	The job was cancelled by the user using the CancelJob request.
cancelled-by-operator	id-val-reasons-cancelled-by-operator	The job was cancelled by the operator using the CancelJob request.
aborted-by-system	id-val-reasons-aborted-by-system	The job was aborted by the system.
logfile-pending	id-val-reasons-logfile-pending	The job's logfile is pending file transfer.
logfile-transferring	id-val-reasons-logfile-transferring	The job's logfile is being transferred.

9.2.8.3 Previous-job-state

This attribute identifies the state of the job (pending, printing, held, etc.) before the last change of job state.

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```
previous-job-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-previous-job-state
```

Standard values are defined in the specification for the **current-job-state** job-status attribute.

9.2.8.4 Printers-assigned

This attribute identifies the physical printer or printers to which this job has been assigned, if any.

When the job is first submitted and the server has not yet assigned any printers to the job, the **SEQUENCE** shall be empty.

If the server intends to use a single printer for the job, and the server has assigned a printer to the job, the **SEQUENCE** shall contain just that printer.

If a server has split the job into multiple pieces and assigned each piece to a different printer, the **SEQUENCE** shall contain n elements, one for each assigned printer. A job with multiple job-result-sets is an example of a job that would be easy to split into multiple pieces.

```
printers-assigned ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSequenceSyntax
        SINGLE VALUE
        ::= id-att-printers-assigned
```

A **SEQUENCE** with no elements shall be returned if this attribute is supported, but this job has not yet been assigned to any physical printers.

The number of elements in the **SEQUENCE** for this attribute shall be the same as the number of elements in the **SEQUENCE** for the associated job attribute **printer-state-of-printers-assigned**.

In addition, the *i*th element of the value of **printer-state-of-printers-assigned** shall be the state of the printer named by the *i*th element of **printers-assigned**.

The **printers-assigned** value shall not be the same as the printer requested by the user if the job's **printer-name-requested** attribute specified a logical printer that supports one or more different physical printers. The **printers-assigned** value might differ also if the job has been re-assigned by an operator to ensure successful completion of the job, allowing the user to find out where a job has been re-assigned (when necessary).

The value of the job's **printers-assigned** attribute shall remain after the job has completed, so that users can determine the physical printer(s) on which the job was printed.

9.2.8.5 Printer-state-of-printers-assigned

This attribute identifies the current state of each assigned printer. This attribute gives the client access to information within each assigned printer. Because this attribute contains a value that is updated within the printer, the server may choose to update the value of this attribute only when a client queries its value.

See the **printers-assigned** attribute for the correspondence between elements of this attribute and those of **printers-assigned**.

```
printer-state-of-printers-assigned ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-printer-state-of-printers-assigned
```

Standard values are defined in the specification for the **printer-state** printer attribute.

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9.2.8.6 Estimated-completion-time

This attribute indicates the estimated time by which this job will be completed.

```
estimated-completion-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-estimated-completion-time
```

The time to complete one job is dependent on the time required to complete all other jobs that the scheduling algorithm determines must be printed before this job may be printed. The time to complete each individual job may depend on when on-request resources are available. The time to print each individual job is dependent on the characteristics of the document formats in which the individual documents of the job are encoded and on the complexities and other characteristics of the documents themselves.

This attribute is highly implementation-dependent. The **estimated-completion-time** may be easy to calculate for some combinations of document formats and scheduling algorithms. It may be impossible to calculate for other combinations. It is recommended that, where possible, document creators provide system hints to the print-system (perhaps appropriately encoded in document format headers) that help the print-system understand which features of the document formats the document will be exercising.

9.2.8.7 Submission-time

This attribute indicates the time at which the latest print request for this job was accepted by the server.

```
submission-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-submission-time
```

9.2.8.8 Modification-time

This attribute indicates the time at which this job was last modified.

```
modification-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-modification-time
```

9.2.8.9 Started-printing-time

This attribute indicates the time at which this job started printing.

```
started-printing-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-started-printing-time
```

9.2.8.10 Job-copies-completed

This attribute indicates the number of job-copies of the job that the printer(s) have completed printing. The server shall not reset its value during the processing of multiple print-job results that are part of the same job (see the **results-profile** job attribute). Since this attribute is intended to measure the progress of a job, the value shall include repeated job-copies due to multiple print-job results for the same job.

```
job-copies-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-copies-completed
```


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The accuracy of this value is implementation-dependent. It is expected that the value reported is never greater than the actual value. This attribute may not be supported for all printers and all page description languages.

The value of this attribute shall be **0** if printing has not started for this job.

9.2.8.11 Pages-completed

This attribute indicates the number of pages of the job that the printer(s) have completed printing.

> NOTE – The number of source pages, impressions and sheets of media may differ. The following examples illustrate how they may differ when attributes, rather than the document contents, control the printing. If **number-up** is 0 or 1, there is one source page per impression, and if **number-up** is 2, there are two source pages per impression. If **sides** is 1, there is one impression per sheet of media, but if **sides** is 2, there are two impressions per sheet of media. By inference, if **number-up** is 4 and **sides** is 2, there are 4 source pages per impression and 8 source pages per sheet of media.

The server shall not reset its value during the processing of multiple copies of documents or the job. Since this attribute is intended to measure the progress of a job, the value shall include repeated pages due to multiple copies. When the job completes, this attribute should contain the value of the total number of source pages that the printer processed for the print-job.

```
pages-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-pages-completed
```

The accuracy of this value is implementation-dependent. It is expected that the value reported is never greater than the actual value. This attribute may not be supported for all printers and all page description languages.

The value of this attribute shall be **0** if printing has not started for this job.

9.2.8.12 Impressions-completed

This attribute indicates the number of impressions that the printer engine(s) have placed on the media for the job. See the note in the **pages-completed** attribute for the relationship of the **pages-completed**, **impressions-completed** and **media-sheets-completed** attributes.

The server shall not reset its value during the processing of multiple copies of documents or the job. Since this attribute is intended to measure the progress of a job, the value shall include repeated pages due to multiple copies. When the job completes, this attribute should contain the value of the total number of impressions that the printer made for the print-job.

```
impressions-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-impressions-completed
```

The accuracy of this value is implementation-dependent. It is expected that the value reported is never greater than the actual value. This attribute may not be supported for all printers and all page description languages.

The value of this attribute shall be 0 if printing has not started for this job.

9.2.8.13 Media-sheets-completed

This attribute indicates the number of sheets of media that the printer(s) have completed printing for the job. See the note in the **pages-completed** attribute for the relationship of the **pages-completed**, **impressions-completed** and **media-sheets-completed** attributes.

The server shall not reset its value during the processing of multiple copies of documents or the job. Since this attribute is intended to measure the progress of a job, the value shall include repeated pages due to multiple copies.

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When the job completes, this attribute should contain the value of the total number of sheets of media used for the print-job.

```
media-sheets-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-media-sheets-completed
```

The accuracy of this value is implementation-dependent. It is expected that the value reported is never greater than the actual value. This attribute may not be supported for all printers and all page description languages.

The value of this attribute shall be 0 if printing has not started for this job.

9.2.8.14 Octets-completed

This attribute indicates the number of octets of the job that the printer(s) have completed printing. The server shall not reset its value during the processing of multiple copies of documents or the job. Since this attribute is intended to measure the progress of a job, the value shall include repeated pages due to multiple copies.

```
octets-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64Syntax
        SINGLE VALUE
        ::= id-att-octets-completed
```

The accuracy of this value is implementation-dependent. It may be approximated by the number of octets conveyed to the printer. This attribute may not be supported for all printers and all page description languages.

The value of this attribute shall be **0** if printing has not started for this job.

9.2.8.15 Total-job-octets

This attribute indicates the size of the job in octets, including document and job copies.

```
total-job-octets ATTRIBUTE
          WITH ATTRIBUTE-SYNTAX cardinal64Syntax
          SINGLE VALUE
          ::= id-att-total-job-octets
```

The server may update the value of this attribute after each document has been transferred to the server or the server may provide this value after all documents have been transferred to the server, depending on implementation. In other words, while the job is in the **pre-processing** state and when the job is in the **held** state with the **job-state-reasons** containing a **document-needed value**, the value of the **total-job-octets** job status attribute depends on implementation and may not correctly reflect the size of the job.

In computing this value, the server shall include the multiplicative factors contributed by the (1) **copy-count** document attribute, (2) the **results-profile.job-copies** job attribute element and (3) multiple values of the **results-profile** job attribute, independent of whether the printer can process multiple copies of the job or document without making multiple passes over the job or document data and independent of the value of the **output** document attribute (**page-collate** vs. **no-page-collate**). Thus the server computation is independent of the printer implementation and shall be:

a) Document contribution: Multiply each **copy-count** by the size of the document in octets.

b) Add each document contribution together

c) Job result contribution: Multiply the job size by the number **job-copies** in the result set.

d) Add each job result contribution together

e) Multiply the value by the number of values in the job's **result-profile** attribute.

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9.2.8.16 Intervening-jobs

This attribute indicates the number of other jobs to be printed before this job may be scheduled for printing. The server shall set the value of this attribute to **0** when the job begins printing.

```
intervening-jobs ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-intervening-jobs
```

9.2.8.17 Print-checkpoint

This attribute indicates the job-copies, document-copies, pages, and octets completed for the document or documents on the specified printer(s) and the local context information at which the last checkpoint was taken.

```
PrintCheckpoint ::= SEQUENCE {
        printer-name            [0] DistinguishedNameString OPTIONAL,
        job-copies-completed    [1] Cardinal OPTIONAL,
        copies-completed        [2] Cardinal OPTIONAL,
        pages-completed         [3] Cardinal OPTIONAL,
        octets-completed        [4] Cardinal64 OPTIONAL,
        context-info            [5] OCTET STRING (SIZE(0..ub-octet-string)),
                                    -- implementation-dependent
        checkpoint-format       [6] OBJECT IDENTIFIER }

printCheckpointSyntax ATTRIBUTE-SYNTAX
        PrintCheckpoint
        MATCHES FOR EQUALITY
        ::= id-syn-print-checkpoint

print-checkpoint ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX printCheckpointSyntax
        MULTI VALUE
        ::= id-att-print-checkpoint
```

This attribute allows a print service to provide information about a checkpoint of a job that is printing. This would indicate where a print-server could resume printing of this job - at a page and copy number of a document close to the point at which the job was paused due to malfunction or operator request.

The **context-info** element shall contain information that would be needed by the server and printer to enable them to resume printing at the last checkpoint. The format of this element identified by the **checkpoint-format** element . The content of this element is implementation-specific; the intent is that the client would return this element, without alteration, in a **ResumeJobArgument** in order to resume the job.

> NOTE – A server should encode the value of **context-info** in such a way as to protect against clients submitting ResumeJob requests with altered **context-info**.

The **checkpoint-format** element shall identify the encoding format used for the **context-info** element. Standard values are defined in the printer attribute **checkpoint-format-supported**.

Some systems support concurrent printing of a job on multiple printers. In such cases, the server shall return a **PrintCheckpoint** sequence for each printer currently assigned to the job.

The ability to generate the previous internal state of the job and the printer is dependent on the page-independence supported by the document format. If a document format is not page-independent, it may be possible to emulate the resumption of the job at the checkpoint by processing through the entire document to the checkpoint page without printing any additional pages, then continue printing pages from that point. Some document formats may not support any form of checkpointing.

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If a PauseJob operation causes a job to pause in the middle of a document encoded in a document format that does not support checkpointing, the server shall set the checkpoint to a value that will force the system to resume back at the beginning of the current copy. Obviously the ability to checkpoint a job is very implementation-dependent.

9.2.8.18 New-job-identifier

This attribute provides the name of the server to which this job has been reassigned, along with the new **local-identifier.** For those servers that are capable of resubmitting print-jobs to other servers, this action would occur usually to allow the job to successfully complete printing of the job after failing at the original server.

```
NewJobIdentifier ::= SEQUENCE {
        server-name             DistinguishedNameString,
        local-identifier        JobIdentifier }

newJobIdentifierSyntax ATTRIBUTE-SYNTAX
        NewJobIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-new-job-identifier

new-job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-new-job-identifier
```

This attribute allows the user to see where an operator has resubmitted the job, should catastrophic failure require this action, and provides the new **job-identifier** that enables the client to obtain status on the job.

9.2.8.19 On-request-resources-required

This attribute identifies the resources (e.g. media and fonts) required to complete the job, but which are not currently available. Resources which would have been identified with the resource-name element of the **ResourceContext** data type should use the **object-name** element of **ObjectIdentification.**

```
objectIdentificationSyntax ATTRIBUTE-SYNTAX
        ObjectIdentification            -- see 8.2.4.1
        MATCHES FOR EQUALITY
        ::= id-syn-object-identification

on-request-resources-required ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentificationSyntax
        MATCHES FOR EQUALITY
        MULTI VALUE
        ::= id-att-on-request-resources-required
```

9.2.8.20 Job-message-from-administrator

This attribute provides a message from an operator, system administrator or 'intelligent' process to indicate to the user the reasons for modification or other management action taken on a job.

```
job-message-from-administrator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-message-from-administrator
```

9.2.8.21 Last-job-events

This attribute presents a list of all the most recent job events that have occurred. The upper limit on how many events shall be retained by the server is implementation-dependent.

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```
last-job-events ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-last-job-events
```

Standard values are defined in 8.5.

This attribute allows systems that do not support asynchronous notification services for event reporting to get the job events synchronously. The sequence shall be ordered with the most recent event first.

This attribute shall record events of all types implemented in the server, irrespective of the events identified in **job-event-handling** attribute.

9.2.8.22 Name-of-last-accessor

This attribute indicates the name of the last user or program to submit or modify the job.

```
name-of-last-accessor ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-name-of-last-accessor
```

9.2.8.23 Error-count

This attribute provides the number of error events occurring while processing the job.

```
error-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-error-count
```

9.2.8.24 Warning-count

This attribute provides the number of warning events occurring while processing the job.

```
warning-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-warning-count
```

9.2.8.25 Processing-time

This attribute indicates how long an individual job has been processing.

```
processing-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-processing-time
```

9.2.8.26 Completion-time

This attribute indicates the time at which this job completed. Providing this time is useful for jobs which are retained after printing.

```
completion-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-completion-time
```


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9.2.8.27 Number-of-documents

This attribute indicates the number of documents in the job. The number indicates how many **Print** abstract-operations that specified a document (of any **document-type**) have been submitted for printing until job submission has been completed; at that point this attribute shall then indicate the total number of printable documents, fonts, and resource objects submitted by the client in the job. If the first **Print** abstract-operation does not contain a **first-document** component (see 8.2.1), the value of this attribute shall be **0**.

The server shall count fonts and resource objects passed to the server by means of **Print** abstract-operation invocations, as documents for the purposes of this attribute.

```
number-of-documents ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-number-of-documents
```

NOTE - the value of the **number-of-documents** attribute represents the total number of documents that the client has submitted to the server during the course of job submission, *regardless* of whether or not the client has cancelled any of the documents. See **CancelJob** abstract-operation.

9.2.8.28 Job-submission-complete

This attribute indicates whether all documents of the print-job have been submitted (i.e., all **Print** abstract-operations have been invoked for the job). The value FALSE indicates that more documents are expected to be submitted for the job, by means of additional print invocations.

```
job-submission-complete ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-submission-complete
```

9.2.8.29 Ignored-attributes

For each non-compulsory attribute type or value ignored (see 9.1.1), the server shall set (and return) a value in **ignored-attributes**. In the case where an attribute type is ignored, the value set by the server shall be the value as submitted; in the case where a value or values were ignored, the server shall set only those values ignored.

A server shall ignore attributes and attribute-values for the following reasons:

a) The server or the specified printer do not support this non-compulsory attribute.

b) The server or the specified printer do not support one or more values of this non-compulsory attribute.

In addition, a server may ignore attributes and attribute-values for the following additional reasons:

c) The resource is unavailable (though supported)

d) The first occurrence of the attribute is replaced by a repeated (duplicate) attribute in an attribute set.

```
IgnoredAttribute ::= SEQUENCE {
        document-number    PositiveInteger OPTIONAL,
                           -- document-sequence-number if a per-document
                           -- attribute; if omitted, the ignored attribute
                           -- specification applies to all documents in the job
        attribute-id       AttributeId,
        attribute-values   SET OF ANY
                           -- DEFINED BY attribute-id -- }
```


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```
ignoredAttributeSyntax ATTRIBUTE-SYNTAX
        IgnoredAttribute
        MATCHES FOR EQUALITY
        ::= id-syn-ignored-attribute

ignored-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX ignoredAttributeSyntax
        MULTI VALUE
        ::= id-att-ignored-attributes
```

9.2.9 Job size attributes

This group of attributes describes the characteristics of the job to be printed.

The server may use any of the attributes in this sub-clause to assist it in scheduling a print-job.

The client may provide these attributes. The server may use the client's values, or the server may compute them itself using job and document attributes, some of which the client supplies (e.g. **job-copies**, **copy-count**, and **sides**), and some of which the server may compute or verify (e.g. **page-count**). When the server computes the value of an attribute, its value may be inaccurate if the computation depends on attributes whose values may be inaccurate (e.g. **page-count**). In the worst case, the client or server may set the value of **page-count** to 0 to indicate that it doesn't know the actual page count. When the server computes the value for an attribute whose value depends on **page-count**, and **page-count** is 0 (or unspecified) for one or more documents in the job, the computed result shall be the server's best estimate, which, in the worst case, may be 0 (to indicate that the server doesn't know the value).

A client may use these attributes in conjunction with ***xxx*-completed** attributes for displaying information about the percentage of a job that has completed. For printers with a single print engine, the ratio of **impressions-completed** to **job-impression-count** gives the best estimate of percentage complete with respect to time.

For a description of the differences between page, impressions and sheets of media, see the note in the **page-completed** attribute.

The client may specify job size attributes in:

a) Print: all

b) ModifyJob: none

c) ListObjectAttributes: all

9.2.9.1 Job-page-count

This attribute contains the number of source pages in the job that the server expects to image. The server shall compute this value by the following procedure:

a) For each document in the job object, multiply the value of document's **page-count** attribute by the value of its **copy-count** attribute and call the result *document-set-page-count*.

b) Add up all the *document-set-page-counts* from the previous step and call this sum the *job-copy-page-count*.

c) For each job-result-set, multiply the value of *job-copy-page-count* from the previous step by the value of **job-copies** element of the job-result-set and call the result *job-result-set-page-count*.

d) Add up all the *job-result-set-page-counts* from the previous step and set this sum into the **job-page-count** attribute.

The value of this attribute is a measure of the amount of computation involved.

```
job-page-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-page-count
```


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The accuracy of this value is dependent on the accuracy of the **page-count** attribute in each document. If some documents have a **page-count** value of 0, the server may set the value of this attribute to 0 and not use it for scheduling.

9.2.9.2 Job-impression-count

This attribute contains the number of impressions that the server expects the printer to make. The server shall compute this value by the following procedure:

a) For each document in the job object, multiply the value of document's **page-count** attribute by the value of its **copy-count** attribute. Then divide the result by the value of **number-up** (if non-zero) and make into an integer using the ceiling operator. Call the result *document-set-impression-count*.

NOTE – The **number-up** attribute may contain a number or an OID. For the OID case, the server either knows implicitly what number is associated with the OID or it must query the **number-up** object for its **imposition-n-up** attribute. In the case where the server cannot obtain the value, it should assume the value of **number-up** is 1.

b) Add up all the *document-set-impression-counts* from the previous step and call this sum the *job-copy-impression-count*.

c) For each job-result-set, multiply the value of *job-copy-impression-count* from the previous step by the value of **job-copies** element of the job-result-set and call the result *job-result-set-impression-count*.

d) Add up all the *job-result-set-impression-counts* from the previous step and set this sum into the **job-impression-count** attribute.

The value of this attribute is a measure of the amount of time the job will take to print on printers with a single print engine.

```
job-impression-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-impression-count
```

The accuracy of this value is dependent on the accuracy of the **page-count** attribute in each document. If some documents have a **page-count** value of 0, the server may set the value of this attribute to 0 and not use it for scheduling.

9.2.9.3 Job-media-sheet-count

This attribute contains the number of sheets of media that the server expects to consume for the job. The server shall compute this value by the following procedure:

a) For each document in the job object, multiply the value of document's **page-count** attribute by the value of its **copy-count** attribute. Then divide the result by the value of **number-up** (if non-zero) and make into an integer using the ceiling operator. Then, if **sides** is 2, divide the result by 2 and round. Call the result *document-set-media-sheet-count*.

NOTE – See the note on **number-up** in the **job-impression-count** attribute.

b) Add up all the *document-set-media-sheet-counts* from the previous step and call this sum the *job-copy-media-sheet-count*.

c) For each job-result-set, multiply the value of *job-copy-media-sheet-count* from the previous step by the value of **job-copies** element of the job-result-set and call the result **job-result-set-media-sheet-count**.

d) Add up all the *job-result-set-media-sheet-counts* from the previous step and set this sum into the **job-media-sheet-count** attribute.

The value of this attribute is a measure of the total number of sheets of media that will be consumed and it is a good measure of the amount of time the job will take to print on printers with two print engines, one for each side of the media.

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```
job-media-sheet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-media-sheet-count
```

The accuracy of this value is dependent on the accuracy of the **page-count** attribute in each document. If some documents have a **page-count** value of 0, the server may set the value of this attribute to 0 and not use it for scheduling.

9.3 Document object attributes

A **document** object contains a set of document attributes, including the **document-content** attribute which specifies the document data. A document object may be of type **printable**, **font**, or **resource** as specified by the document's **document-type** attribute. The server shall create document objects as contained members of job objects in response to a client that performs one or more print-requests (see 8.2.1). In addition, **initial-value-document** objects are created in a server by means outside the scope of this part of ISO/IEC 10175 in order to represent complete sets of default values for document attributes (see the **initial-value-document** object class). This subclause of ISO/IEC 10175 specifies the document attributes for both document and initial-value-document objects.

In addition to the attributes specifically defined for the **document** and **initial-value-document** objects, certain of the generic attributes may also be associated with these objects. For example, when requesting a list of attribute values for an object of these classes, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Sub-clause	Generic attribute name
9.1.6.1	object-class
9.1.6.5	message

NOTE – Except for the generic attribute **object-class**, there are no attributes that apply to both the job and document objects. Thus the server may return both job and document attributes mixed together without ambiguity in the ModifyJob and CancelJob requests.

9.3.1 Document-information attributes

This sub-clause contains information about the document. This information might be printed on a job-sheet or document-sheet or it might be a part of the information displayed to a user listing print-jobs.

The client may specify document-information attributes in:

a) Print: all

b) ModifyJob: all

c) ListObjectAttributes: all

9.3.1.1 Document-name

This attribute supplies a human readable string for the document. This string is used for naming the document in a human-readable "free-form" fashion.

```
document-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-document-name
```

This attribute is intended for enabling a user or the user's application to convey a document name that may be printed on a start sheet, returned in a ListObjectAttributes result, or used in notification or logging messages.

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If this attribute is not specified, no document name is assumed, but implementation specific defaults are allowed, such as the simple-name part of the value of the **document-file-name** attribute. It is suggested, however, that the server not supply additional text for this attribute when printing its value (e.g. on a start sheet). This string only has meaning to the clients and can therefore take several forms, e.g. the name of a mail folder, name of a revisable document, the file specification minus the file path, the title of a document, etc.

9.3.1.2 Document-file-name

This attribute specifies the file name of the document, if the document came from a file.

```
document-file-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-document-file-name
```

The file name may include the full path to the file, in which case the **name-syntax** element of the **DistinguishedNameString** data type shall specify the syntax of the file name. If the document did not come from a file, the client should not specify this attribute.

9.3.1.3 Document-authors

This attribute supplies a human-readable name for the authors of the document.

```
document-authors ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-document-authors
```

If this attribute is not specified, no author name is assumed, but implementation specific defaults are allowed.

NOTE – It is assumed, but not mandated by ISO/IEC 10175, that the client derives this attribute from information associated with the revisable form document from which the document to be printed was created.

9.3.1.4 Document-comment

This attribute supplies an arbitrary human-readable message associated with the document.

```
document-comment ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-document-comment
```

This attribute is intended for enabling a user to convey a text string that may be printed on a document start sheet, for example, in an implementation-dependent manner.

NOTE – It is assumed, but not mandated by ISO/IEC 10175, that the client derives this attribute from the revisable form document from which the document to be printed was created.

9.3.1.5 Document-revision-date

This attribute specifies the date and time the document was created or modified.

```
document-revision-date ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-document-revision-date
```

The date given in this attribute refers to the latest revision of the revisable form document.

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9.3.2 Document production-instructions

These attributes provide information that affect the rendering and finishing of the document and are referred to as *document production instructions (DPI).* DPI may also be contained in the document to be printed.

If there is a conflict between the value of one of these attributes, and a corresponding parameter found in the document (either implicit or explicit), the value of the attribute shall take precedence over the document parameter, unless specifically mandated otherwise in the standard defining that document format.

All the **default-*xxx*** attributes (e.g. **default-medium**) specifically allow for the document contents to override the **default-*xxx*** attribute under all conditions.

The client may specify document production-instruction attributes in:

a) Print: all

b) ModifyJob: all, except **id-att-initial-value-document**

c) ListObjectAttributes: all

9.3.2.1 Default-medium

This attribute identifies a medium that the server shall use as the medium default for the pages of the document that require a specification.

```
default-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-medium
```

Standard values are defined in the specification of the **medium-identifier** medium attribute.

If the **page-media-select** attribute is specified (either by the client or by a server default, i.e., the **page-media-select** attribute of the initial-value-job object specified by the logical or physical printer), then the server shall use the **page-media-select** value to override the **default-medium** specification on a page by page basis.

The **default-medium** attribute may contain a value of **id-val-generic-none** (see 9.1.2) indicating that the server shall not use a default medium. Instead, the server shall rely on lower precedence document attributes (such as **default-input-tray**) for the media specification.

If the document data, itself, specifies media, such specification shall override the **default-medium** attribute on a page by page basis. If the document data specifies media which are not also values of **media-used**, then a printer may receive a document which requires media that are not ready. In such a case, an implementation may either abort the document or try printing the document on some alternative medium, such as the **default medium**.

A client has numerous ways to specify the media to be used when printing a document and different document pages can be specified in different ways. The client can specify the media in the document contents or with attributes. Some attributes override the document contents, and other attributes may be overridden by the document contents. In addition, the client can specify the media by name or by the input-tray containing it.

Before printing each page of a document, the server determines the medium or input-tray for that page by finding the first condition in the list of numbered steps below that is satisfied. For this discussion, either the medium or the input-tray is sufficient information:

a) If **page-media-select** has a medium value for the current page, use that medium, regardless of document contents and other attributes.

b) If **input-tray-select** has a value, use that tray.

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c) If the document contents specify a medium, and that medium is the same as the value of one of the original-medium elements in the **media-substitution** attribute, then use the corresponding substitution-medium in the **media-substitution** attribute.

d) If the document contents specify a medium, use that medium.

e) If the document contents specify an input-tray, use that input-tray.

f) If the **default-medium** has a value, and the document format interpreter allows its use, and that medium is the same as the value of one of the **original-medium** elements in **media-substitution** attribute, then use the corresponding **substitution-medium** in the **media-substitution** attribute.

g) If the **default-medium** has a value and the document format interpreter allows its use, use the **default-medium**.

h) If the **default-input-tray** has a value and the document format interpreter allows its use, use the **default-input-tray**.

i) Use the medium or input-tray selected by the document format processor in the printer. This selection is implementation-dependent.

9.3.2.2 Default-input-tray

This attribute identifies an input-tray that the server shall use as the input-tray default for the pages of the document that require a specification.

The correspondence between the simple-name of an input-tray (alphanumeric or numeric) and the actual tray in the printer is printer-dependent, and a tray named by such a simple-name may also have an OBJECT IDENTIFER that names it as well.

```
default-input-tray ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-input-tray
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
top	id-val-input-tray-top	The top input tray in the printer.
middle	id-val-input-tray-middle	The middle input tray in the printer.
bottom	id-val-input-tray-bottom	The bottom input tray in the printer.
envelope	id-val-input-tray-envelope	The envelope input tray in the printer.
manual	id-val-input-tray-manual	The manual feed input tray in the printer.
large-capacity	id-val-input-tray-large-capacity	The large capacity input tray in the printer.
main	id-val-input-tray-main	The main input tray
side	id-val-input-tray-side	The side input tray

A server may try to convert a simple-name received from a client to one of the server's OIDs, depending on implementation. However, a server shall always return an input-tray as an OID to the client if the server identifies the input-tray using an OID.

Examples: The simple-name strings: **envelope**, **top**, **2**, or **02**, or the OID value: **id-val-input-tray-top**.

If the **default-medium** attribute is specified (either by the client or by a server default, i.e., the **default-medium** attribute of the initial-value-job object specified by the logical or physical printer), then the server shall use the **default-medium** value and shall ignore the **default-input-tray** attribute, if specified. If the **page-media-select** attribute is specified (either by the client or by a server default, i.e., the **page-media-select** attribute of the initial-value-job object specified by the logical or physical printer), then the server shall use the **page-media-select** value to override the **default-input-tray** specification on a page by page basis.

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If the document data, itself, specifies media or input trays, such specification shall override the **default-input-tray** attribute on a page by page basis. If the document data specifies media or input-trays which are not also values of **media-used** or **input-trays-used**, respectively, then a printer may receive a document which requires media or input-trays which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative input-tray, such as the **default input-tray**.

9.3.2.3 Default-font

This attribute identifies a font that the server shall use as the font default for the pages of the document that require a specification.

```
default-font ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        SINGLE VALUE
        ::= id-att-default-font
```

Standard values are defined in the specification of the **font-identifier** font attribute.

If the document data, itself, specifies fonts, such specification shall override the **default-font** attribute on a page by page basis. If the document data specifies fonts which are not also values of **fonts-used**, then a printer may receive a document which requires fonts which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative fonts, such as the **default font**.

9.3.2.4 Default-resources

This attribute identifies resources, other than fonts, that the server shall use as the resources default for the pages of the document that require a specification. Such resources may include overlays, forms, logos, images, clip art, and signatures (see the **resource** object class). Each such resource may be passed explicitly in the print-job in a separate print-request (see 8.2.1) or may be accessed elsewhere in the distributed system by use of the document's **resource-context** attribute, the printer's **printer-resource-context** attribute, and the server's **server-resource-context** attribute using the search order specified in the **resource-context** document attribute.

A client may identify resources either by object reference or by a server-dependent resource-name. For a resource-name, the server locates resources via the resource-context attributes: **resource-context**, **printer-resource-context**, and **server-resource-context**, in an implementation-dependent manner using the search order specified in the description of the **resource-context** document attribute.

```
Resource ::= CHOICE {
        object-name   [0] NameOrOid,    -- Identifies Resource Object
        resource-name [1] Text }        -- Identifies resource name

resourceSyntax ATTRIBUTE-SYNTAX
        Resource
        MATCHES FOR EQUALITY
        ::= id-syn-resource

default-resources ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceSyntax
        MULTI VALUE
        ::= id-att-default-resources
```

If the document data, itself, specifies resources, such specification shall override the **default-resources** attribute on a page by page basis. If the document data specifies resources which are not also values of **resources-used**, then a printer may receive a document which requires resources which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative resources, such as the **default-resources**.

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9.3.2.5 Default-character-set

This attribute identifies a coded character-set that the server shall use as the coded character-set default for the pages of the document that require a coded character set specification.

```
default-character-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-set
```

If the document data, itself, specifies coded character-sets, such specification shall override the **default-character-set** attribute on a page by page basis. If the document data specifies coded character-sets which are not also values of **character-sets-used**, then a printer may receive a document which requires coded character-sets which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative coded character-set, such as the character set specified by the **default-character-set** attribute.

9.3.2.5.1 Assignment of object identifiers for coded character sets

ISO/IEC 10175 uses object identifiers to identify coded character sets, as ISO/IEC 10175 does for all attributes for which implementor extension is desired with implementor-defined object identifiers. In order to align this International Standard with other related standardization activities, the DPA object identifiers for coded character sets are assigned algorithmically from the integer values assigned by the Internet Assigned Number Authority (IANA), as discussed previously, in 9.1.7. The algorithm used is described in the following note.

NOTE – the OID assignment algorithm is based on a set of IANA-assigned values contained in an FTP-server subdirectory that may be obtained by anonymous FTP. The ftp address of the subdirectory is:

ftp.isi.edu/in-notes/iana/assignments/character-sets

This subdirectory contains a list of simple enumerated integer (enum) values assigned to the character sets used in current printer implementations. To obtain additional enum values for additional character sets, implementors must make a request of the IANA registration authority in order to obtain a unique enum value.

ISO/IEC 10175 assigns a value-class object identifier for purposes of assigning full object identifiers: **id-vc-code-set**:

```
iso(1) standard(0) dpa(10175) part-1(1) vc(6) code-set(24)
```

The complete ISO/IEC 10175 **id-val-code-set-*xxx*** object identifier is formed by taking the IANA **CodedCharSet** enum value and appending the enum value to the **id-vc-code-set** OID.

For example, consider the **csISOLatin1** coded character set that the IANA has assigned the enum value **4**. The corresponding ISO/IEC 10175 coded character set OID for **csISOLatin1** is:

```
iso(1) standard(0) dpa(10175) part-1(1) vc(6) code-set(24) ISO-Latin1(4)
```

The space of the coded character set enumeration has been divided into three regions by the IANA. The first region (3-999) consists of coded character sets that have been standardized by some standard setting organization. This region is intended for standards that do not have subset implementations. The second region (1000-1999) is for the Unicode and ISO/IEC 10646 coded character sets together with a specification of a (set of) sub-repertoires that may occur. The third region (>1999) is intended for vendor specific coded character sets.

Where a given coded character set may be known by more than one name, the most commonly known name is used as the name of the enumeration and other names are shown in the comments. The comments also indicate where to find detailed information on the coded character set and briefly characterize its relationship to other similar coded character sets.

The ISO/IEC 10175 simple-names were derived from the IANA enum symbol names by dropping the **cs** prefix and adding hyphens (-) between words. The letters **reg** (for registration) were added between **ISO** and the coded character set registration number. The descriptor text is taken directly from the IANA comments for each coded character set.

When additional coded character set enum values are registered with IANA, the corresponding ISO/IEC 10175 OIDs are automatically assigned using the preceding algorithm; no addendum to ISO/IEC 10175 is required.

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Implementors are free to use their own implementor-defined OIDs for coded character sets as well, though the chances of interoperation with other vendor implementations will be less likely than if the values specified in this International Standard are used.

9.3.2.5.2 Representation of coded character sets in documents and attributes

Unicode and ISO/IEC 10646 character coded data may be processed and stored in either most-significant-octet-first order (sometimes called Big Endian) or least-significant octet first order (sometimes called Little Endian), depending on the architecture of the processor. Furthermore, in environments where either order may occur, the so-called Unicode BYTE ORDER MARK (BOM) character (which is ISO/IEC 10646 ZERO WIDTH NO BREAK SPACE), coded as FEFF (hex) in two octets and 0000FEFF (hex) in four octets is used at the beginning of the data as a signature to indicate the order of the following data (See ISO/IEC 10646 Annex F). Thus either ordering and BOM may occur in document data. However, ISO/IEC 8824/8825 (ASN.1/BER) is quite clear that the most-significant-byte-first (Big Endian) order shall be used and BOM shall NOT be used in transmission in the ASN.1/BER protocol.

> NOTE 1 - Transmitting Unicode in most-significant-octet-first (Big Endian) order in ISO/IEC 10175 should not prove to be a hardship for least-significant-octet-first (Little Endian) machines, since ASN.1/BER requires integers to be transmitted in most-significant-octet-first order as well. So ISO/IEC 10175 implementations on least-significant-octet-first order machines are already reversing the order of integers to make them most-significant-octet-first for transmission. Also Unicode characters are usually treated as two-octet integers, not short text strings, so that it will be straightforward for least-significant-octet-first machines to reverse the order of Unicode character octets as well before transmitting them and after receiving them via the ISO/IEC 10175 protocol.

The OIDs defined for the **default-character-set** attribute may also be used by other attributes that specify coded character sets, such as the **operation-locale** common arguments attribute, the **locale** element of the **notification-profile** job attributes, the **coded-character-sets-used** document attribute, and the **locale** server attribute. In addition, any of the coded character sets listed in the table may be used to represent ISO/IEC 10175 the **ErrorMessage** data type used by the server to return error messages as results of operations (see 8.4). In such cases, the above conformance requirements most-significant-octet-first representation of coded character sets shall also apply.

The four standard ISO/IEC 10175 coded character sets used to represent attributes (see generic **Text**, **DescriptiveName**, **Descriptor**, **Message**, **ErrorMessage**, **SimpleName**, and **DistinguishedNameString** data types in 9.1.5) shall have the following corresponding OIDs used in the **Locale** data type (see the **operation-locale**, **notification-profile**, **logging-profile**, **locale**, and **locales-supported** attributes):

Context Tag	Tag value	Data types	OID (descriptive-name)
iso-646-irv	[0]	VisibleString	ASCII
ccitt-t-61	[1]	T61String	JIS-Encoding
iso-latin1	[2]	Latin1String	ISO-Latin1
iso-ucs-2	[3]	UCS2Level2String	ISO-UCS-2-level2

The following standard values are defined for coded character sets:

> NOTE 2 – Taken from IANA character-sets subdirectory, except that ISO-UCS-2-level2 is an addition for ISO/IEC 10175 only.

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Descriptive Name	Object Identifier	Descriptor Text
ISO-UCS-2-level2	id-val-code-set-ISO-UCS-2-level2	ISO Universal Coded Character Set level 2 Universal Coded Character set. Any character. See ISO/IEC 10646 two-octet representation, implementation level 2. NOTE – This value is an ISO/IEC 10175-only addition, not in the IANA list, since output devices are able to handle ISO/IEC 10646 Level 3 (Unicode).
other	id-val-code-set-other	other The designated coded character set is not currently in the enumeration

NOTE 3 – The ISO-UCS-2-level2 object identifier has no corresponding IANA enum value. ISO-UCS-2-level2 coded character set is used in ISO/IEC 10175 attributes only.

Unicode is ISO/IEC 10646 two-octet representation, implementation level 3, while ISO-UCS-2-level2 is ISO/IEC 10646 two-octet representation, implementation level 2. Level 2 is a strict subset of level 3, in which each character has a unique coded representation. In level 3 (Unicode), most accented letter have at least two coded representations: (1) the level 2 combined accented letter character representation (two octets) and (2) the base letter (two octets) followed by one (two octet) or more (more than two octets) non-spacing accent(s) characters. Level 2 is specified as one of the standard coded character sets for ISO/IEC 10175 attribute value data, because the comparison of character coded data for exact, case-insensitive, same letter (see **Filter**), is simpler since each character has only one coded representation.

Standard coded character sets (in the range 3-999):

Descriptive Name	Object Identifier	Descriptor Text
ASCII	id-val-code-code-set-ASCII	ASCII ISO/IEC 646-1991 IRV with the dollar sign as the currency symbol. Note that this set is 7-bit ASCII with either the 8th bit omitted, or zero; this set is not 8-bit ASCII which is the same as ISO 8859-1 (ISO Latin-1)
ISO-Latin1	id-val-code-set-ISO-Latin1	ISO Latin Alphabet No. 1 8-bit Latin for Western Europe and Western Hemisphere. See ISO 8859-1
ISO-Latin2	id-val-code-set-ISO-Latin2	ISO Latin Alphabet No. 2 8-bit Latin for Eastern Europe. See ISO 8859-2
ISO-Latin3	id-val-code-set-ISO-Latin3	ISO Latin Alphabet No. 3 8-bit Latin for Southern Europe and Western Hemisphere. See ISO 8859-3
ISO-Latin4	id-val-code-set-ISO-Latin4	ISO Latin Alphabet No. 4 8-bit Latin for Northern Europe. See ISO 8859-4
ISO-Latin-Cyrillic	id-val-code-set-ISO-Latin-Cyrillic	ISO Latin/Cyrillic Alphabet 8-bit ASCII plus Cyrillic. See ISO 8859-5
ISO-Latin-Arabic	id-val-code-set-ISO-Latin-Arabic	ISO Latin/Arabic Alphabet 8-bit ASCII plus Arabic. See ISO 8859-6
ISO-Latin-Greek	id-val-code-set-ISO-Latin-Greek	ISO Latin/Greek Alphabet 8-bit ASCII plus Greek. See ISO 8859-7

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ISO-Latin-Hebrew	id-val-code-set-ISO-Latin-Hebrew	ISO Latin/Hebrew Alphabet 8-bit ASCII plus Hebrew. See ISO 8859-8
ISO-Latin5	id-val-code-set-ISO-Latin5	ISO Latin Alphabet No. 5 8-bit Latin for EU Member countries. See ISO 8859-9
ISO-Latin6	id-val-code-set-ISO-Latin6	ISO Latin Alphabet No. 6 8-bit Latin for Scandinavian countries; better than Latin4 for those countries. See ISO 8859-10
ISO-Text-Communication	id-val-code-set-ISO-Text-Communication	ISO Latin 8-bit Text Communication Used in ISO ASN.1 T61String. See ISO/IEC 6937
Half-Width-Katakana	id-val-code-set-Half-Width-Katakana	Half Width Katakana One byte only, this is equivalent to JIS/Roman (similar to ASCII) plus eight-bit half-width Katakana. See JIS X 0201-1976
JIS-Encoding	id-val-code-set-JIS-Encoding	JIS Encoding Uses ISO/IEC 2022 escape sequences to shift code sets as documented in JIS X 0202-1
Shift-JIS	id-val-code-set-Shift-JIS	Shift JIS Also known as MS Kanji. A Microsoft code that extends Half Width Katakana to include Kanji by adding a second byte when the value of the first byte is in the ranges 81-9F or E0-EF (hex)
EUC-Packed-Format-Japanese	id-val-code-set-EUC-Packed-Format-Japanese	Extended UNIX Code Packed Format for Japanese Standardized by OSF, UNIX International, and UNIX Systems Laboratories Pacific. Uses ISO/IEC 2022 rules to select: code set 0: JIS Roman (a single 7-bit byte set) code set 1: JIS X0208-1990 (a double 8-bit byte set) restricted to A0-FF in both bytes code set 2: Half Width Katakana (a single 7-bit byte set) requiring SS2 as the character prefix code set 3: JIS X0212-1990 (a double 7-bit byte set) restricted to A0-FF in both bytes requiring SS3 as the character prefix. PCL Symbol Set id: 17K
EUC-Fixed-Width-Japanese	id-val-code-set-EUC-Fixed-Width-Japanese	Extended UNIX Code Fixed Width for Japanese Used in Japan. Each character is 2 octets: code set 0: JIS Roman (a single 7-bit byte set) 1st byte = 00, 2nd byte = 20-7E code set 1: JIS X0208-1990 (a double 7-bit byte set restricted to A0-FF in both bytes) code set 2: Half Width Katakana (a single 7-bit byte set) 1st byte = 00, 2nd byte = A0-FF code set 3: JIS X0212-1990 (a double 7-bit byte set) restricted to A0-FF in the first byte and 21-7E in the second byte

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ISO-reg4-United-Kingdom	id-val-code-set-ISO-reg4-United-Kingdom	United Kingdom national std set See registration 4 - ISO/IEC 2375 Registration Authority: ECMA
ISO-reg11-Swedish-for-Names	id-val-code-set-ISO-reg11-Swedish-for-Names	Swedish for Names national std set See registration 11 - ISO/IEC 2375 Registration Authority: ECMA.
ISO-reg15-Italian	id-val-code-set-ISO-reg15-Italian	Italian national set See registration 15 - ISO/IEC 2375 Registration Authority: ECMA.
ISO-reg17-Spanish	id-val-code-set-ISO-reg17-Spanish	Spanish national set See registration 17 - ISO/IEC 2375 Registration Authority: ECMA.
ISO-reg21-German	id-val-code-set-ISO-reg21-German	German national std set See registration 21 - ISO/IEC 2375 Registration Authority: ECMA.
ISO-reg60-Danish-Norwegian	id-val-code-set-ISO-reg60-Danish-Norwegian	Danish Norwegian national std set See registration 60 - ISO/IEC 2375 Registration Authority: ECMA.
ISO-reg69-French	id-val-code-set-ISO-reg69-French	French - see ISO Reg No 69 See registration 69 - ISO/IEC 2375 Registration Authority: ECMA.

Unicode and vendor-supplied combinations of ISO collections (in the range 1000-1999):

Descriptive Name	Object Identifier	Descriptor Text
Unicode	id-val-code-set-Unicode	Unicode Universal Coded Character set. Any character. See ISO/IEC 10646 two-octet representation, implementation level 3
UCS4	id-val-code-set-UCS4	Four-octet Universal Coded Character Set Any character. See ISO/IEC 10646 four-octet representation, implementation level 3
Unicode-ASCII	id-val-code-set-Unicode-ASCII	ASCII subset of Unicode Basic Latin = collection 1 See ISO/IEC 10646, Appendix A
Unicode-Latin1	id-val-code-set-Unicode-Latin1	ISO Latin-1 subset of Unicode Basic Latin and Latin-1 Supplement = collections 1 and 2. See ISO/IEC 10646, Appendix A
Unicode-IBM-2039	id-val-code-set-Unicode-IBM-2039	IBM Latin-1 SAA Core Coded Character Set Extended ISO 8859-1 Presentation Set, GCSGID: 2039
Unicode-IBM-1261	id-val-code-set-Unicode-IBM-1261	IBM Latin-2, -3, -5 Extended Presentation Set GCSGID: 1261
Unicode-IBM-1268	id-val-code-set-Unicode-IBM-1268	IBM Latin-4 Extended Presentation Set GCSGID: 1268
Unicode-IBM-1276	id-val-code-set-Unicode-IBM-1276	IBM Cyrillic Greek Extended Presentation Set GCSGID: 1276
Unicode-IBM-1264	id-val-code-set-Unicode-IBM-1264	IBM Arabic Presentation Set GCSGID: 1264

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Unicode-IBM-1265	id-val-code-set-Unicode-IBM-1265	IBM Hebrew Presentation Set GCSGID: 1265

Vendor developed coded character sets (in the range 2000-xxx):

Descriptive Name	Object Identifier	Descriptor Text
Windows30-Latin1	id-val-code-set-Windows30-Latin1	Windows Latin-1 Extended ISO 8859-1 for Windows 3.0 PCL Symbol Set id: 9U
Windows31-Latin1	id-val-code-set-Windows31-Latin1	Windows Latin-1 Extended ISO 8859-1 for Windows 3.1 PCL Symbol Set id: 19U
Windows31-Latin2	id-val-code-set-Windows31-Latin2	Windows Latin-2 Extended ISO 8859-2 for Windows 3.1 PCL Symbol Set id: 9E
Windows31-Latin5	id-val-code-set-Windows31-Latin5	Windows Latin-5 Extended ISO 8859-5 for Windows 3.1 PCL Symbol Set id: 5T
HP-Roman8	id-val-code-set-HP-Roman8	HP Roman8 HP 8-bit Latin set, ASCII in LH PCL Symbol Set id: 8U
Adobe-Standard-Encoding	id-val-code-set-Adobe-Standard-Encoding	Adobe Standard Encoding PCL Symbol Set id: 10J
Ventura-US	id-val-code-set-Ventura-US	Ventura US ASCII plus characters typically used in publishing, like pilcrow, copyright, registered, trade mark, section, dagger, and double dagger in the range A0 (hex) to FF (hex). PCL Symbol Set id: 14J
Ventura-International	id-val-code-set-Ventura-International	Ventura International ASCII plus coded characters similar to Roman8 PCL Symbol Set id: 13J
DEC-MCS	id-val-code-set-DEC-MCS	DEC Multinational Similar to ISO 8859-1 Digital Equipment Corp
PC-page-850-Multilingual	id-val-code-set-PC-page-850-Multilingual	PC Multilingual code page 850 ASCII in the LH; other Latin characters in the RH PCL Symbol Set id: 12U
PC-page-852-Latin2	id-val-code-set-PC-page-852-Latin2	PC Latin-2 code page 852 PCL Symbol Set id: 17U
PC8-page-437-US	id-val-code-set-PC8-page-437-US	PC Code page 437 for US US PC code page PCL Symbol Set id: 10U
PC8-Danish-Norwegian	id-val-code-set-PC8-Danish-Norwegian	PC Danish Norwegian 8-bit PC set for Danish Norwegian PCL Symbol Set id: 11U
PC-page-862-Latin-Hebrew	id-val-code-set-PC-page-862-Latin-Hebrew	PC Latin Hebrew code page 862 PCL Symbol Set id: 15H
PC8-Turkish	id-val-code-set-PC8-Turkish	PC Latin Turkish PCL Symbol Set id: 9T
IBM-Symbols	id-val-code-set-IBM-Symbols	IBM Symbols Presentation Set CPGID: 259

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IBM-Thai	id-val-code-set-IBM-Thai	IBM Thai Presentation Set CPGID: 838
HP-Legal	id-val-code-set-HP-Legal	HP Legal PCL Symbol Set id: 1U
HP-PiFont	id-val-code-set-HP-PiFont	HP PI font PCL Symbol Set id: 15U
HP-Math8	id-val-code-set-HP-Math8	HP Mathematics set HP 8-bit math set PCL Symbol Set id: 8M
HP-PS-Math,	id-val-code-set-HP-PS-Math	HP PostScript Math Similar to AdobeSymbolEncoding PCL Symbol Set id: 5M
HP-Desktop	id-val-code-set-HP-Desktop	HP Desktop PCL Symbol Set id: 7J
Ventura-Math	id-val-code-set-Ventura-Math	Ventura Math PCL Symbol Set id: 6M
Microsoft-Publishing	id-val-code-set-Microsoft-Publishing	Microsoft Publishing PCL Symbol Set id: 6J
Windows31J	id-val-code-set-Windows31J	Windows Japanese A further extension of **ShiftJIS** to include several OEM-specific Kanji extensions. Like **ShiftJIS**, **Windows31J** adds a second byte when the value of the first byte is in the ranges 81-9F or E0-EF. PCL Symbol Set id: 19K
GB-2312	id-val-code-set-GB-2312	Chinese for People's Republic of China (PRC) mixed one byte, two byte set: 20-7E = one byte ASCII. A1-FE = two byte PRC Kanji. See GB 2312-80 PCL Symbol Set Id: 18C
Big5	id-val-code-set-Big5	Chinese for Taiwan Multi-byte set. PCL Symbol Set Id: 18T

If the document data, itself, specifies coded character-sets, such specification shall override the **default-character-set** attribute on a page by page basis. If the document data specifies character-sets which are not also values of **character-sets-used**, then a printer may receive a document which requires character-sets which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative character-set, such as the **default-character-set**.

9.3.2.6 Default-character-repertoire

This attribute identifies a character-repertoire that the server shall use as the character-repertoire default for the pages of the document that require a specification. A character repertoire, sometimes called a character collection, is a particular subset of the characters in a coded character set.

```
default-character-repertoire ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-repertoire
```

Standard values are defined in ISO/IEC character set standards. See ISO/IEC 6937, ISO/IEC 7350, ISO/IEC 10538, and ISO/IEC 10646. Character set repertoires are registered according to the procedures specified in ISO/IEC 7350 and ISO/IEC 10538.

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If the document data, itself, specifies character-repertoires, such specification shall override the **default-character-repertoire** attribute on a page by page basis. If the document data specifies character-repertoires which are not also values of **character-repertoires-used**, then a printer may receive a document which requires character-repertoires which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative character-repertoire, such as the **default-character-repertoire**.

9.3.2.7 Default-character-mapping

This attribute identifies a character-mapping that the server shall use as the character-mapping default for the pages of the document that require a specification. A character map associates each character in a coded character set with a glyph identifier.

```
default-character-mapping ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-mapping
```

Values are registered according to the procedures specified by the Association for Font Information Interchange (AFII).

NOTE – AFII is the registration authority assigned by the ISO Secretariat to register character mappings.

If the document data, itself, specifies character-mappings, such specification shall override the **default-character-mapping** attribute on a page by page basis. If the document data specifies character-mappings which are not also values of **character-mappings-used**, then a printer may receive a document which requires character-mappings which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative character-mapping, such as the **default-character-mapping**.

9.3.2.8 Default-printer-resolution

This attribute identifies a resolution that the server shall use as the resolution default for (the pages of) the document where the document itself does not specify a resolution. The specified resolution may either be an integer value in dots per inch (dpi) or it may name a resolution with an OID.

```
default-printer-resolution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-printer-resolution
```

The following standard values are defined for printer resolutions:

Descriptive Name	Object Identifier	Description
lowest	id-val-printer-resolution-lowest	The lowest resolution supported by the selected physical printer.
medium	id-val-printer-resolution-medium	A middle resolution supported by the selected physical printer. If two resolutions are equally near, this attribute references the higher of the two.
highest	id-val-printer-resolution-highest	The highest resolution supported by the selected physical printer.

NOTE – The client may obtain the actual resolution associated with an oid-value OID by querying the printer's attribute **printer-resolutions-supported**, which contains the mapping of resolution OIDs to resolution values.

If the document data, itself, specifies resolution, such specification shall override the **default-printer-resolution** attribute, even on a page by page basis, depending on the printer. If the document data specifies printer resolutions which are not also values of **printer-resolutions-used**, then a printer may receive a document which requires printer-resolutions which are not ready. In such a case, an implementation may either abort the document or try printing the document using some alternative printer-resolution, such as the **default- printer-resolution**.

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9.3.2.9 Medium-substitution

This attribute specifies a list of pairs of medium identifiers. Each of these pairs identifies a document medium, followed by the medium to be substituted for it.

The server shall apply a substitution for a page only if all four following conditions are met.

a) The page is not controlled by **page-media-select**.

b) The **input-tray-select** attribute does not have a value.

c) Either of the following conditions is met: a) The document contents specify a medium explicitly. b) The document contents do not specify an input tray, and the **default-medium** attribute has a value.

d) The value of one of the **original-medium** elements of this attribute is the medium specified by step 3.

For each page, the server shall perform at most one substitution, even if the resulting **substitution-medium** also appears as an **original-medium**. That is, if the **medium-substitution** attribute specifies that medium x becomes y, and medium y becomes z, then medium x does not become z through a double substitution.

The client shall ensure that no medium shall occur more than once as an **original-medium** value. If the **default-medium** value or a medium value within the document does not occur as the value of an **original-medium**, no substitution occurs for that medium.

The server shall apply these substitutions even if an **original-medium** is supported or ready on the printer, and regardless of whether the **substitution-medium** is ready or supported on the printer.

```
MediumReference ::= NameOrOid

MediumSubstitution ::= SEQUENCE {
        original-medium         MediumReference,
        substitution-medium     MediumReference }

mediumSubstitutionSyntax ATTRIBUTE-SYNTAX
        MediumSubstitution
        MATCHES FOR EQUALITY
        ::= id-syn-medium-substitution

medium-substitution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSubstitutionSyntax
        MULTI VALUE
        ::= id-att-medium-substitution
```

Standard values for medium identifiers are defined in the specification of the **medium-identifier** attribute of the medium object class.

Omission of this attribute does not imply that the server shall not apply implicit medium substitution. However, the server shall not perform implicit medium substitution for compulsory medium attributes (see 9.1.1).

9.3.2.10 Input-tray-select

This attribute specifies the input-tray from which media shall be drawn for printing the document.

The server shall apply this attribute only to those pages not specified in the **page-media-select** attribute. If **page-media-select** has no value, this attribute applies to the entire document. This attribute overrides any media or input-trays specified within the document contents and any values specified by **default-medium** or **default-input-tray**.

```
input-tray-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-input-tray-select
```


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9.3.2.11 Font-substitution

This attribute specifies a list of pairs of font references. Each of these pairs identifies a document font, followed by the font to be substituted for it.

```
FontSubstitution ::= SEQUENCE {
        original-font       FontReference,
        substitution-font   FontReference }

fontSubstitutionSyntax ATTRIBUTE-SYNTAX
        FontSubstitution
        MATCHES FOR EQUALITY
        ::= id-syn-font-substitution

font-substitution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontSubstitutionSyntax
        MULTI VALUE
        ::= id-att-font-substitution
```

Omission of this attribute does not imply that the server shall not apply implicit font substitution. However, the server shall not perform implicit font substitution for compulsory font attributes (see 9.1.1).

9.3.2.12 Resource-context

This attribute allows a sequence of one or more contexts to be specified with the document. Each context is a choice of either a resource-context object reference or a specific server path name. A context provides a pointer to a group of resources (see the **resource** object class); when combined with an appropriate resource name, a fully-qualified name is formed, unambiguously identifying a particular resource within the distributed system.

```
ResourceContext  ::= CHOICE {
        object-name [0] NameOrOid,  -- Identifies resource-context object
        path-name   [1] Text }      -- Identifies server path

ResourceContextSequence ::= SEQUENCE OF ResourceContext

resourceContextSyntax ATTRIBUTE-SYNTAX
        ResourceContextSequence
        MATCHES FOR EQUALITY
        ::= id-syn-resource-context

resource-context ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-resource-context
```

In addition, the server shall use the printer's **printer-resource-context** attribute and the server's **server-resource-context** attribute to locate resources required for the printing of a job. For each reference to a resource from a document or from the value of the **default-resource** document attribute, the server shall use the following order of search in order to locate the resource:

a) The resource objects submitted with the print-job using separate print-requests with the **document-type** component of the **PrintArgument** set to **resource** (see 8.2.1).

b) The explicit contexts specified by the document's **resource-context** attribute, supplied (1) by the client in the **PrintArgument**, (2) by the specified (logical or physical) printer's initial-value-job object (if the client did not supply the **resource-context** attribute with a value), or (3) by the physical printer's initial-value-job object (if neither the client nor the specified (logical printer's) initial-value-job object specified a value) in the order they appear in the **resource-context** attribute;

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c) The contexts specified by the printer's **printer-resource-context** attribute, in the order they appear in that attribute;

d) The contexts specified by the server's **server-resource-context** attribute, in the order they appear in that attribute.

9.3.2.13 Finishing

This attribute identifies a finishing-object or a sequence of one or more finishing-processes to be applied to each copy of the printed document.

Finishing encompasses the operations that may be applied to the media output of a print-job. Examples include stapling, saddle-stitching, hole-drilling, binding with tape, etc. The **Finishing** type permits a client to specify finishing by either of two means:

a) one server-defined named-finishing object may be specified by supplying its name or OID in the **finishing** attribute; the specified finishing object may consist of any number of individual finishing processes which shall be applied to each copy of the document; the individual finishing processes shall be applied in the sequence defined by the specified finishing object;

b) one or more individual finishing processes may be specified in the **finishing** attribute; each of the individual processes may also be specified in one of two ways:

   1) by identifying a server-defined finishing object, as in a) above; the identified finishing object shall be appropriate to the finishing process for which it is specified (e.g., it is an error to identify a stitching finishing object in a punching process specification, or to identify a finishing object comsisting of more than one finishing process).

   2) by including the required parameters for each of the individual finishing processes in the **finishing** attribute.

   For either method of specification, the individual finishing processes shall be applied in the sequence specified in the **finishing** attribute.

See the **finishing** object class for the definition of the **Finishing** type.

```
finishing ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-finishing
```

Standard values for this attribute are defined in the specification of the **finishing-identifier** attribute of the finishing object class.

See the related per-job **job-finishing** attribute that applies finishing objects to each job-copy.

9.3.2.14 Finishing-includes-document-sheets

This attribute specifies whether a **document-copy-start-sheet** and a **document-copy-end-sheet**, if printed, shall be included in document finishing operations. A value of **TRUE** means that such a **document-copy-start-sheet** and a **document-copy-end-sheet** shall be included in the sheets controlled by the document finishing operations; a value of **FALSE** means that such sheets shall be excluded from the document finishing operations.

```
finishing-includes-document-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-finishing-includes-document-sheets
```

9.3.2.15 Output

This attribute identifies the output processing for the media on which the document is to be printed.

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```
output ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-output
```

Standard values for this attribute are defined in the specification of the **output-identifier** output attribute.

9.3.2.16 Imposition attributes

This group of attributes identify and/or specify the imposition operations performed on each page. An imposition operation consists of 3 steps performed in the order given below and specified by six attributes. The steps are:

a) **number-up**: the number of source page-images to make up a target page image. This operation may be complex.

b) **binding-edge-shift**: the amount to shift the target page image away from the binding edge, based on **plex** and **binding edge.**

c) **page-image-shift**: the final amount to shift in the x and y direction without regard to **plex**.

As introduced in 6.3.13, imposition functions affect the placement, orientation and scaling of page images on the selected media. Examples include applying binding margins, placing two page images on a side of the medium, and simple pamphlet.

9.3.2.16.1 Number-up

This attribute specifies the number of source page-images to impose upon a single instance of a selected medium. The attribute can be specified either by a number directly or by naming an imposition object which specifies some particular number-up imposition.

```
number-up  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrNameOrOidSyntax
        SINGLE VALUE
        ::= id-att-number-up
```

In general, only certain numeric values are valid for this attribute, depending upon the server and printer implementations to which the print-request is directed. A value of **0** or **none** shall suppress any server default number up, if any.

This attribute primarily controls the translation, scaling and rotation of page images, but a site may choose to add embellishments, such as borders to each logical page. A site may even choose to add an attribute to control the presence or characteristics of such embellishments.

The following standard values are defined:

Descriptive Name	Object Identifier	Numeric value	Descriptor Text
none	id-val-generic-none	**0**	This value suppresses any number-up operation or its embellishments.
simple-1-up	id-val-imposition-simple-1-up	**1**	This value specifies that 1 logical page is to be imaged on one surface of the medium, possibly with embellishments.
simple-2-up	id-val-imposition-simple-2-up	**2**	This value specifies that 2 logical pages are to be imaged on one surface of the medium, possibly with embellishments.
simple-4-up	id-val-imposition-simple-4-up	**4**	This value specifies that 4 logical pages are to be imaged on one surface of the medium, possibly with embellishments.

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NOTE – The value 0 or **none** specifies that no convenience imposition functions shall be performed; 0 or **none** is needed to suppress any special number-up operation because a value of 1 for some sites may cause the server to alter the placement, or size of the page image, or to add embellishments, such as borders or to rotate the page depending on **content-orientation**.

The server may support three values for **number-up** besides **0** (and **id-val-generic-none**), namely **1** (and **id-val-imposition-1-up**), **2** (and **id-val-imposition-simple-2-up**) and **4** (and **id-val-imposition-simple-4-up**), which this document will reference by the respective names of **0-up**, **1-up**, **2-up** and **4-up**, henceforth. These **1-up**, **2-up** and **4-up values** provide a simple means for users to request the printing of compact documents of a temporary or informal nature. Figures 9-2 and 9-3 contain illustrations. The imposition function is accomplished by transforming the page-images of the original document format as needed in order to print each one, two, or four, consecutive page images adjacent to one another on one physical medium surface. These functions are not intended for use in publishing activities such as the production of 2-up or 4-up signatures that will be bound into quality pamphlets and books. It is expected that other numeric values and OIDs will be defined in the future or by implementors to support these more complex activities.

Figure 9-2 shows the four page orientations with **0-up**, i.e., with no rotation or other imposition. The first row shows the four page orientations with respect to the Reference Coordinate System (RCS). See 6.5.4. The second row shows the four orientations after the user has manually rotated the medium to its natural viewing orientation *after* the page has been printed. The folded corners help indicate that manual rotation, if any, performed by the user in order to view the page.

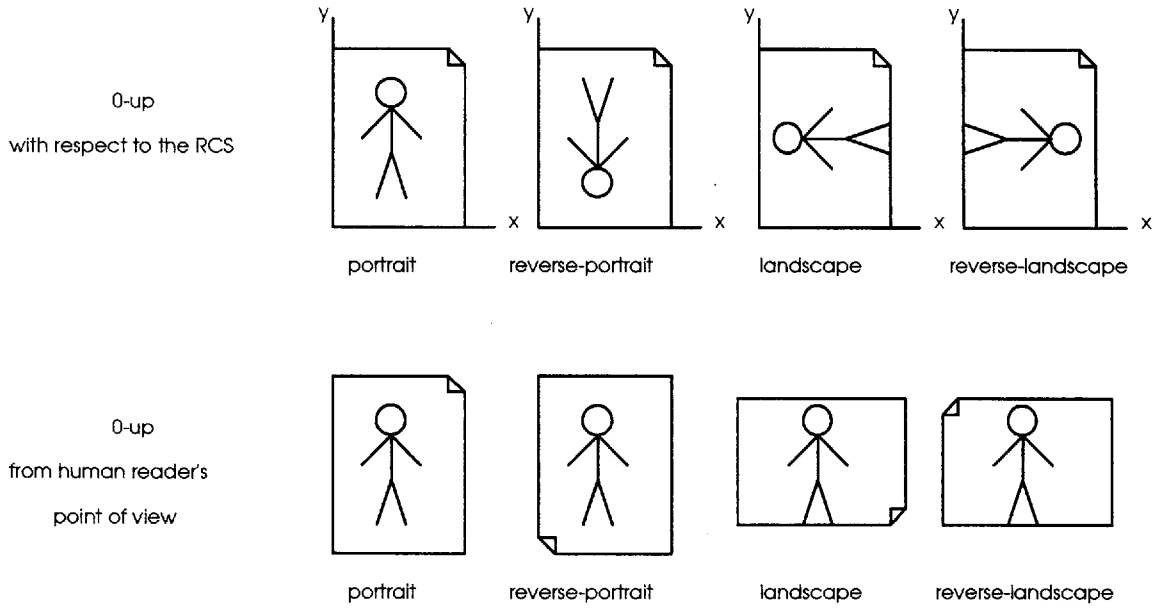

Figure 9-2 - Portrait, reverse-portrait, landscape, and reverse-landscape orientations (0-up)

NOTE – In this International Standard, **landscape** orientation is a rotation of the logical page image of +90 degrees (i.e., anti-clockwise) compared to **portrait** (see the **content-orientation** document attribute), so that binding on the long edge is the same physical edge of the medium for both **portrait** (on the "left") and **landscape** (on the "top"). However, some applications rotate **landscape** -90 degrees (i.e., clockwise) with respect to **portrait**, instead of +90 degrees (i.e., anti-clockwise). Therefore this International Standard provides both **landscape** and **reverse-landscape**, so that either semantics for **landscape** can be specified. The **reverse-portrait** orientation is provided for completeness and to help the printing system accommodate any orientation that applications may have implemented.

Figure 9-3 shows the four page orientations with **1-up**, **2-up**, and **4-up** impositions when the **presentation-direction** is **toRight-toBottom**. For other values of the **presentation-direction**, the rotation and/or order of placement of logical pages upon the physical medium may differ. The first row shows the four page orientations with respect to the Reference Coordinate System (RCS). See 6.5.4. The second row shows the four orientations after the user has

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manually rotated the medium to its natural viewing orientation *after* the page has been printed. The folded corners help indicate that manual rotation, if any, performed by the user in order to view the page.

The transformations required to achieve the **1-up**, **2-up,** or **4-up** effect shall require translation of some page images (i.e., shifting parallel to the x-axis or y-axis of the RCS), and may involve rotation and scaling of the document's source page images; the transformation parameters shall depend upon:

- the specific **number-up** function (i.e., **1-up, 2-up,** or **4-up**);
- the page-size and orientation for which the source document was originally formatted as specified by the **page-size** and **content-orientation** attributes;
- the **current-page-order** to determine the order of placement of logical pages upon the physical medium;
- the **page-count** when the **current-page-order** is **last-to-first** in order to determine the number of empty logical pages to be left blank on the first impression of the document.
- the **medium-size** of the specified output media;
- the **presentation-direction** to determine the rotation and order of placement of logical pages upon the physical medium.

The semantics of the standard imposition values is specified in the following sub-clauses when the value of the **presentation-direction** is **toRight-toBottom**; other values of **presentation-direction** may require other rotations and/or other placements of logical pages upon the medium.

9.3.2.16.1.1 Semantics of 1-up Imposition

When **number-up** is **1-up** and the **presentation-direction** is **toRight-toBottom**, the server shall transform the original document format such that *each* consecutive source page image shall be rendered on a single side of one instance of the output medium. In addition, the server shall perform the following transformations:

- If the value of **content-orientation** is **reverse-portrait** or **reverse-landscape**, rotate the page image 180 degrees.
- Apply any additional embellishments, such as borders, and/or reducing the page image so that the entire page image fits within the assured reproduction area of the medium, depending on implementation.

9.3.2.16.1.2 Semantics of 2-up Imposition

When **number-up** is **2-up** and the **presentation-direction** is **toRight-toBottom**, the server shall transform the original document format such that *each pair of* consecutive source page images shall be rendered on a single side of one instance of the output medium. If the output medium is of the same size as the page-size for which the source document was originally formatted, the following actions shall be performed:

- each source page image shall be reduced in size by approximately the quotient of the length of the short edge divided by the length of the long edge (exact ratio depends upon the dimensions of the medium);
- each scaled page-image shall be rotated:
  - +90 degrees (i.e., anti-clockwise) if the value of **content-orientation** is **portrait** or **reverse-landscape**;
  - –90 degrees (i.e., clockwise) if the value of **content-orientation** is **landscape** or **reverse-portrait**;
- From the standpoint of the RCS (i.e. ignoring the rotation of the page images and keeping the medium in portrait orientation), the first page of the pair of pages is below the second page for **portrait** or **reverse-portrait**, and the first page is above the second page for **landscape** or **reverse-landscape**.

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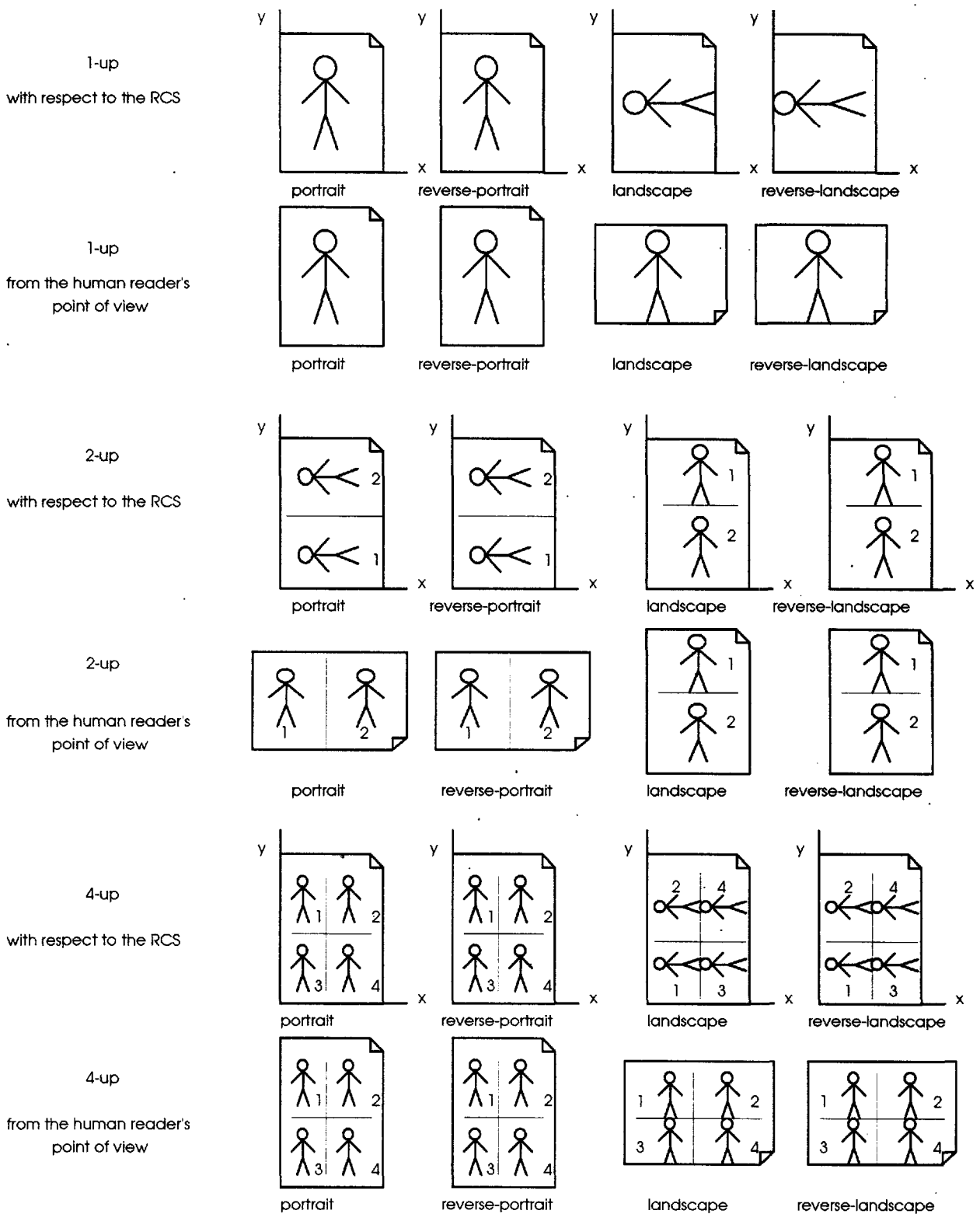

Figure 9-3 - 1-up, 2-up, and 4-up Imposition for presentation-direction = toRight-toBottom

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9.3.2.16.1.3 Semantics of 4-up Imposition

When **number-up** is **4-up** and the **presentation-direction** is **toRight-toBottom**, the server shall transform the original document format such that *each four consecutive* source page images shall be rendered adjacent to one another on a single side of one instance of the output medium. If the output medium is of the same size as the page-size for which the source document was originally formatted, the following actions shall be performed:

- each source page image shall be reduced in each dimension by approximately one-half;
- the scaled page-images shall be rotated:
  - 0 degrees (i.e., not rotated) if the value of **content-orientation** is **portrait** or **landscape**
  - 180 degrees, if the value of **content-orientation** is **reverse-portrait** or **reverse-landscape**;
- the set of four consecutive page images shall be translated as needed (i.e., shifted horizontally or vertically) to place them in the following order on a single surface of the output medium: top-left, top-right, bottom-left, bottom-right where the context for this ordering is rotated from the RCS by: 0 degrees for **portrait** and **reverse-portrait**, and by 90 degrees (anti-clockwise) for **landscape** and **reverse-landscape**.

9.3.2.16.2 Plex

This attribute indicates whether the page images of the output document to be conditioned for (eventual) 1-sided or 2-sided printing, and also specifies whether the relative orientation between consecutive page-images is to be altered.

This attribute is evaluated in conjunction with the **binding-edge-image-shift** attribute to determine, whether, and how, to shift page-images relative to the output medium to allow extra space for binding margins. The value of this attribute may also be used by the presentation processes of some document formats to determine whether or not to print certain designated pages (e.g., the extra blank pages needed in 2-sided printing to cause sections to begin on recto pages).

```
plex ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-plex
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
simplex	id-val-plex-simplex	The document pages are to be conditioned for 1-sided printing.
duplex	id-val-plex-duplex	The document pages are to be conditioned for 2-sided printing; see below for how **duplex** and **tumble** differ.
tumble	id-val-plex-tumble	The document pages are to be conditioned for 2-sided printing; see below for how **tumble** and **duplex** differ. Sometimes referred to as "head-to-toe" page orientation.

In both **duplex** and **tumble** mode, the page images are eventually destined for 2-sided printing. But the two differ in how the image on the back side relates to the image on the front side. For this discussion, assume that the printer has just imaged the front side of the paper. To place a page image on the back side of the medium, the medium is rotated 180 degrees about the y (vertical) axis (i.e. flipped over) within the RCS coordinate system and the image is placed on the medium with no rotation for duplex (i.e. kept right side up) and after rotating it 180 degrees for tumble (i.e. turned upside down). That is, if we observe the line defined as 'y=0' on the front side of the medium and the line 'y=0' on the back side of the medium in the image coordinate system (the possibly rotated one), they run along the same physical edge of the paper for **duplex** and along opposite physical edges for **tumble** (hence the term "head-to-toe").

Whether the images are portrait or landscape, the binding edge is parallel to: the y axis for **duplex**, and the x axis for **tumble**. This last observation is important for understanding when to use **tumble**. If the binding edge of the

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document is along the y-axis, the **plex** is **duplex**, whether the orientation is **portrait** or **landscape**, and if the binding-edge is along the x-axis, the **plex** is **tumble**, whether the orientation is **portrait** or **landscape**. See Figure 9-4 for an illustration of the relationships.

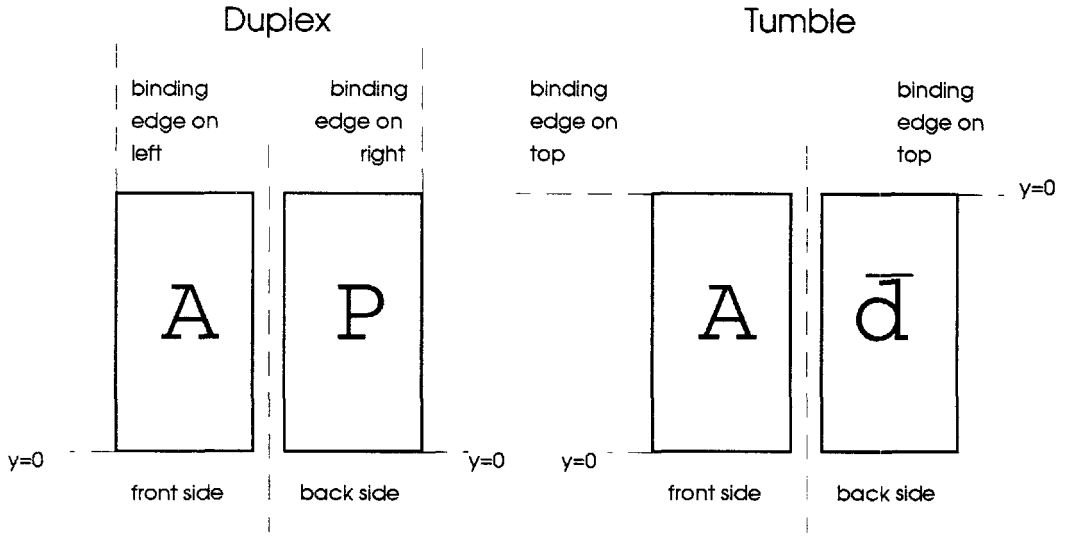

Figure 9-4 - Duplex and Tumble

Refer to subsequent subclauses for details of the interaction between this attribute and the attributes binding-edge and binding-edge-image-shift.

> NOTE – The attribute **plex** is independent of the attribute **sides**. For example, a value of **2** for **sides** specifies that the output is to be rendered on both sides of the selected medium sheets, without regard to the placement of the images on the medium surfaces; a value of **duplex** for **plex** specifies that the output is expected to be printed in 2-sided form eventually -- but not necessarily as a result of the current print-request. The purpose in defining these two attributes independently is to provide the ability to print a 1-sided master that is properly formatted for subsequent use in some high-volume duplication process, such as off-set printing.

9.3.2.16.3 Binding-edge

The binding edge specifies the edge of the physical medium on which binding will (eventually) occur from the perspective of the first sheet imaged. This attribute determines the edge to which the **binding-edge-image-shift** is applied.

If the client does not specify this attribute, its default value is **top-edge** if the **plex** is **tumble**, and otherwise, **left-edge** (i.e. if the **plex** is **simplex** or **duplex**).

```
binding-edge ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX edgeSyntax
        SINGLE VALUE
        ::= id-att-binding-edge
```

See 9.1.5.49 for a definition of **edgeSyntax**.

> NOTE – If the client specifies (a range of pages of) a document where the first page of the document is a back side of a sheet, the client must specify the binding edge to be from the perspective of that "first" page; e.g. on a document that is

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to be bound on the left-edge, the client would specify **right-edge** because the back page would be bound on its right edge.

9.3.2.16.4 Binding-edge-image-shift

This attribute determines the amount to shift the image away from the binding edge in a direction that is perpendicular to the binding-edge (as specified in the **binding-edge** attribute or by its default value). The purpose of this attribute is to enable a user/client to request a wider margin on one edge to allow for some binding operation.

```
binding-edge-image-shift ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nonNegativeRealSyntax
        SINGLE VALUE
        ::= id-att-binding-edge-image-shift
```

The values are measured in millimeters in a direction perpendicular to the binding edge; default value is 0. The first page-image is to be shifted away from the paper edge specified as the **binding-edge**. The shift for subsequent pages depends on the **plex**:

plex = simplex: all pages are shifted away from the specified **binding-edge** by the amount indicated by the **binding-edge-image-shift**.

plex = tumble (or even **duplex**), **binding-edge = top-edge** or **bottom-edge** all pages are shifted away from the specified **binding-edge** by the amount indicated by the **binding-edge-image-shift**.

plex = duplex (or even **tumble**), **binding-edge = left-edge** or **right-edge**: because the **binding-edge** appears to alternate between opposite edges on consecutive pages, consecutive page-images are shifted in alternating directions away from the apparent binding-edge, by the amount of **binding-edge-image-shift** value; the initial page-image of the output document is shifted away from the **binding-edge**; the second page-image shall be shifted by the same amount, but in a direction opposite to the first page-image shift; each subsequent pair of page-images in the output document shall be shifted in the same manner as the first pair.

NOTE – The behavior of **duplex** and **tumble** are this way because of the relationship between the page-image on opposite sides of a page as described for the **plex** attribute. When the **binding-edge** is **top-edge** on the front side, its position on the back side is still **top-edge**. The same is true for **bottom-edge**. But when the **binding-edge** is **left-edge** on the front side, its actual position on the back side is **right-edge**. A similar reversal occurs for **right-edge**.

9.3.2.16.5 x-image-shift

This attribute causes page-images to be shifted in position with respect to the media on which the page-images are to be rendered. The direction of shift shall be parallel to the x-axis of the Reference Coordinate System.

The purpose of the image-shift attributes **x-image-shift** and **y-image-shift** (defined in the following subclause) is to enable a user/client to request a different margin, possibly to correct a misalignment.

```
x-image-shift ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-x-image-shift
```

The **x-image-shift** values are measured in millimetres along the x-axis of the RCS; default value is zero.

The sign of the **x-image-shift** indicates the direction of the shift. A positive value indicates that the shift is in the positive x-direction, and a negative value indicates that the shift is in the negative x-direction. The shift direction is the same for all pages, regardless of the value of **plex**.

9.3.2.16.6 y-image-shift

This attribute causes page-images to be shifted in position with respect to the media on which the page-images are to be rendered. The direction of shift shall be parallel to the y-axis of the Reference Coordinate System.

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```
y-image-shift ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-y-image-shift
```

The **y-image-shift** values are measured in millimetres along the y-axis of the RCS; default value is zero.

The sign of the **y-image-shift** indicates the direction of the shift. A positive value indicates that the shift is in the positive y-direction, and a negative value indicates that the shift is in the negative y-direction. The shift direction is the same for all pages, regardless of the value of plex.

9.3.2.17 Print-quality

This attribute specifies the desired output quality of the printed document.

```
print-quality ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-print-quality
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
draft	id-val-print-quality-draft	Lowest quality available on the printer
normal	id-val-print-quality-normal	Normal or intermediate quality on the printer
high	id-val-print-quality-high	Highest quality available on the printer

Some printers have programmatically controlled output quality. This attribute allows the user to specify the level of output quality desired from these printers.

9.3.2.18 Medium-fidelity

This attribute specifies how closely the available media shall adhere to the requested media. Media may be specified both in the document attributes and in the document production instructions (DPI) contained in the document data.

The presence of one of these **medium-fidelity** values indicates that a medium may only be substituted by a server if it has the same value of the particular medium attribute as the requested medium, if any.

If the **default-medium**, **media-used** or **page-media-select** attributes are compulsory (the OID of their attribute-ids is not contained in the document's **non-compulsory-attributes**), the server shall ignore the **medium-fidelity** attribute, since compulsory means that the server shall perform the semantics of all compulsory attributes as specified or reject the request.

If the **default-medium**, **media-used** or **page-media-select** attributes are non-compulsory (the OID of their attribute-ids is contained in the document's **non-compulsory-attributes**) and a specified medium is not recognized by the server, the server shall reject the job with an **undefined-attribute-value** AttributeError, if the client supplied a **medium-fidelity** attribute with a value, because the server would be unable to obtain any medium attribute values on which to base a substitution as specified by the **medium-fidelity** attribute.

```
medium-fidelity ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-medium-fidelity
```

The following standard values are defined:

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Descriptive Name	Object Identifier	Descriptor Text
size	id-val-medium-fidelity-size	This value indicates that an appropriate medium may be substituted by the server if this medium has the same value for the attribute **medium-size** or **medium-dimensions**
colour	id-val-medium-fidelity-colour	This value indicates that an appropriate medium may be substituted if this medium has the same value of the attribute **medium-colour**
tooth	id-val-medium-fidelity-tooth	This value indicates that an appropriate medium may be substituted if this medium has the same value of the attribute **medium-tooth**
grain	id-val-medium-fidelity-grain	This value indicates that an appropriate medium may be substituted if this medium has the same value of the attribute **medium-grain**
weight	id-val-medium-fidelity-weight	This value indicates that an appropriate medium may be substituted if this medium has the same value of the attribute **medium-weight**
ara	id-val-medium-fidelity-ara	This value indicates that an appropriate medium may be substituted by the server if the value for **medium-assured-reproduction-area** of the substituting medium is equal to or larger than the value for the corresponding attribute of the requested medium

9.3.2.19 Sides

This attribute specifies the number of printable surfaces of the medium to be imaged.

```
Sides ::=  INTEGER (1..2)

sidesSyntax ATTRIBUTE-SYNTAX
        Sides
        MATCHES FOR EQUALITY
        ::= id-syn-sides

sides ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        SINGLE VALUE
        ::= id-att-sides
```

9.3.2.20 Page-select

This attribute specifies one or more sequences of pages to be printed, specified by ordinal page number, by alphanumeric string, and/or tag of a group of pages.

```
PageIdentifier ::= CHOICE {
        nominal-page-number        [0] PositiveInteger,
        alphanumeric-page-number   [1] SimpleName,
        page-tag                   [2] NameOrOid }

PageSelect ::= SEQUENCE {
        beginning-page  [0] PageIdentifier OPTIONAL,
                            -- omitted means no lower bound
        ending-page[1]  [1] PageIdentifier OPTIONAL
                            -- omitted means no upper bound -- }

PageSelectSequence ::= SEQUENCE OF PageSelect
```


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```
pageSelectSyntax ATTRIBUTE-SYNTAX
        PageSelectSequence
        MATCHES FOR EQUALITY
        ::= id-syn-page-select

page-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageSelectSyntax
        SINGLE VALUE
        ::= id-att-page-select
```

The **nominal-page-number** is the in-sequence number in the document in the order that the pages are presented to the server, starting with 1.

The **alphanumeric-page-number** is a page-number that can be recognized in the page identifiers of the document format.

NOTE – This is not possible for most document formats.

The **page-tag** is a tag that identifies a group of pages. All pages containing the identified page-tag are printed. Both **beginning-page** and **ending-page** components shall contain the same tag, else the server shall return the **constraint-violation** AttributeError.

If the **beginning page** is omitted, the first page of the document is assumed. If the **ending-page** is omitted, the last page of the document is assumed.

For each page range specified, if **beginning-page** and **ending-page** exist, and **beginning-page** is not after **end-page**, the pages from the former to the latter are printed, inclusive. Sequences shall not overlap. If these conditions are not met, the server shall return the **constraint-violation** AttributeError.

If the page specified by **beginning-page** is not found in the document, no pages of the document are printed, and an **inconsistent-with-other-attributes** AttributeError is returned. The server may detect this condition when the document is being printed, after the server has accepted the print-request (successfully), in which case the **event-error-page-select** event shall occur.

If the page specified by ending-page is not found in the document, pages from beginning-page to the end of the document are printed, and no error or warning is returned.

The page select values shall identify pages before any imposition function is applied.

9.3.2.21 Page-media-select

This attribute indicates that specified pages (which may be the entire document) shall be printed on the identified media. For the specified pages, this specification shall override the media specified by the **input-tray-select** attribute, the **media-substitution** attribute, the document contents, the **default-medium** attribute, and the **default-input-tray** attribute. Any pages not specified by this attribute shall be printed on the medium specified according to the algorithm specified for the **default-medium**.

This attribute includes the capability of overriding the medium for the entire document when the **medium-for-all-pages** element of the CHOICE is specified.

NOTE – Some implementations may support the **medium-for-all-pages** element of the CHOICE without supporting the **medium-for-selected-pages** element. See ANNEX E.6.

If this attribute is used in conjunction with **number-up**, then the page numbers of this attribute refer to the source (logical) pages. The server shall determine the medium for each physical page by determining the medium requested for the first logical page of the physical page.

```
PageMediaSelect ::= SEQUENCE {
        page-range   [0] PageSelect,
        medium-id    [1] MediumReference }
```


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```
MediaSelect ::= CHOICE {
        medium-for-all-pages       [0] MediumReference,
        medium-for-selected-pages [1] SEQUENCE OF PageMediaSelect  }

pageMediaSelectSyntax ATTRIBUTE-SYNTAX
        MediaSelect
        MATCHES FOR EQUALITY
        ::= id-syn-page-media-select

page-media-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageMediaSelectSyntax
        SINGLE VALUE
        ::= id-att-page-media-select
```

The server shall detect and return the same error conditions and events as for the **page-select** attribute.

9.3.2.22 Copy-count

This attribute specifies the number of copies of the documents, or of the selected pages of the document, to be printed.

```
copy-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-copy-count
```

A value of **1** for **copy-count** shall generate a single human perceptible copy of the electronic document. If a value of **0** is supplied, then:

a) if the server supports specification of the value 0, the job shall be processed normally, but no print output shall be produced; or

b) if the server does not support specification of the value 0, the server shall return an **unsupported-attribute-value** AttributeError.

9.3.2.23 Reset-printer

This attribute specifies that the interpreter and/or printer be reset after processing this document (in a multiple document job).

```
reset-printer ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-reset-printer
```

This attribute would normally be used to suppress the resetting of non-page-independent interpreters and/or printers so that the previously defined state (e.g. font resources, forms, etc.) is inherited by the next document in the job.

This attribute has no meaning or effect for document formats that are page-independent, such as SPDL.

A server shall ensure that a printer is always reset after the last document in a job, independent of whether reset-printer is TRUE or FALSE for the last document, so that jobs are independent of one another.

9.3.2.24 Initial-value-document

This attribute identifies an initial-value-document object (see the **initial-value-document** object class) that contains default attributes to be used when constructing the document object during print-job submission.

If the client specifies the **initial-value-document** attribute with a value, the server shall use the specified initial-value-document object to initialize any document object attributes not specified (or specified with no value) in the **PrintArgument**, instead of using the initial-value-document object specified by the printer's **printer-initial-value-**

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document attribute). Thus, the **initial-value-document** attribute provides the client with the ability to specify a different set of default attribute values than the set the server normally provides with the specified printer. See the **printer-initial-value-document** printer attribute for a description of the server defaulting of document attributes when the print-job is submitted and when the print-job is printed.

By specifying this attribute, the client has the capability of specifying a different initial-value-document object for each document of a print-job.

```
initial-value-document ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-document
```

If this attribute is unspecified (or specified with no value) at the time a print-job is created, the server shall copy the value from the printer-initial-value-document attribute (if supported) as the value for this attribute.

9.3.3 Document-description attributes

These attributes identify the document and its characteristics and specify the method by which the document is acquired by the print-server.

The client may specify document-description attributes in:

a) Print: all, except **document-type**, **transfer-method**, and **document-content** shall be passed as explicit parameters of the **Print** abstract-operation and shall not be passed as attributes.

b) ModifyJob: all, except **id-att-transfer-method**, and **id-att-document-content**

c) ListObjectAttributes: all, except **id-att-document-content**

9.3.3.1 Document-type

This attribute indicates that the document being passed by the current **Print** abstract-operation is either a printable document, a font, or a -resource.

```
document-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-type
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
printable	id-val-document-type-printable	Specifies that this document is to be printed on the assigned printer.
font	id-val-document-type-font	Specifies that this document is a font resource which may be required by one or more of the printable documents associated with the print-job. See the **font** object class.
resource	id-val-document-type-resource	Specifies that this document contains resource data, of some type other than font, which may be required to print one or more of the printable documents associated with the print-job. See the **resource** object class.

How resources are managed during the printing process is necessarily dependent on the characteristics of the server and printer implementations. These methods are considered implementation-specific, and shall not be dictated by ISO/IEC 10175. In particular, ISO/IEC 10175 does not require that resources be passed in advance of the documents

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that use them; i.e., resources may be passed to the server in any order within the job, subject only to the requirement that the resources be present at the server before processing begins on the documents that use them.

9.3.3.2 Transfer-method

This attribute identifies the method by which the document is transferred to or acquired by the print-server.

```
transfer-method ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method
```

Standard values are defined in the specification of the **transfer-method-identifier** transfer-method attribute.

> NOTE – Four paradigms are identified by the standard values, but there may be many (implementation specific) transfer-methods and corresponding protocols. A standardized example is Referenced Data Transfer.

Conforming client and server implementations shall support at least **id-val-transfer-method-with-request**, which is the default transfer-method. See 8.2.1.1.

9.3.3.3 Document-format

This attribute identifies the overall print document format used for the document. It consists of three elements, a **document-format**, a **document-format-variants** and a **document-format-version**. The latter two elements are optional.

```
DocFormat  ::= SEQUENCE {
        document-format          [0] OBJECT IDENTIFIER,
        document-format-variants [1] Text OPTIONAL,
        document-format-version  [2] SimpleName OPTIONAL }

docFormatSyntax ATTRIBUTE-SYNTAX
        DocFormat
        MATCHES FOR EQUALITY
        ::= id-syn-doc-format

document-format  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        SINGLE VALUE
        ::= id-att-document-format
```

The **document-format** element identifies a particular family of document formats, of which there may exist several versions or variants. The **document-format-variants** and **document-format-version** elements identify a specific instance of a document format. The variant refers to a particular functional subset of a format. For example, the format PostScript has variants of level 1 and level 2, and the format PCL has several variants, including PCL4 and PCL5.

The version distinguishes among successive releases of the same basic format and variant. For example, successive versions of Xerox Interpress include versions 2.0, 2.1, 3.0, 3.1, etc.

The **document-format-variants** element consiststs of a single text string. If it is necessary to identify more than one variant, the respective variant values shall all be contained in the document-format-variants element, separated from one another by commas.

If the client omits the **document-format-variants** or **document-format-version** elements, the server may supply a format-specific default which will restrict the outcome of the rules described in the next paragraph. This rule shall not cause a job to fail in validation if it would have succeeded with the rules of the next paragraph.

If the client omits the **document-format-variants** element, the server shall print the document if the requested printer's **document-formats-supported** attribute contains a **DocFormat** which differs from the specified **document-**

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format only in the value of its **document-format-variants**. If the **document-format-variants** is omitted from the **printer document-formats-supported** attribute, the printer shall accept documents with any variant of the specified format. Similar rules apply if the **document-format-version** element is omitted.

If the client omits the **document-format-variants** or **document-format-version** elements, the server may supply a format-specific default. Such a default shall be one that could have matched a document-format according to the rules of the preceding paragraph.

Proprietary values for the **document-format**, **document-format-variants**, and **document-format-version** elements are assigned by the owners of those formats. Annex F contains a set of document-formats and variants for various commercially available formats and variants that are currently in common use.

9.3.3.4 Document-content

This attribute specifies a transfer-method-specific reference for the document to be transferred.

```
DocumentContent ::= CHOICE {
        included-document       [0] EXTERNAL,
        referenced-document     [1] DOR }
```

The **DOR** datatype (*Distinguished Object Reference*) is imported from ISO/IEC 10031-2. The **DOR** datatype may be used for other transfer-methods, e.g., **ftam-by-server**.

```
documentContentSyntax ATTRIBUTE-SYNTAX
        DocumentContent
        MATCHES FOR EQUALITY
        ::= id-syn-document-content

document-content ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX documentContentSyntax
        SINGLE VALUE
        ::= id-att-document-content
```

9.3.3.5 Non-compulsory-attributes

This attribute identifies the attribute-type **ObjectIdentifier** of those document attributes that the server shall consider as *non-compulsory* (see 6.4.6 and 9.1.1). If a server does not recognize and/or support (1) a document attribute or (2) some of the values of the document attribute supplied by a client in a **Print** abstract-operation, the server shall either:

a) If the **ObjectIdentifier** of that attribute-type is present in the value of **non-compulsory-attributes**, the server shall ignore that attribute and/or its unsupported values and copy them to the value of the job's **ignored-attributes** attribute.

b) If the **ObjectIdentifier** of that attribute-type is not present in the value of **non-compulsory-attributes**, the server shall reject the job (see 8.2.1).

```
non-compulsory-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-non-compulsory-attributes
```

9.3.4 Document-characteristic attributes

This group of attributes describes the characteristics of the document to be printed.

The values provided by these attributes are intended to assist the print-server in validating and scheduling the print-job. Providing these attributes independent of the document allows the server to schedule a job or to validate the resources required to print the document without interpreting the contents of the document. This provides the opportunity for a server to support a broad set of document formats yet still support fast efficient scheduling and

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validation of each job. The values provided by these attributes are also intended to provide parameters to print-server services, such as a text formatter or imposition's number-up procedure.

The values of these attributes are hints to the server about production instructions and resources needed to print a document, but the printer does not use these attributes during the actual printing of a document. The values of these attributes are intended to come from the document content, but some may come from intentions of the client. The values of these attributes are assigned as follows:

a) First the client may, at its option, either omit these attributes, or assign values to any of them based on the document content or client intent.

b) The server may then, at its option, either leave any of these attributes unchanged, or assign values to any of them based on its own analysis of the document contents. If the document contains incomplete information or no information about the attribute, or the server cannot ascertain the information, the server may choose to assign some default value. For ***xxx*-used** attributes which have a corresponding **default-*xxx***, the server shall use the value of the **default-*xxx*** as the default. When a default is used with a MULTI VALUE attribute, it may be one of several values in the attribute, e.g. some pages may have an explicit medium, others may use a default.

c) Finally, the server may choose to assign a value to these attributes only when the client does not supply a value, or the server may choose to override whatever the client supplies, or the server may also choose to do nothing, regardless of what the client supplies.

If the client performs the **ModifyJob** operation on any of these attributes, the server shall follow rules b and c, above, for the modified attributes. Thus, in effect, the server shall have control over whether to honor a client's requested change.

For validation and scheduling, the server shall use these attributes and shall not examine the document contents. However, according to the rules above, the server may have examined the document contents earlier to assign values to these attributes.

Processes, such as text formatting and number-up may use some of these attributes as parameters, or they may do their own independent analysis during the procedure.

The client may specify document-characteristic attributes in:

a) Print: all

b) ModifyJob: all

c) ListObjectAttributes: all

9.3.4.1 Intended-page-size

This attribute identifies or specifies the page size for which pages in the document have been formatted.

It may be used as a parameter to processes, such as imposition's **number-up** procedure which may use the value of this attribute to compute the scale factor for recessing each page in the document to its size on paper. (The **number-up** procedure might instead get the page-size directly from the document and ignore this attribute.)

This attribute shall not be used by a text formatter for determining page-size because the **simple-text** document format has its own attributes for specifying page-size. (See Annex F.)

This attribute shall neither specify the size of the medium nor affect, in any way, on which medium the document is printed.

The value of this attribute should be consistent with the actual contents of a document so that an operation using this attribute will produce the same results as it would if it used information within the document if all pages in the document have the same size.

The size of the page may be identified as one of the specific sizes or may be specified in millimetres.

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```
PageSize := CHOICE {
        page-size-id        OBJECT IDENTIFIER
        page-dimensions     MediumDimensions }

pageSizeSyntax ATTRIBUTE-SYNTAX
        PageSize
        MATCHES FOR EQUALITY,
        ::= id-syn-page-size

intended-page-size ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageSizeSyntax
        SINGLE VALUE
        ::= id-att-intended-page-size
```

Standard values for this attribute are defined in the specification of the **medium-size** medium attribute.

If this attribute is missing, then the server may derive the page-size from the medium-dimensions of the medium (or media) for the document. The media for a document is controlled by the attributes **page-media-select**, **input-tray-select**, **medium-substitution**, **default-medium**, **default-input-tray** or the document contents. If the document has multiple media of different sizes, the server may use any one of these media for determining the page size.

9.3.4.2 Content-orientation

This attribute identifies the most significant orientation of the document.

This attribute should provide information to an operation such as a text formatter or imposition's number-up procedure (see the **number-up** attribute).

If all pages of a document have the same orientation, the value of this attribute should be consistent with the actual contents of a document so that an operation using this attribute will produce the same results as it would using information within the document. If a document has more than one orientation, then the value of this attribute should be consistent with some portion of the actual contents of a document so that an operation using this attribute will produce similar (but probably not identical) results as it would using information within the document.

This attribute may also set some internal state (including, but not limited to, putting a printer in the appropriate mode). Use of this attribute to set the internal state of a server is not necessary (nor advisable) for all servers and/or all document formats.

```
content-orientation ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-content-orientation
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
portrait	id-val-content-orientation-portrait	The page orientation such that the sides are longer than the top when the page is held in the intended human reading orientation

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landscape	id-val-content-orientation-landscape	The page orientation such that the sides are shorter than the top when the page is held in the intended human readable orientation. Landscape is defined to be a rotation of the page by +90 degrees with respect to the medium (i.e. anti-clockwise) from the portrait orientation NOTE – The +90 direction was chosen because simple finishing on the long edge is the same edge whether portrait or landscape
reverse-portrait	id-val-content-orientation-reverse-portrait	The page orientation defined to be a rotation of 180 degrees with respect to portrait
reverse-landscape	id-val-content-orientation-reverse-landscape	The page orientation defined to be a rotation of 180 degrees with respect to landscape. Landscape is defined to be a rotation of the page by -90 degrees with respect to the medium (i.e. clockwise) from the portrait orientation NOTE – **Reverse-landscape** was added because some applications rotate landscape -90 degrees from portrait, rather than +90 degrees.

9.3.4.3 Presentation-direction

This attribute indicates the most significant presentation direction of text contained in the document. For example, Japanese text may be printed in vertical columns which are read from top to bottom, with the columns progressing from right to left; Hebrew is printed in horizontal lines, with the characters progressing from right to left, and the rows from top to bottom; and so on.

This attribute should provide information to an operation such as a text formatter or imposition's number-up procedure.

If all pages of a document have the same presentation direction, the value of this attribute should be consistent with the actual contents of a document so that an operation using this attribute will produce the same results as it would using information within the document. If a document has more than one presentation direction, then the value of this attribute should be consistent with some portion of the actual contents of a document so that an operation using this attribute will produce similar (but probably not identical) results as it would using information within the document.

```
PresentationDirection ::= ENUMERATED {
        toRight-toBottom    (0),
        toLeft-toBottom     (1),
        bidirect-toBottom   (2),
        toRight-toTop       (3),
        toLeft-toTop        (4),
        bidirect-toTop      (5),
        toBottom-toRight    (6),
        toBottom-toLeft     (7),
        toTop-toLeft        (8),
        toTop-toRight       (9) }

presentationDirectionSyntax ATTRIBUTE-SYNTAX
        PresentationDirection
        MATCHES FOR EQUALITY
        ::= id-syn-presentation-direction
```


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```
presentation-direction ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        SINGLE VALUE
        ::= id-att-presentation-direction
```

The presentation direction values are defined as follows:

a) **toRight-toBottom** – the direction of the character path is from left to right; the direction of the line progression is from top to bottom;

b) **toLeft-toBottom** – the direction of the character path is from right to left; the direction of the line progression is from top to bottom;

c) **bidirect-toBottom** – the direction of the character path is bi-directional, i.e., both left to right and right to left, within the same line; the direction of the line progression is from top to bottom;

d) **toRight-toTop** – the direction of the character path is from left to right; the direction of the line progression is from bottom to top;

e) **toLeft-toTop** – the direction of the character path is from right to left; the direction of the line progression is from bottom to top;

f) **bidirect-toTop** – the direction of the character path is bi-directional, i.e., both left to right and right to left, within the same line; the direction of the line progression is from bottom to top;

g) **toBottom-toRight** – the direction of the character path is from top to bottom; the direction of the line progression is from left to right;

h) **toBottom-toLeft** – the direction of the character path is from top to bottom; the direction of the line progression is from right to left;

i) **toTop-toLeft** – the direction of the character path is from bottom to top; the direction of the line progression is from to right to left;

j) **toTop-toRight** – the direction of the character path is from bottom to top; the direction of the line progression is from left to right;

9.3.4.4 Page-order-received

This attribute specifies the page order for which pages in the document have been formatted. The value of this attribute is the page order at the time the server receives the document. The value of this attribute does not change, even if the server changes the page order.

This attribute is not used directly for scheduling or job validation. Instead, a server uses its value to initialize the document attribute **current-page-order** which the server uses for validation.

```
PageOrderType ::= ENUMERATED {
        unknown (2),          -- values are the same as those in
                              -- IETF Printer MIB (RFC 1759)
        first-to-last (3),    -- the order normally viewed by a reader
        last-to-first (4) }   -- reverse order

pageOrderTypeSyntax ATTRIBUTE-SYNTAX
        PageOrderType
        MATCHES FOR EQUALITY
        ::= id-syn-page-order-type

page-order-received ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageOrderTypeSyntax
        SINGLE VALUE
        ::= id-att-page-order-received
```


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9.3.4.5 Media-used

This attribute identifies the media specified in the document.

The values in this attribute should contain the actual media required for printing the document, taking into account the results of interpreting the document contents, and applying the attributes: **page-media-select, input-tray-select, media-substitution, default-medium** and **default-input-tray**.

```
media-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-media-used
```

Standard values for this attribute are defined in the specification of the **medium-identifier** medium attribute.

This attribute contains a **SEQUENCE** of values rather than a **SET** because the *i*th element of this attribute corresponds to the *i*th attribute of the **assured-reproduction-areas-used** attribute.

This attribute is intended for scheduling and validation. The server uses this attribute with the printer attributes **media-supported** for validation and **media-ready** for scheduling.

9.3.4.6 Assured-reproduction-areas-used

This attribute specifies the area required to image the document content for the corresponding medium. The *i*th element in this attribute is the assured-reproduction-area for the medium at the *i*th element of the attribute **media-used**. The server uses this attribute for scheduling and validation, to ensure that the printer and the media both allow the required assured-reproduction-area required for each page of a job.

```
assured-reproduction-areas-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX areaSequenceSyntax
        SINGLE VALUE
        ::= id-att-assured-reproduction-areas-used
```

This attribute holds the maximum assured-reproduction-area for each type of medium in the document. Each assured-reproduction-area value in this attribute must meet two criteria with respect to its corresponding medium:

a) The specified value must be contained within its corresponding medium's assured-reproduction-area.

NOTE 1 – Some media may have a smaller assured-reproduction-area than a printer's, but for many media, the printer is the most constraining factor.

b) The value must be contained within the printer's assured-reproduction-area for media of the size of its corresponding medium.

NOTE 2 - For validation, the server uses the value of the **assured-reproduction-area** element or the **generic-assured-reproduction-** area element of **medium-source-sizes-supported** attribute whose page-size is that of the corresponding medium. For scheduling, the server uses the value of the **(generic-)assured-reproduction-area** element of **medium-source-sizes-ready** attribute whose page-size is that of the corresponding medium and whose input-tray holds the specified medium according to the **input-trays-medium** printer attribute.

The attribute value specifies the x and y coordinates of the assured reproduction area, in millimetres with respect to the Reference Coordinate System. The assured-reproduction-area is independent of the content-orientation as specified in the **document format** or the **content-orientation** attribute.

9.3.4.7 Input-trays-used

This attribute identifies the input-trays specified in the document.

```
input-trays-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-used
```


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Standard values for this attribute are defined in the specification of the **default-input-tray** document attribute.

9.3.4.8 Fonts-used

This attribute identifies the font resources specified in the document. See the **font** object class.

```
fonts-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MATCHES FOR EQUALITY
        MULTI VALUE
        ::= id-att-fonts-used
```

9.3.4.9 Resources-used

This attribute specifies resources, other than fonts, that may be referenced by the document, such as overlays, forms, logos, images, clip art, and signatures (see the **resource** object class). Each such resource may be passed explicitly in the print-job in a separate print-request (see 8.2.1) or may be accessed elsewhere in the distributed system by use of the document's **resource-context** attribute, the printer's **printer-resource-context** attribute, and the server's **server-resource-context** attribute using the search order specified in the **resource-context** document attribute description.

A client may identify resources either by object reference or by a server-dependent resource-name. For a resource-name, the server locates resources via the resource-context attributes: **resource-context**, **printer-resource-context**, and **server-resource-context**, in an implementation-dependent manner.

```
resources-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-resources-used
```

NOTE - The printable document itself may contain references to resources which be used in the couse of document processing. For example, PostScript structuring conventions may name a ProcSet.

9.3.4.10 Character-sets-used

This attribute identifies the coded character sets specified in the document.

```
character-sets-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-used
```

Standard values are defined in the specification of the **default-character-set** document attribute.

9.3.4.11 Character-repertoires-used

This attribute identifies the character repertoires used in the document. A character repertoire, sometimes called a character collection, is a particular subset of the characters in a coded character set.

```
character-repertoires-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-used
```

Standard values are defined in the specification of the **default-character-set** document attribute.

9.3.4.12 Character-mappings-used

This attribute identifies the mappings specified in the document to associate each character in a coded character set with a glyph identifier.

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```
character-mappings-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-used
```

Values are registered according to the procedures specified by the Association for Font Information Interchange (AFII).

NOTE – AFII is the registration authority assigned by the ISO Secretariat to register character mappings.

9.3.4.13 Printer-resolutions-used

This attribute normally identifies the resolutions specified within the document itself.

```
printer-resolutions-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrOidSyntax
        MULTI VALUE
        ::= id-att-printer-resolutions-used
```

Standard values are defined in the specification of the **default-printer-resolution** document attribute.

9.3.4.14 Content-orientations-used

This attribute identifies all the orientations used in the content of the document.

This attribute is intended for scheduling and validation. The server uses this attribute with the printer attribute **content-orientations-supported** for validation and scheduling. A server may use this attribute to assign this job to a printer which supports the specified orientation(s).

This attribute does not have any effect on text formatting, imposition or the state of the printer. See the **content-orientation** attribute for the attribute that handles these functions.

```
content-orientations-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-content-orientations-used
```

Standard values are defined in the specification of the **content-orientation** document attribute.

9.3.4.15 Presentation-directions-used

This attribute identifies all the presentation direction(s) of the text contained in the document.

This attribute is intended for scheduling and validation. The server uses this attribute with the printer attribute **presentation-directions-supported** for validation and scheduling. A server may use this attribute to assign this job to a printer which supports the specified presentation-direction(s).

This attribute does not have any effect on text formatting or on imposition. Instead, see the **presentation-direction** document attribute.

NOTE – This attribute is a MULTI VALUE attribute, thus permitting a document to contain more than one direction.

```
presentation-directions-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        MULTI VALUE
        ::= id-att-presentation-directions-used
```

Standard values are defined in the specification of the **presentation-direction** document attribute.

9.3.4.16 System-hints

These attributes provide data that may be used to estimate the complexity of the print-job.

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9.3.4.16.1 Octet-count

This attribute specifies the size of the document in octets.

```
octet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64Syntax
        SINGLE VALUE
        ::= id-att-octet-count
```

9.3.4.16.2 Page-count

This attribute specifies the size of the document in pages.

This value is the number of pages in the source document that the server will image. This number may be smaller that the actual number of pages in the source document if the **page-select** document attribute is specified. This number may also be different from the number of sheets of media or the number of impressions. The value of **copy-count** is ignored, i.e. treated as if it were 1.

```
page-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-page-count
```

9.3.4.16.3 Glyph-count

This attribute specifies the size of the document in glyphs.

```
glyph-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-glyph-count
```

9.3.4.16.4 Font-count

This attribute specifies the number of different fonts used in the document.

```
font-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-font-count
```

9.3.4.16.5 Font-change-count

This attribute specifies the number of font changes in the document.

```
font-change-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-font-change-count
```

9.3.4.16.6 Maximum-fonts-per-page

This attribute specifies the maximum number of different fonts used on a page of the document.

```
maximum-fonts-per-page ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-maximum-fonts-per-page
```


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9.3.4.16.7 Percent-graphics

This attribute indicates the percentage of the octets in the document that comprise graphic data. Graphic data may be assumed to consist primarily of line drawings.

```
percent-graphics ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX percentSyntax
        SINGLE VALUE
        ::= id-att-percent-graphics
```

The value may be used by a server as a weighting factor when estimating the complexity of a print-job.

9.3.4.16.8 Percent-images

This attribute indicates the percentage of the octets in the document that comprise image data. Image data may be assumed to consist primarily of raster images in bit-map format.

```
percent-images ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX percentSyntax
        SINGLE VALUE
        ::= id-att-percent-images
```

The value may be used by a server as a weighting factor when estimating the complexity of a print-job.

9.3.5 Document-status attributes

These attributes specify the document status, before, during, and after processing of the document by the server. The server shall create the document object with these attributes (if implemented) and shall assign appropriate values to each such document-status attribute.

The client may specify document-status attributes in:

a) Print: none

b) ModifyJob: none

c) ListObjectAttributes: all

9.3.5.1 Document-sequence-number

This attribute specifies the number of this document in relation to the set of documents in this job. The first document in the job is numbered 1.

The document-sequence-number is not passed as an input attribute in the **Print** abstract-operation. Documents are assumed to be submitted in order (i.e., document number 1 followed by document number 2, etc.).

```
document-sequence-number ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-document-sequence-number
```

A server shall return a value of **0** for this attribute if the first **Print** abstract-operation has not submitted a document (e.g., the **first-document** element is omitted in the **create-job** element of the **Print** abstract-operation).

9.3.5.2 Document-state

This attribute identifies the current state of the document.

```
document-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-state
```


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The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
transfer-pending	id-val-document-state-transfer-pending	The server has created the document object, but the data transfer of the document data has not started or completed
pending	id-val-document-state-pending	The server has received the document data and the document is waiting for processing to begin. The job may already be in the **processing** state, if the job's **job-scheduling** attribute in not **after-complete** (see the **current-job-state** and **job-scheduling** job attributes.
processing	id-val-document-state-processing	The server has started processing this document, or has made the document ready for printing, but the output device is not yet printing it, either because the document hasn't reached the output device or because the document is queued in the output device or some other spooler, awaiting the output device to print it.
printing	id-val-document-state-printing	The server has completed processing the document and the output device is currently printing the document on at least one printer. That is, a print engine is either printing pages of the document, or failing in its attempt to print pages of the document because of some wait state, such as, start-wait, end-wait, needs-attention, etc. The complete document state includes the detailed status represented in the printers' printer-state attribute(s).
completed	id-val-document-state-completed	The server has completed printing this document. The job may still be in the **printing** state, or may be in the **retained** state.

9.3.5.3 Copies-completed

This attribute indicates the number of complete copies of this document that have been printed.

```
copies-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-copies-completed
```

Some printers print multiple copies of each individual page of a document, completing the printing of all copies at the same time, printing as many of these pages as necessary to satisfy the **copy count**. The value of **copies-completed** is 0 if printing has not started for this document.

9.3.5.4 File-reference

This attribute specifies a file reference in a file store (or a transfer-method-specific reference). It is returned by the server as part of the PrintResult. For example, if the document transfer-method of the job required the client to perform the transfer (e.g. **ftam**); this attribute shall contain the target filename for the client to use.

```
fileReferenceSyntax ATTRIBUTE-SYNTAX
        DOR
        MATCHES FOR EQUALITY
        ::= id-syn-file-reference
```


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```
file-reference ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fileReferenceSyntax
        SINGLE VALUE
        ::= id-att-file-reference
```

9.3.5.5 Current-page-order

This document status attribute identifies the page order for which pages in the document are currently formatted.

The server shall keep the value of this attribute to be consistent with what it thinks is the actual page order of the document. Initially, the server shall set the value of this attribute to have the same value as the document attribute **page-order-received** because the value of **page-order-received** has a value that the server believes to be the actual page order of the document at the time it is received. If the server reverses the order of the pages (e.g. with a page reversal filter), the server shall change the value of this attribute so that it continues to reflect the page order of the document.

The number-up part of the imposition process shall use this attribute to determine the order to place logical pages on the physical page.

```
current-page-order ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageOrderTypeSyntax
        SINGLE VALUE
        ::= id-att-current-page-order
```

During job validation, the server shall compare the value of this attribute with the value of the **stacking-order** for each **output-bin** requested in the job attribute **results-profile**. The stacking order comes from the **stacking-order** element of the printer attribute **output-bins-characteristics**. There are three cases:

a) The values are the same, or one (or both) are **unknown**: the document is accepted.

b) The values differ and the server determines that it can run a reversal filter on the document: the document is accepted.

c) The values differ and the server determines that it cannot run a reversal filter on the document:

   1) If the job attribute **results-profile** is non-compulsory, the document is accepted, but will print in the wrong order.

   2) If the job attribute **results-profile** is compulsory, the document is rejected because it would print in the wrong order. At some time after validation, if the server determines that the value of the document status attribute **current-page-order** has the reverse value of the **stacking-order** of the requested **output-bin**, it applies the reversal filter to the document and reverses the value of the document status attribute **current-page-order** to reflect the change in the document.

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9.4 Printer Object attributes

A printer object may represent either a *physical printer* or a *logical printer*, or both.

A **physical printer** is a printer object containing a set of printer object attributes that represent an output device capable of rendering a document in visible form. Examples include electronic and electro-mechanical printers such as laser printers, ink-jet printers, and various kinds of impact printers, but may include other types of output devices such as microfiche imagers and plotters as well.

A **logical printer** is a printer object containing a set of printer object attributes that have been grouped under one name in order to represent some class of printer or printing effect. For example, an administrator might define a single logical printer to represent all of the physical printers of the same type and capability in a single location, associated with a particular server. A user/client would normally send a print-job to a logical printer, and allow the server to assign the job to a particular physical printer based on the relative load and availability of the printers under its control, thus providing a load balancing service. However, ISO/IEC 10175 does not preclude a user/client from sending a print-job to a physical printer. Such a restriction is up to the policy of the system administrator and the access control that the administrator specifies.

Logical and physical printer objects may be defined to specify that a particular set of default values for job and document attributes are to be assumed when a client identifies that printer. Such things as default media, fonts, finishing operations, etc., may be specified for a job simply by sending the job to a particular logical or physical printer. When the client identifies a logical printer, the server shall assign the job to a particular physical-printer that the administrator has explicitly associated with the logical-printer. Depending on implementation, the server may assign the job when the job is received, or the server may delay the assignment, until a physical printer is free, thereby achieving more dynamic load balancing between several physical printers.

A printer object shall have one of three realizations, as specified by the value of its **printer-realization** attribute **logical**, **physical**, or **logical-and-physical**. The **logical-and-physical** value is used in the simple and frequent case when the system administrator creates a single printer object to represent both a logical printer and a physical printer. This would be the case when a single physical-printer is associated with a single print-server or when the administrator has decided not to offer additional sets of defaults for the physical printer. In order to create more than one set of defaults for a physical printer, the system manager shall create an associated logical printer and sets its **printer-realization** to **logical**.

If the **printer-realization** attribute is not implemented, the server shall treat all printer objects as if the **printer-realization** attribute had the value **logical-and-physical**.

Throughout ISO/IEC 10175, the term *printer* shall refer to both logical and physical printers, and shall be used when no distinction is being made between logical and physical printers. The term *logical printer* shall be used for a printer object whose **printer-realization** attribute has the value **logical** or **logical-and-physical**. The term *physical printer* shall be used for a printer object whose **printer-realization** attribute has the value **physical** or **logical-and-physical**.

The attributes defined in this subclause provide information about a particular logical or physical printer; all of the attributes apply to logical and physical printers.

In addition to the attributes specifically defined for this object, certain of the generic attributes may also be associated with this object. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

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The applicable generic attributes are:

Sub-clause	Generic attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.5	message
9.1.6.6	availability
9.1.6.7	list-of-managers
9.1.6.8	notification-profile
9.1.6.9	logging-profile
9.1.6.10	associated-server

In addition to the generic attributes that the printer object may contain, the following printer attributes are described at the end of this sub-clause, but may also be associated with the server class (see 9.5):

Sub-clause	Common Printer and Server object attributes
9.4.73.1.	Job-attributes-supported
9.4.73.2.	Document-attributes-supported
9.4.73.3.	Multiple-documents-supported
9.4.73.4.	Cancel-individual-document-supported
9.4.73.5.	Translators-supported
9.4.73.6.	Translators-ready
9.4.73.7.	Job-result-set-delivery-methods-supported
9.4.73.8.	Job-result-set-delivery-methods-ready
9.4.73.9.	Notification-delivery-methods-supported
9.4.73.10.	Notification-delivery-methods-ready
9.4.73.11.	Log-delivery-methods-supported
9.4.73.12.	Log-delivery-methods-ready
9.4.73.13.	Initial-value-jobs-supported
9.4.73.14.	Initial-value-documents-supported
9.4.73.15.	Are-foreign-jobs-visible
9.4.73.16.	Enabled

9.4.1 Printer-name

This attribute uniquely identifies the printer.

```
printer-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-printer-name
```

9.4.2 Printer-name-aliases

This attribute specifies one or more alternate names for a printer.

```
printer-name-aliases ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-printer-name-aliases
```

9.4.3 Printer-locations

This attribute identifies the location of this printer. More than one location should be specified if the printer satisfies more than one location specification.

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```
printer-locations ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-locations
```

This attribute in not intended to define either distance to a printer or location of the printer in a standardized coordinate system. This attribute is intended to be used as a secondary "location-specific" name, and be interpreted as such. But actual implementation is expected to be vendor-specific.

9.4.4 Printer-model

This attribute identifies the make and model of the printer.

```
printer-model ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-printer-model
```

9.4.5 Printer-types

This attribute identifies the marking technologies of the printer. If the printer contains more than one marking sub-unit, multiple values may be used to represent the technology.

```
printer-types ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-types
```

The OIDs for this attribute are formed by taking the enum integer values assigned by the Internet Printer MIB for the **prtMarkerMarkTech** object and appending them to the ISO DPA **id-vc-printer-type** OID to create a set of ISO DPA OIDs (See the Internet Printer MIB, RFC 1759). As additional enum values are assigned by the procedures explained in the Printer MIB specification, the corresponding **printer-type** ISO DPA OIDs will be automatically available for use with this attribute. The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
other	id-val-printer-type-other	Other than the standard values
unknown	id-val-printer-type-unknown	Unknown printer type
electrophotographic-LED	id-val-printer-type-electrophotographic-LED	electrophotographic LED
electrophotographic-laser	id-val-printer-type-electrophotographic-laser	electrophotographic laser
electrophotographic-other	id-val-printer-type-electrophotographic-other	other electrophotographic
impact-moving-head-dot-matrix-9-pin	id-val-printer-type-impact-moving-head-dot-matrix-9-pin	9-pin impact moving head dot matrix
impact-moving-head-dot-matrix-24-pin	id-val-printer-type-impact-moving-head-dot-matrix-24-pin	24-pin impact moving head dot matrix
impact-moving-head-dot-matrix-other	id-val-printer-type-impact-moving-head-dot-matrix-other	neither 9-pin nor 24-pin moving head dot matrix
impact-moving-head-fully-formed	id-val-printer-type-impact-moving-head-fully-formed	fully formed impact moving head
impact-band	id-val-printer-type-impact-band	impact band
impact-other	id-val-printer-type-impact-other	impact other
inkjet-aqueous	id-val-printer-type-inkjet-aqueous	aqueous inkjet

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inkjet-solid	id-val-printer-type-inkjet-solid	solid inkjet
inkjet-other	id-val-printer-type-inkjet-other	other inkjet
pen	id-val-printer-type-pen	pen
thermal-transfer	id-val-printer-type-thermal-transfer	thermal transfer
thermal-sensitive	id-val-printer-type-thermal-sensitive	thermal sensitive
thermal-diffusion	id-val-printer-type-thermal-diffusion	thermal diffusion
thermal-other	id-val-printer-type-thermal-other	other thermal
electro-erosion	id-val-printer-type-electro-erosion	electro-erosion
electro-static	id-val-printer-type-electro-static	electro-static
photographic-microfiche	id-val-printer-type-photographic-microfiche	photographic microfiche
photographic-imagesetter	id-val-printer-type-photographic-imagesetter	photographic imagesetter
photographic-other	id-val-printer-type-photographic-other	other photographic
ion-deposition	id-val-printer-type-ion-deposition	ion deposition
E-beam	id-val-printer-type-E-beam	E-beam
typesetter	id-val-printer-type-typesetter	typesetter

9.4.6 Printer-realization

This attribute indicates whether the associated printer has been designated as a physical or a logical printer, or both. If no distinction has been specified for the printer, it shall be treated as both, i.e., **logical-and-physical**. See the beginning of the **printer** object class description.

```
printer-realization ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-printer-realization
```

9.4.7 Maximum-printer-speed

This attribute specifies the maximum speed of the printer.

```
maximum-printer-speed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX positiveIntegerSyntax
        SINGLE VALUE
        ::= id-att-maximum-printer-speed
```

The values of this attribute are in pages per minute (to the nearest integer value).

9.4.8 Printer-resolutions-supported

This attribute specifies the resolutions supported by the printer. Also, for each resolution, it specifies an optional OID which is an alias for the resolution. If a job specifies the value of the **default-printer-resolution** attribute to be an object identifier, this attribute gives the mapping of that object identifier to an actual resolution.

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```
printer-resolutions-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX oidCardinalMapSyntax
        MULTI VALUE
        ::= id-att-printer-resolutions-supported
```

The values of this attribute are in dots per inch (dpi, to the nearest integer value).

The same cardinal value for a resolution shall occur in more than one OidCardinalMap if more than one OID is an alias for it.

Standard OID values for this attribute are defined in the specification of the **default-printer-resolution** attribute.

9.4.9 Printer-state

This attribute identifies the current state of the printer. Print-clients and DP-Servers shall be prepared to receive all the standard printer states. DP-Servers are not required to generate all the printer states, only those which are appropriate for the particular implementation.

```
printer-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-state
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
unknown	id-val-printer-state-unknown	The printer state is not known, or is indeterminate, or is not returned by the operation
idle	id-val-printer-state-idle	The printer is ready to accept jobs, but none have been scheduled on it.
printing	id-val-printer-state-printing	The printer is currently printing a job
needs-attention	id-val-printer-state-needs-attention	The printer needs human attention (no special skills required). This state typically includes adding paper, clearing a jam, changing the medium, etc.
paused	id-val-printer-state-paused	The operator has (temporarily) paused the printer, by means outside the scope of this part of ISO/IEC 10175.
shutdown	id-val-printer-state-shutdown	The printer has been taken out of service, (for a long time), whether for repairs or others reasons. The printer's **message** generic attribute may be used to record a reason and estimated time for return to service
job-start-wait	id-val-printer-state-job-start-wait	The currently processing job was started with the **job-start-wait** attribute set, and is awaiting operator intervention or time-out.
job-end-wait	id-val-printer-state-job-end-wait	The currently processing job was started with the **job-end-wait** attribute set, and is awaiting operator intervention or time-out.
job-password-wait	id-val-printer-state-job-password-wait	The currently processing job was started with the **job-password** attribute set, and is awaiting the operator or user to enter the password supplied by the **job-password** attribute.
needs-key-operator	id-val-printer-state-needs-key-operator	The printer needs the attention of a key operator. Key operator functions are printer-specific, but typically include adding toner or developer, or attending to a hardware fault.

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connecting-to-printer	id-val-printer-state-connecting-to-printer	The server has scheduled a job on the printer and is in the process of connecting to a shared network printer (and may not be able to actually start printing the job for an arbitrarily long time depending on the usage of the printer by other servers).
timed-out	id-val-printer-state-timed-out	The server was able to connect to the printer (or is always connected), but was unable to get a response from the printer in the time specified by the printer's **printer-timeout-period** attribute.

9.4.10 Printer-associated-printers

This attribute identifies the logical/physical printers associated with this physical/logical printer.

A logical printer object with its **realization** attribute set to **logical** shall have its **printer-associated-printers** attribute set to the name(s) of the associated physical printer(s) (**realization** set to either **physical** or **logical-and-physical**) that this logical printer represents. A physical printer object with its **realization** attribute set to **physical** shall have its **printer-associated-printers** attribute set to the name(s) of the associated logical printer(s) (**realization** set to **logical**) that represent the physical printer A combination logical and physical printer object with its **realization** attribute set to **logical-and-physical** shall have its **printer-associated-printers** attribute set to the name of itself and the name(s) of the logical printer(s) (**realization** set to **logical**) that represent it, if any.

NOTE – With the above constraints, associated printer references are limited to a depth of one. That is a printer cannot be associated with another printer which is associated with a third printer.

```
printer-associated-printers ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-printer-associated-printers
```

9.4.11 Printers-ready

This attribute identifies the logical/physical printers ready to be used on this physical/logical printer.

```
printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-printers-ready
```

9.4.12 Printer-initial-value-job

This attribute identifies an initial-value-job object in the server for this printer. An initial-value-job object contains those attributes that the server shall default when a print-job is submitted, if the client does not specify an initial-value-job attribute with the print-request, the server shall use the initial-value-job object specified by the printer's printer-initial-value-job attribute to initialize the job object when the job is submitted and set the job's initial-value-job attribute to the value of the printer-initial-value-job attribute. See 9.2 and the **initial-value-job** job attribute.

In an initial-value-job object, SINGLE VALUE attributes (1) shall contain one attribute-value or (2) may specify no attribute values, i.e., an empty attribute-value (see 9.1.2). MULTI VALUE attributes shall contain zero or more attribute-values. Attributes containing no values either (1) are not supported by the printer, or (2) are expected to be defaulted by the printer hardware itself.

```
printer-initial-value-job ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-printer-initial-value-job
```


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NOTE – The conformance requirements in ANNEX E require that a level 2 server shall implement the printer-initial-value-job attribute. This requirement is important, so that the server defaulting mechanism shall permit a client to submit a print-job with many attributes omitted, and the server supplies default values.

9.4.13 Printer-initial-value-document

This attribute identifies an initial-value-document object in the server for this printer. If the client does not specify an initial-value-document attribute with the print-request, the server shall use the initial-value-document object specified by the printer's **printer-initial-value-document** attribute to initialize the document object when the document is submitted and set the document's **initial-value-document** attribute to the value of the **printer-initial-value-document** attribute. See 9.2 and the document attribute **initial-value-document.**

A printer may specify only one initial-value-document object, which will be used to initialize all document object instances targeted at this printer unless overridden by the **initial-value-document** attribute as described above. Each document in a job may therefore use a different initial-value-document object even though the printer may specify only one.

In an initial-value-document object, SINGLE VALUE attributes (1) shall contain one attribute value or (2) may specify no attribute values, i.e. an empty attribute-value (see 9.1.2). MULTI VALUE attributes shall contain zero or more attribute-values. Attributes containing no values either (1) are not supported by the printer, or (2) are expected to be defaulted by the printer hardware itself.

```
printer-initial-value-document ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-printer-initial-value-document
```

NOTE – The conformance requirements in ANNEX E require that a level 2 server shall implement the **printer-initial-value-document attribute**. This requirement is important so that the server defaulting mechanism shall permit a client to submit a document print-request with many attributes omitted, and the server supplies default values.

9.4.14 Media-supported

This attribute identifies the media supported by this printer.

```
media-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-media-supported
```

Standard values are defined in 9.6.1.

9.4.15 Media-ready

This attribute identifies the media currently ready to be used on this printer.

```
media-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-media-ready
```

Standard values are defined in 9.6.1.

9.4.16 Medium-source-sizes-supported

This attribute identifies or specifies the sizes of media that are supported by the printer. For printers which select paper by specifying a tray or path to draw from, the input-tray OID should be specified. For printers which select paper by specifying medium size or which have only a single tray or path, the input-tray OID may be omitted.

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All information about each physical input tray (whether named or not in the **MediumSourceSize**) shall be collected into a single **MediumSize** item so that each physical input tray has, at most, one corresponding **MediumSize** item in the set of **MediumSourceSize**. For printers which select paper by specifying medium size (i.e. the input-tray OID is omitted), two or more input trays with the same value for **MediumSize** may share a single entry in the set of **MediumSourceSize**. For printers which select paper by specifying a tray (i.e. the input-tray OID is present), each physical input-tray in the printer should have a corresponding **MediumSourceSize** item.

The sizes may be specified as a set of discrete page sizes or as a range of pages size specified by a range of widths (across-feed-direction) and a range of lengths (in-feed-direction). For discrete page sizes, there is a Boolean attribute for specifying whether the long edge (TRUE) or short edge (FALSE) of the paper feeds into the printer so that orientation is specified. For continuous sizes, the client may optionally specify an increment in either or both directions. If the client omits or specifies as 0 the increment in either or both directions, the paper can have any size within the size-range. If the client specifies the increment for a direction, the paper can only have sizes

minimum-size-range + i*size-increment for integral values of i >= 0,
where minimum-size-range + i*size-increment <= maximum-size-range.

This attribute also contains the assured-reproduction-area supported for each discrete medium size, and the generic assured reproduction area for continuous sizes. The generic assured reproduction area is computed for the minimum page size. If long-edge-feeds is TRUE then the x coordinates of the assured reproduction area refer to the across-feed direction; otherwise, the x coordinates of the assured reproduction area refer to the in-feed direction. The assured reproduction area of other sizes is computed by assuming that the same unprintable margins are preserved throughout all sizes.

The system can compute the actual assured reproduction area supported by a particular medium by using the following formula with its medium-assured-reproduction-area (call it M) and the assured-reproduction-area (call it S) associated with the medium-size from the medium-source-sizes-supported attribute.

actual ara:
minimum-x: max(M.minimum-x, S.minimum-x)
maximum-x: min(M.maximum-x, S.maximum-x)
minimum-y: max(M.minimum-y, S.minimum-y)
maximum-y: min(M.maximum-y, S.maximum-y)

For proper functioning of a printer, the media-supported attribute should contain only those media whose medium-size and/or medium-dimensions conform to the values of this medium-sizes-supported attribute, but the server may choose not to check values of media-supported when they are changed.

```
MediumSize ::= CHOICE {
        medium-discrete-sizes     [0] SET OF SEQUENCE {
            page-size                   [0] PageSize,
            long-edge-feeds             [1] BOOLEAN DEFAULT TRUE,
            assured-reproduction-area: [2] Area },

        medium-continuous-sizes  [1] SEQUENCE {
            size-range-across-feed-direction     [0] NonNegativeRealRange,
            size-increment-across-feed-direction [1] NonNegativeReal OPTIONAL,
            size-range-in-feed-direction         [2] NonNegativeRealRange,
            size-increment-in-feed-direction     [3] NonNegativeReal OPTIONAL,
            long-edge-feeds                      [4] BOOLEAN DEFAULT TRUE,
            generic-assured-reproduction-area:   [5] Area }}

MediumSourceSize ::= SEQUENCE {
        input-tray   [0] OBJECT IDENTIFIER OPTIONAL,
        medium-size  [1] MediumSize }
```


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```
mediumSourceSizeSyntax ATTRIBUTE-SYNTAX
        MediumSourceSize
        MATCHES FOR EQUALITY
        ::= id-syn-medium-source-size

medium-source-sizes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSourceSizeSyntax
        MULTI VALUE
        ::= id-att-medium-source-sizes-supported
```

Standard values are defined in 9.6.5.

9.4.17 Medium-source-sizes-ready

This attribute identifies or specifies the sizes of media that are ready in the printer, either by input tray or by the printer as a whole if the printer does not have input trays. Printers with a single media source shall omit the optional input-tray OID to indicate that the media sizes refer to the entire printer.

Note that in the case of medium-discrete-sizes, the SET should contain only one element (describing the single medium that is ready in the tray) and in the case of medium-continuous-sizes, the value of the upper and lower bound should be identical for each NonNegativeRealRange so that a single value (rather than a range of values) is defined for each NonNegativeRealRange and that value reflects the actual size of the medium in that tray. The size-increments should be absent.

```
medium-source-sizes-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSourceSizeSyntax
        MULTI VALUE
        ::= id-att-medium-source-sizes-ready
```

Standard values are defined in 9.6.5.

9.4.18 Medium-fidelities-supported

This attribute identifies the medium-fidelities supported by this printer.

```
medium-fidelities-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-medium-fidelities-supported
```

Standard values are defined in the specification for the **medium-fidelity** document attribute.

9.4.19 Fonts-supported

This attribute identifies the font resources supported by this printer.

```
fonts-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MULTI VALUE
        ::= id-att-fonts-supported
```

9.4.20 Fonts-ready

This attribute identifies the font resources currently ready to be used on this printer.

```
fonts-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MULTI VALUE
        ::= id-att-fonts-ready
```


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9.4.21 Resources-supported

This attribute identifies the resources supported by this printer.

```
resources-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-resources-supported
```

Resource objects are specified in 9.8.

9.4.22 Resources-ready

This attribute identifies the resources currently ready to be used on this printer.

```
resources-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MATCHES FOR EQUALITY
        MULTI VALUE
        ::= id-att-resources-ready
```

Resource objects are specified in 9.8.

9.4.23 Printer-resource-context

This attribute allows a sequence of one or more contexts to be associated with a printer. A context is a sequence of relative-distinguished-names in the form of the most significant part of a DistinguishedName, which may be used as a pathname to a group of resources. A context provides a pointer to a group of resources; when combined with an appropriate resource name, a fully-qualified name is formed, unambiguously identifying a particular resource within the distributed system. See the **resource-context** document attribute.

The server shall search the contexts specified by (1) the **resource-context** attribute specified with the document to be printed, if any, (2) the printer's **printer-resource-context** and (3) the server's **server-resource-context** in the order specified in the description of the **resource-context** document attribute.

```
printer-resource-context ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-printer-resource-context
```

9.4.24 Job-finishings-supported

This attribute identifies the job-level finishing objects supported by this printer, that is the server-installed finishing objects that may be used as values of the **job-finishing** job attribute.

```
job-finishings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-job-finishings-supported
```

Standard values are defined in 9.13.5 and 9.13.8.

9.4.25 Job-finishings-ready

This attribute identifies the job-level finishing objects ready to be used on this printer.

```
job-finishings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-job-finishings-ready
```


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Standard values are defined in 9.13.5 and 9.13.8.

9.4.26 Finishing-includes-job-sheets-supported

This attribute identifies the options allowed for including or not including job sheets with job copies in **job-finishing** operations.

```
finishing-includes-job-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        MULTI VALUE
        ::= id-att-finishing-includes-job-sheets-supported
```

If this attribute is supported, it shall contain one of three possible values: a single **TRUE** value, a single **FALSE** value, or both **TRUE** and **FALSE**.

9.4.27 Finishings-supported

This attribute identifies the per-document finishing objects supported by this printer, that is the server-installed finishing objects that may be used as values of the **finishing** document attribute.

```
finishings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishings-supported
```

Standard values are defined in 9.13.5 and 9.13.8.

9.4.28 Finishings-ready

This attribute identifies the per-document finishing objects ready to be used on this printer.

```
finishings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishings-ready
```

Standard values are defined in 9.13.5 and 9.13.8.

9.4.29 Finishing-includes-doc-sheets-supported

This attribute identifies the options allowed for including or not including document sheets with document copies in document finishing operations.

```
finishing-includes-doc-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        MULTI VALUE
        ::= id-att-finishing-includes-doc-sheets-supported
```

If this attribute is supported, it shall contain one of three possible values: a single **TRUE** value, a single **FALSE** value, or both **TRUE** and **FALSE**.

9.4.30 Outputs-supported

This attribute identifies the output-methods supported by this printer.

```
outputs-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-outputs-supported
```

Standard values are defined in 9.14.1.

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9.4.31 Outputs-ready

This attribute identifies the output-methods currently ready to be used on this printer.

```
outputs-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-outputs-ready
```

Standard values are defined in 9.14.1.

9.4.32 Input-trays-supported

This attribute identifies the input-trays supported by this printer using either (1) a simple-named tray identification (which may consist of a simple-name or solely of numeric digits for numbered trays, including leading 0 digits), and (2) for those that use named trays that are identified with object identifiers.

```
input-trays-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-supported
```

Standard values are defined in the specification for the **default-input-tray** document attribute.

A server shall always return an input-tray as an OID to the client if the server identifies the input-tray using an OID.

Examples: The simple-name strings: **envelope**, **2**, or **02**, or the OID value: **id-val-input-tray-top**.

9.4.33 Input-trays-ready

This attribute identifies the input-trays currently ready to be used on this printer using either (1) a simple-named tray identification (which may consist of a simple-name or solely of numeric digits for numbered trays, including leading 0 digits), and (2) for those that use named trays that are identified with object identifiers.

```
input-trays-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-ready
```

Standard values are defined in the specification for the **default-input-tray** document attribute.

A server shall always return an input-tray as an OID to the client if the server identifies the input-tray using an OID. See **input-trays-supported** for examples.

9.4.34 Input-trays-medium

This attribute identifies the medium in each input tray of the printer. Each input-tray object identifier shall appear only once in the values of this attribute (one medium per tray), but medium identifiers may appear several times (same medium in multiple trays).

> NOTE 1 – This attribute does not include information about the feed direction of the medium from its associated tray because this attribute exists to allow the server to know what tray to get a requested media from. Once the tray is selected, the server may make the association between a tray and feed direction by using the attribute medium-source-sizes-ready.

Depending on implementation, the server may sense the value of this attribute automatically from the printer device or may require an operator to set the value of this attribute, by some means outside the scope of this part of ISO/IEC 10175.

> NOTE 2 – For many printers, the server can set medium-source-sizes-ready automatically by reading printer sensors.

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```
InputTrayMedium ::= SEQUENCE {
        input-tray      NameOrOid ,
        medium          NameOrOid }

inputTrayMediumSyntax ATTRIBUTE-SYNTAX
        InputTrayMedium
        MATCHES FOR EQUALITY
        ::= id-syn-input-tray-medium

input-trays-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX inputTrayMediumSyntax
        MULTI VALUE
        ::= id-att-input-trays-medium
```

Standard values for input-tray are defined in the specification for the **default-input-tray** document attribute and standard values for media are defined in 9.6.1.

9.4.35 Output-bins-supported

This attribute identifies the output bins supported by this printer using either (1) a simple-named bin identification (which may consist of a simple-name or solely of numeric digits for numbered bins, including leading 0 digits), and (2) for those that use named bins that are identified with object identifiers.

```
output-bins-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-output-bins-supported
```

Standard values are defined in the specification for the **results-profile** job attribute.

A server shall always return an output-bin as an OID to the client if the server identifies the output-bin using an OID.

Examples: The simple-name strings: **mail-box**, **2**, or **02**, or the OID value: **id-val-output-bin-top**.

9.4.36 Output-bins-ready

This attribute identifies the output bins currently ready to be used on this printer using either (1) a simple-named bin identification (which may consist of a simple-name or solely of numeric digits for numbered bins, including leading 0 digits), and (2) for those that use named bins that are identified with object identifiers.

```
output-bins-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-output-bins-ready
```

Standard values are defined in the specification for the **results-profile** job attribute.

A server shall always return an output-bin as an OID to the client if the server identifies the output-bin using an OID. See **output-bins-supported** for examples.

9.4.37 Output-bins-characteristics

This attribute identifies the characteristics for each output-bin. The value of the *i*th element of this attribute contains information about the *i*th output-bin of the **output-bins-supported** attribute.

The information for each output-bin includes information about the stacking order of media (**first-to-last** or **last-to-first**) and the orientation (**face-up** or **face-down**).

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NOTES

1 Information about output-bins contained in the **output-bins-ready** attribute can be computed by finding the position of the output-bin with the same name in the **output-bins-supported** attribute.

2 Stacking order and orientation for output bins are two independent concepts. If a printer delivers each sheet to an output bin face-up and places it on top of the previous sheet, or delivers each sheet to an output bin face-down and places it beneath the previous sheet, the stacking order is **last-to-first**. If a printer delivers each sheet to an output bin face-down and places it on top of the previous sheet, or delivers each sheet to an output bin face-up and places it beneath the previous sheet, the stacking order is **first-to-last**.

```
PageOrientationType ::= ENUMERATED {
        unknown (2),    -- values are the same as those for the IETF Printer MIB
        face-up (3),
        face-down (4) }

pageOrientationTypeSyntax ATTRIBUTE-SYNTAX
        PageOrientationType
        MATCHES FOR EQUALITY
        ::= id-syn-page-orientation-type

OutputBinsCharacteristics ::= SEQUENCE OF SEQUENCE {
        stacking-order       [0] PageOrderType,
        orientation          [1] PageOrientationType }

outputBinsCharacteristicsSyntax ATTRIBUTE-SYNTAX
        OutputBinsCharacteristics
        MATCHES FOR EQUALITY
        ::= id-syn-output-bins-characteristics

output-bins-characteristics ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX outputBinsCharacteristicsSyntax
        SINGLE VALUE
        ::= id-att-output-bins-characteristics
```

9.4.38 Print-qualities-supported

This attribute identifies the print qualities supported by this printer.

```
print-qualities-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-print-qualities-supported
```

Standard values are defined in the specification of the **print-quality** document attribute.

9.4.39 Print-qualities-ready

This attribute identifies the print qualities ready to be used on this printer.

```
print-qualities-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-print-qualities-ready
```

Standard values are defined in the specification of the **print-quality** document attribute.

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9.4.40 Job-sheets and document-sheets

A job specifies the auxiliary-sheets that the printer system shall insert into the job by using two attributes: **job-sheets** and **documents-sheets**. The value of each of these attributes is a name or OID referencing an **auxiliary-sheet-package** object which in turn specifies **auxiliary-sheets** and their positions within the job.

The value of each of the printer attributes in this section is a set of names or OIDs referencing **auxiliary-sheet-package** objects. An administrator can set the value of the ***xxx*-supported** attributes in this section in order to control which **auxiliary-sheet-package** objects (i.e. which combination of sheets) at the job and document level are allowed for a printer.

9.4.40.1 Job-sheets-supported

This attribute identifies the **auxiliary-sheet-package** values supported by this printer.

```
job-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-job-sheets-supported
```

To allow no job sheets, the system administrator shall include the value **id-val-generic-none** as a value for this attribute. The client specifies that there are no job sheets by using the value **id-val-generic-none** as the value of the **job-sheets** attribute.

If the **job-sheets** attribute is not specified or contains a value which the printer does not support, and the **job-sheets** value is non-compulsory (so that the server accepts the job), then the server may select from among the values of this attribute. The server shall not select the value **id-val-generic-none** unless it is the only value specified for the **job-sheets-supported** attribute.

> NOTE – It is preferable for the server to produce some job auxiliary-sheet, even if not the desired one, rather than produce none at all.

9.4.40.2 Job-sheets-ready

This attribute identifies the **auxiliary-sheet-package** values ready to be used on this printer. An **auxiliary-sheet-package** shall not be ready if any media used by any of its auxiliary-sheets are not ready.

```
job-sheets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-job-sheets-ready
```

When the server is scheduling a job, the server may use the values in this attribute to match against the value of the **job-sheets** job attribute, if the server is using a strategy of minimizing human intervention.

9.4.40.3 Document-sheets-supported

This attribute identifies the **auxiliary-sheet-package** values supported by this printer.

```
document-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-document-sheets-supported
```

To allow no document sheets, the system administrator shall include the value **id-val-generic-none** as a value for this attribute. The client specifies that there are no document sheets by using the value **id-val-generic-none** as the value of the **document-sheets** attribute.

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If the **document-sheets** attribute is not specified or contains a value which the printer does not support, and the **document-sheets** value is non-compulsory (so that the server accepts the job), then the server may select from among the values of this attribute. The server shall not select the value **id-val-generic-none** unless it is the only value specified for the **document-sheets-supported** attribute.

NOTE – It is preferable for the server to produce some job auxiliary-sheet, even if not the desired one, rather than produce none at all.

9.4.40.4 Document-sheets-ready

This attribute identifies the values ready to be used on this printer. An **auxiliary-sheet-package** shall not be ready if any media used by any of its auxiliary-sheets are not ready.

```
document-sheets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-document-sheets-ready
```

When the server is scheduling a job, the server may use the values in this attribute to match against the value of the **document-sheets** job attribute, if the server is using a strategy of minimizing human intervention.

9.4.41 Character-sets-supported

This attribute identifies the character set encodings supported by this printer. See 9.3.2.5, Default-character-set.

```
character-sets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-supported
```

9.4.42 Character-sets-ready

This attribute identifies the character set encodings ready to be used on this printer. See 9.3.2.5, Default-character-set.

```
character-sets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-ready
```

9.4.43 Character-repertoires-supported

This attribute identifies the character repertoires supported by this printer.

```
character-repertoires-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-supported
```

9.4.44 Character-repertoires-ready

This attribute identifies the character repertoires ready to be used on this printer.

```
character-repertoires-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-ready
```


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9.4.45 Character-mappings-supported

This attribute identifies the character mappings supported by this printer. A character set mapping associates each character in a coded character set with a glyph identifier.

```
character-mappings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-supported
```

9.4.46 Character-mappings-ready

This attribute identifies the character mappings ready to be used on this printer.

```
character-mappings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-ready
```

9.4.47 Start-message-supported

This attribute indicates whether the **job-start-message** attribute is supported by this printer.

```
start-message-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-start-message-supported
```

9.4.48 End-message-supported

This attribute indicates whether the **job-end-message** attribute is supported by this printer.

```
end-message-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-end-message-supported
```

9.4.49 Sides-supported

This attribute indicates the values of the **sides** attribute supported by this printer, i.e., the different numbers of surfaces of a medium that can be imaged by this printer.

```
sides-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        MULTI VALUE
        ::= id-att-sides-supported
```

9.4.50 Sides-ready

This attribute indicates the values of the **sides** attribute that are ready to be used on this printer, i.e., the different number of surfaces of a medium that can be imaged by this printer without operator intervention.

```
sides-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        MULTI VALUE
        ::= id-att-sides-ready
```


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9.4.51 Page-select-supported

This attribute indicates the types of page identifier supported by this printer, either nominal numeric or alpha-numeric string, or both. Page identifier types are defined in the specification for the **page-select** document attribute.

```
PageIdType ::= ENUMERATED {
        numeric         (1),
        alphanumeric    (2),
        tag             (3) }

pageIdTypeSyntax ATTRIBUTE-SYNTAX
        PageIdType
        MATCHES FOR EQUALITY
        ::= id-syn-page-id-type

page-select-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageIdTypeSyntax
        MULTI VALUE
        ::= id-att-page-select-supported
```

9.4.52 Maximum-copies-supported

This attribute indicates the maximum number of copies of a document that can be rendered by this printer in a single print-job.

A server shall ensure that neither a document's **copy-count** attribute nor any single **job-copies** element of a **ResultsProfile** exceeds the value specified in this attribute. A server may ensure that for each document the product of the document's **copy-count** and the sum of all **job-copies** in all result-sets does not exceed this value.

A value of 0 shall indicate there is no limit on the maximum number of document copies for this printer.

```
maximum-copies-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX positiveIntegerSyntax
        SINGLE VALUE
        ::= id-att-maximum-copies-supported
```

9.4.53 Document-formats-supported

This attribute identifies the document-formats, including the document-format-variants and document-format-versions, supported by the output device and the server software collectively. This set includes both the formats that are native to the output device and those formats that the server software can translate to one that is native to the output device. From the client's point of view, this set contains all formats in which documents can be submitted to this printer.

```
document-formats-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-document-formats-supported
```

Proprietary document format identifiers, variants, and versions are assigned by the owners of those formats. Annex F contains a set of format identifiers and variants for various commercially available formats and variants that are currently in common use.

9.4.54 Document-formats-ready

This attribute identifies the document formats that are ready on the output device and server software collectively. This attribute contains all those values that **document-formats-supported** contains except for those document formats which are not currently ready (e.g. a cartridge may not be plugged in).

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```
document-formats-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-document-formats-ready
```

Proprietary document format identifiers, variants, and versions are assigned by the owners of those formats. Annex F contains a set of format identifiers and variants for various commercially available formats and variants that are currently in common use.

9.4.55 Native-document-formats-ready

This attribute identifies the document-formats, including the document-format-variants and document-format-versions, ready to use on the output device itself. This set includes the formats that are native to the output device, but not those formats that the server software must translate to one that is native to the output device.

The server uses this attribute in conjunction with the server and printer attribute **translators-ready** to determine how to translate a document that is in a format that is not a native format for the output device.

This attribute is intended to allow a server to determine which documents it can pass directly to an output device and which documents that the server must translate.

```
native-document-formats-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-native-document-formats-ready
```

Proprietary document format identifiers, variants, and versions are assigned by the owners of those formats. Annex F contains a set of format identifiers and variants for various commercially available formats and variants that are currently in common use.

9.4.56 Content-orientations-supported

This attribute identifies the content orientations currently supported by this printer.

```
content-orientations-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-content-orientations-supported
```

Standard values are defined in specification for the **content-orientation** document attribute.

9.4.57 Presentation-directions-supported

This attribute indicates the text presentation direction(s) supported by the printer.

The purpose of this attribute is to enable a print-client to determine whether a particular printer is capable of rendering the text of a document properly in those cases where the text presentation direction is different from the default for the site.

```
presentation-directions-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        MATCHES FOR EQUALITY
        MULTI VALUE
        ::= id-att-presentation-directions-supported
```

Standard values are defined in the specification of the **presentation-directions-contained** document attribute.

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9.4.58 Sheet-count

This attribute provides the number of sheets consumed during the operation of this printer. The sheet-count is reset by implementation-dependent administrative or operator action, outside the scope of ISO/IEC 10175.

```
sheet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-sheet-count
```

9.4.59 Printer-needs-attention-time

This attribute specifies how long the printer has been waiting for attention (e.g., waiting for additional media).

```
printer-needs-attention-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-needs-attention-time
```

9.4.60 Printer-needs-key-operator-attention-time

This attribute specifies how long a printer has been waiting for attention by a key operator (e.g., jammed). The attention by key operator may be independent of "normal" attention required (e.g., the job could be continued with lower quality, if the printer requires the key operator to perform preventive maintenance).

```
printer-needs-key-operator-attention-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-needs-key-operator-attention-time
```

9.4.61 Printer-security

Attributes that deal with printer security are specified in this subclause. These attributes are directly related to the job-security-handling attributes defined in 9.3; refer to that subclause for a discussion of the rules governing the printing of documents in a secure environment.

9.4.61.1 Printer-confidentiality-level-range

This attribute specifies the printer's minimum and maximum confidentiality levels. Each confidentiality level range is associated with an organization which has defined the meaning of the levels.

```
LevelRange ::= SEQUENCE {
        organization-identifier OBJECT IDENTIFIER,
        level-minimum   MinimumInteger,
        level-maximum   MaximumInteger }

levelRangeSyntax ATTRIBUTE-SYNTAX
        LevelRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-level-range

printer-confidentiality-level-range ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX levelRangeSyntax
        MULTI VALUE
        ::= id-att-printer-confidentiality-level-range
```

A printer may support the confidentiality levels of more than one organization, although only one level-range is to be specified for a given organization. For a given organization-identifier the printer's confidentiality level-minimum shall be less than or equal to its confidentiality level-maximum.

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9.4.61.2 Printer-confidentiality-category-sets

This attribute specifies the printer's minimum and maximum sets of confidentiality categories. Each confidentiality category set is associated with an organization which has defined the meaning of the categories.

```
CategorySet ::= SEQUENCE {
        organization-identifier OBJECT IDENTIFIER,
        category-minimum   SET OF Cardinal,
        category-maximum   SET OF Cardinal }

categorySetSyntax ATTRIBUTE-SYNTAX
        CategorySet
        MATCHES FOR EQUALITY
        ::= id-syn-category-set

printer-confidentiality-category-sets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX categorySetSyntax
        MULTI VALUE
        ::= id-att-printer-confidentiality-category-sets
```

A printer may support the confidentiality categories of more than one organization, though only one CategorySet is to be defined for a given organization. For a given organization-identifier the printer's confidentiality category-minimum shall be a subset of the printer's confidentiality category-maximum.

9.4.61.3 Printer-confidentiality-policy

This attribute specifies the security policy for confidentiality.

```
printer-confidentiality-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-confidentiality-policy
```

Standard values are defined in the specification for the **job-security-confidentiality-policy** job attribute.

9.4.61.4 Printer-integrity-level-range

This attribute specifies the printer's minimum and maximum integrity levels. Each integrity level range is associated with an organization which has defined the meaning of the levels.

```
printer-integrity-level-range ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX levelRangeSyntax
        MULTI VALUE
        ::= id-att-printer-integrity-level-range
```

A printer may support the integrity-levels of more than one organization, though only one LevelRange is to be defined for any given organization. For a given organization-identifier the printer's integrity level-minimum shall be less than or equal to the printer's integrity level-maximum.

9.4.61.5 Printer-integrity-category-sets

This attribute specifies the printer's minimum and maximum set of integrity categories. Each set of integrity categories is associated with an organization which has defined the meaning of these categories.

```
printer-integrity-category-sets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX categorySetSyntax
        MULTI VALUE
        ::= id-att-printer-integrity-category-sets
```


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A printer may support the integrity categories of more than one organization, though only one CategorySet is to be defined for a given organization. For a given organization the printer's integrity category-minimum shall be a subset of the printer's integrity category-maximum.

9.4.61.6 Printer-integrity-policy

This attribute specifies the security policy for integrity.

```
printer-integrity-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-integrity-policy
```

Standard values are defined in the specification for the **job-security-integrity-policy** job attribute.

9.4.61.7 Printer-security-label-policy

This attribute specifies the location(s) of the security label that shall be applied to each sheet of the job. The location(s) of the label specified by this attribute defines site policy and cannot be overridden by a print-request.

```
printer-security-label-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-security-label-policy
```

Standard values are defined in the specification for the **job-security-label** job attribute.

9.4.62 Imposition-object attribute support

This subclause defines those attributes used to indicate the level of support and readiness provided by a printer for imposition-object attributes. See 9.15 for related attribute definitions.

9.4.62.1 Plexes-supported

This attribute identifies the plexes supported by this printer.

```
plexes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-plexes-supported
```

Standard values are defined in the specification for the **plex** document attribute.

9.4.62.2 Numbers-up-supported

This attribute identifies the number-up values and imposition objects supported by this printer. The cardinal-range is an alternative (shorthand) way of specifying consecutive cardinal-values.

```
NumbersUpSupported ::= CHOICE {
        cardinal-value          [0] Cardinal,
        name-or-oid-value       [1] NameOrOid,
        cardinal-range          [2] CardinalRange }

numbersUpSupportedSyntax ATTRIBUTE-SYNTAX
        NumbersUpSupported
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-numbers-up-supported
```


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```
numbers-up-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX numbersUpSupportedSyntax
        MULTI VALUE
        ::= id-att-numbers-up-supported
```

There are no standard values defined.

9.4.62.3 Binding-edges-supported

This attribute identifies the binding-edge values supported by this printer.

```
binding-edges-supported  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX edgeSyntax
        MULTI VALUE
        ::= id-att-binding-edges-supported
```

9.4.62.4 Binding-edge-image-shift-max-supported

This attribute identifies the maximum binding-edge-shift supported by this printer.

```
binding-edge-image-shift-max-supported  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        REAL VALUE
::= id-att-binding-edge-image-shift-max-supported
```

9.4.62.5 X-image-shift-range-supported

This attribute identifies the x-image-shift-range supported by this printer.

```
x-image-shift-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realRangeSyntax
        SINGLE VALUE
        ::= id-att-x-image-shift-range-supported
```

9.4.62.6 Y-image-shift-range-supported

This attribute identifies the y-image-shift-range supported by this printer.

```
y-image-shift-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realRangeSyntax
        SINGLE VALUE
        ::= id-att-y-image-shift-range-supported
```

9.4.63 Schedulers-supported

This attribute identifies the schedulers supported by this printer.

```
schedulers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-schedulers-supported
```

Standard values are defined in 9.16.1

9.4.64 Scheduler-ready

This attribute identifies the scheduler ready to be used on this printer.

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```
scheduler-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-scheduler-ready
```

Standard values are defined in 9.16.1

9.4.65 Job-size-range-supported

This attribute specifies the maximum and minimum values of a print-job's **total-job-octets** attribute that the server shall accept for this printer. See the **total-job-octets** attributes for the computation of a job's job size in octets.

```
job-size-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64RangeSyntax
        SINGLE VALUE
        ::= id-att-job-size-range-supported
```

If a job is submitted whose **total-job-octets** is greater than the maximum job size specified by this attribute or is less than the minimum job size specified by this attribute, the server shall reject the job with the **unsupported-attribute-value** AttributeError.

9.4.66 Job-size-range-ready

This attribute specifies the maximum and minimum values of a print-job's **total-job-octets** attribute that the server shall schedule print-jobs for this printer. See the **total-job-octets** attribute for the computation of a job's job size in octets.

```
job-size-range-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64RangeSyntax
        SINGLE VALUE
        ::= id-att-job-size-range-ready
```

The server shall accept jobs whose **total-job-octets** size is outside the current range value of this attribute, but shall put the job into the **held** state, with the **job-states-reasons** set to **required-resources-not-ready**, so that the job will not be scheduled until the operator extends the range of the value of this printer's attribute beyond the job's **total-job-octets** value.

The range of **job-size-range-ready** should not exceed the range of **job-size-range-supported**.

9.4.67 Printer-timeout-period

This attribute identifies the period of time in seconds for which the server shall wait in order to get a response from this printer before putting this printer into the **timed-out** state (by setting the value of the printer's **printer-state** attribute to **timed-out**).

```
printer-timeout-period ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-timeout-period
```

9.4.68 Job-abort-criteria-supported

This attribute identifies the attributes supported by this printer as values of the criterion-type element of the job-abort-criteria attribute.

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```
job-abort-criteria-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                                -- i.e. the OID of an attribute
        MULTI VALUE
        ::= id-att-job-abort-criteria-supported
```

9.4.69 Job-warning-criteria-supported

This attribute identifies the attributes supported by this printer as values of the criterion-type element of the **job-warning-criteria** attribute.

```
job-warning-criteria-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                                -- i.e. the OID of an attribute
        MULTI VALUE
        ::= id-att-job-warning-criteria-supported
```

9.4.70 Document-abort-criteria-supported

This attribute identifies the attributes supported by this printer as values of the criterion-type element of the **document-abort-criteria** attribute.

```
document-abort-criteria-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                                -- i.e. the OID of an attribute
        MULTI VALUE
        ::= id-att-document-abort-criteria-supported
```

9.4.71 Checkpoint-formats-supported

This attribute identifies the formats supported by this printer of the **context-info** element in the **PrintCheckpoint** data type.

```
checkpoint-formats-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-checkpoint-formats-supported
```

The following standard values are defined (the server may, but need not, support this value):

Descriptive Name	Object Identifier	Descriptor Text
no-context-info	id-val-checkpoint-format-no-context-info	There is no context-info information provided and the server should use the ***xxx*-completed** elements for the checkpoint data.

9.4.72 Initial-value-jobs-supported

This attribute identifies the initial-value-job objects supported by this printer.

```
initial-value-jobs-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-initial-value-jobs-supported
```

NOTE – The values of this attribute link printer objects to initial-value-job objects, while the initial-value-job's **logical-printers-ready** and **physical-printers-ready** attributes link initial-value-job objects to printer objects, to help with attribute value consistency checking between objects, if implemented. The values of these linking attributes may be set automatically by the server or may require the administrator to set them explicitly depending on implementation.

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9.4.73 Initial-value-documents-supported

This attribute identifies the initial-value-document objects supported by this printer.

```
initial-value-documents-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-initial-value-documents-supported
```

NOTE – The values of this attribute link printer objects to initial-value-document objects, while the initial-value-document's **logical-printers-ready** and **physical-printers-ready** attributes link initial-value-document objects to printer objects, to help with attribute value consistency checking between objects, if implemented. The values of these linking attributes may be set automatically by the server or may require the administrator to set them explicitly depending on implementation.

9.4.74 Common Printer and Server object attributes

This sub-clause specifies those attributes that may be contained in both printer and server objects, depending on implementation. These attributes are provided for use with both object classes, since some implementations may need to vary the values for different printers supported by a single server because of the different characteristics of the printer driver software for each printer, while other implementations may have the same values for all printers, since common software in the server implements the support for all printers.

9.4.74.1 Job-attributes-supported

This attribute contains the attribute-type **ObjectIdentifiers** of the job attributes recognized and supported by this object (printer or server). The value of this attribute shall include all supported job attributes, both those defined in ISO/IEC 10175, as well as implementor-defined attributes.

The primary purpose of this attribute is to indicate exactly those job attributes that a client may send to this object (printer or sever) with reasonable expectations of their being accepted and acted upon successfully. In addition, attribute identifiers supplied by this attribute may be sent back to the server in the argument of a ListObjectAttributes abstract-operation to obtain other essential information about supported job attributes; this can enable clients to begin immediately to access the features represented by newly defined/implemented/installed attribute types.

```
job-attributes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-attributes-supported
```

Standard values include all of the attribute-type **ObjectIdentifiers** defined for the **job** object class.

9.4.74.2 Document-attributes-supported

This attribute contains the attribute-type **ObjectIdentifiers** of the document attributes recognized and supported by this object (printer or server). The value of this attribute shall include all supported document attributes, both those defined in ISO/IEC 10175, as well as implementor-defined attributes.

The primary purpose of this attribute is to indicate exactly those document attributes that a client may send to this object (printer or server) with reasonable expectations of their being accepted and acted upon successfully. In addition, attribute identifiers supplied by this attribute may be sent back to the server in the argument of a ListObjectAttributes abstract-operation to obtain other essential information about supported document attributes; this can enable clients to begin immediately to access the features represented by newly defined/implemented/installed attribute types.

```
document-attributes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-document-attributes-supported
```


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Standard values include all of the attribute-type **ObjectIdentifiers** defined for the **document** object class.

9.4.74.3 Multiple-documents-supported

This attribute indicates whether this object (printer or server) is capable of processing and printing multiple documents per job.

```
multiple-documents-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-multiple-documents-supported
```

This object (printer or server) shall not support any operation involving multiple documents unless this attribute has the value **TRUE**. In spite of this requirement, it is still a printer driver implementation option of whether to support modifying and/or cancelling individual documents within a multi-document job or not.

9.4.74.4 Cancel-individual-document-supported

This attribute indicates whether this object (printer or server) is capable of cancelling the printing of individual documents within a multiple document job.

```
cancel-individual-document-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-cancel-individual-document-supported
```

9.4.74.5 Translators-supported

This attribute identifies the translators supported by this object (printer or server).

```
TranslatorType ::= SEQUENCE {
        from      DocFmtVariantChars,
        to        DocFmtVariantChars }

translatorTypeSyntax ATTRIBUTE-SYNTAX
        TranslatorType
        MATCHES FOR EQUALITY
        ::= id-syn-translator-type

translators-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX translatorTypeSyntax
        MULTI VALUE
        ::= id-att-translators-supported
```

NOTE – This information is expected to be of value primarily to system administrators. Normally, clients will only inquire as to the document formats supported (by a printer or server), and will not be concerned with the question of whether translation is performed to achieve the desired result.

9.4.74.6 Translators-ready

This attribute identifies the translators ready to be used through this object (printer or server).

```
translators-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX translatorTypeSyntax
        MULTI VALUE
        ::= id-att-translators-ready
```

9.4.74.7 Job-result-set-delivery-methods-supported

This attribute identifies the delivery-methods supported by this object (printer or server) for specifying job result sets in the **results-profile** attribute.

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```
job-result-set-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-result-set-delivery-methods-supported
```

Standard values are defined in 9.10.2.

9.4.74.8 Job-result-set-delivery-methods-ready

This attribute identifies the delivery-methods ready to be used by this object (printer or server) for specifying job result sets in the **results-profile** attribute.

```
job-result-set-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-result-set-delivery-methods-ready
```

Standard values are defined in 9.10.2.

9.4.74.9 Notification-delivery-methods-supported

This attribute identifies the delivery-methods supported by this object (printer or server) for specifying event notification in the **notification-profile** attribute.

```
notification-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-notification-delivery-methods-supported
```

Standard values are defined in 9.10.2.

9.4.74.10 Notification-delivery-methods-ready

This attribute identifies the delivery-methods ready to be used by this object (printer or server) for specifying event notification in the **notification-profile** attribute.

```
notification-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-notification-delivery-methods-ready
```

Standard values are defined in 9.10.2.

9.4.74.11 Log-delivery-methods-supported

This attribute identifies the delivery-methods supported by this object (printer or server) for specifying event logging in the **logging-profile** attribute.

```
log-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-log-delivery-methods-supported
```

Standard values are defined in 9.10.2.

9.4.74.12 Log-delivery-methods-ready

This attribute identifies the delivery-methods ready to be used by this object (printer or server) for specifying event logging in the **logging-profile** attribute.

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```
log-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-log-delivery-methods-ready
```

Standard values are defined in 9.10.2.

9.4.74.13 Are-foreign-jobs-visible

This attribute specifies whether a client can use the ListObjectAttributes operation to see jobs that were submitted to the associated output device through some route other than the server to which the client is directing the ListObjectAttributes operation. Such a job, about which the server has no direct knowledge, is called a *foreign* job. Foreign jobs can easily exist on a network printer, which can receive jobs from many hosts. This attribute can be associated with a printer or a server.

```
are-foreign-jobs-visible ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-are-foreign-jobs-visible
```

If the value is **FALSE**, the server shall return only jobs that it has direct knowledge of, i.e. job submitted through itself. No information about foreign jobs shall be returned; they shall be invisible to the client.

If the value if **TRUE**, the server shall return foreign jobs too. In this case, the ListObjectAttributes operation shall return information about jobs submitted through itself, as well as ones waiting on the downstream server or printer that came from elsewhere, though the information about foreign jobs may be limited.

If an implementation partitions a server into a supervisor piece and spooler piece, and if it allows jobs to be submitted to the supervisor piece, the spooler piece may treat such jobs as foreign jobs. If a printer receives jobs from more than one spooler, each spooler may treat jobs from the other spoolers as foreign jobs.

> NOTE – This attribute is relevant mainly for printers which have internal queuing and for supervisor which submit jobs to legacy spoolers, but it may also apply to certain arrangements of spoolers.

9.4.74.14 Enabled

This read-only attribute indicates whether this object (printer or server) is (1) enabled to accept or (2) disabled from accepting **create-job Print** abstract-operations from clients.

```
enabled ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-enabled
```

This read-only attribute is set by means outside the scope of ISO/IEC 10175-1.

This attribute applies to the server as a whole. When the server's **enabled** attribute is FALSE, the server shall not accept any **create-job Print** abstract-operations for any of its printers.

This attribute also applies to both logical and physical printers. When the logical printer's **enabled** attribute is **FALSE**, the server shall not accept **create-job Print** abstract-operations from clients for this printer. When the physical printer's **enabled** attribute is **FALSE**, the server shall neither accept **create-job Print** abstract-operations from any clients and the server shall not schedule print-jobs on this physical printer.

In order for a server to accept a **create-job Print** abstract-operations for a printer, both the server's **enabled** attribute and the specified printer's **enabled** attribute shall be **TRUE**.

If a printer's or a server's **enabled** attribute is changed from **TRUE** to **FALSE**, after a **create-job Print** abstract-operation has been accepted by a server, but before the **close-job Print** request for that job, the server shall continue

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to accept **add-document** and **close-job Print** abstract-operations. Thus, the act of disabling a printer or server shall not disrupt partially submitted print-jobs.

NOTE – The enabled/disabled condition is represented as a separate (read-only) printer and server attribute, since the printer and server can progress through any of the printer and servers states, while enabled or disabled. Thus the enabled/disabled condition is orthogonal to the printer and server state.

9.5 Server object attributes

These attributes provide information about a particular server.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Sub-clause	Generic attribute
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.5	message
9.1.6.6	availability
9.1.6.7	list-of-managers
9.1.6.8	notification-profile
9.1.6.9	logging-profile

In addition to the generic attributes that the server object may contain, the following printer attributes may also be associated with this class (see 9.4):

Sub-clause	Common Printer and Server object attributes
9.4.73.1	Job-attributes-supported
9.4.73.2	Document-attributes-supported
9.4.73.3	Multiple-documents-supported
9.4.73.4	Cancel-individual-document-supported
9.4.73.5	Translators-supported
9.4.73.6	Translators-ready
9.4.73.7	Job-result-set-delivery-methods-supported
9.4.73.8	Job-result-set-delivery-methods-ready
9.4.73.9	Notification-delivery-methods-supported
9.4.73.10	Notification-delivery-methods-ready
9.4.73.11	Log-delivery-methods-supported
9.4.73.12	Log-delivery-methods-ready
9.4.73.13	Initial-value-jobs-supported
9.4.73.14	Initial-value-documents-supported
9.4.73.15	Are-foreign-jobs-visible
9.4.73.16	Enabled

9.5.1 Server-name

This attribute uniquely identifies the server.

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```
server-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-server-name
```

9.5.2 Server-name-aliases

This attribute specifies one or more alternate names for the server.

```
server-name-aliases ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-server-name-aliases
```

9.5.3 Server-address

This attribute indicates the address of this server.

```
server-address ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX OCTET STRING (SIZE(0..ub-octet-string))
        SINGLE VALUE
        ::= id-att-server-address
```

9.5.4 Server-state

This attribute indicates the state of this server.

```
server-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-server-state
```

The standard values are defined in the specification for the **state** generic attribute.

9.5.5 Object-classes-supported

This attribute identifies the object-classes (e.g. -printer, medium, font, etc.) supported by this server.

```
object-classes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-object-classes-supported
```

Standard values are defined in the specification for the **object-classes** generic attribute.

9.5.6 Physical-printers-supported

This attribute identifies the physical printers (printer's **realization** attribute is either **physical** or **logical-and-physical**) supported by this server.

```
physical-printers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-physical-printers-supported
```

9.5.7 Physical-printers-ready

This attribute identifies the physical printers (printer's **realization** attribute is either **physical** or **logical-and-physical**) ready to be used through this server.

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```
physical-printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-physical-printers-ready
```

9.5.8 Logical-printers-supported

This attribute identifies the logical printers (printer's **realization** attribute is either **logical** or **logical-and-physical**) supported by this server.

```
logical-printers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-logical-printers-supported
```

9.5.9 Logical-printers-ready

This attribute identifies the logical printers (printer's **realization** attribute is either **logical** or **logical-and-physical**) ready to be used through this server.

```
logical-printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-logical-printers-ready
```

9.5.10 Job-validates-supported

This attribute identifies the job-validate values supported by this server.

```
job-validates-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX  objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-validates-supported
```

Standard values are defined in the specification for the **job-validate** job attribute.

9.5.11 Events-supported

This attribute identifies the event types and event classes supported by this server. See 8.5.

```
events-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-events-supported
```

9.5.12 Modify-individual-document-supported

This attribute indicates whether the server is capable of modifying the print-request parameters for individual documents within a multiple document job.

```
modify-individual-document-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-modify-individual-document-supported
```

9.5.13 Transfer-methods-supported

This attribute identifies the transfer-methods supported by this server.

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```
transfer-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-transfer-methods-supported
```

Standard values are defined in 9.9.1.

9.5.14 Extended-problems-supported

This attribute identifies the extended problems supported by this server. Extended problems are error problems that may be returned in the **extended-problem** element of the abstract-error datatypes (see 8.4). These error problems are defined by implementors, and not included among the standard values defined in ISO/IEC 10175. This attribute enables a client to obtain descriptions for all extended problems supported by the server.

```
extended-problems-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-extended-problems-supported
```

9.5.15 Conformance-levels-supported

This attribute identifies the conformance-levels supported by this server. The composition of the different conformance-levels is specified in Annex E.

```
conformance-levels-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-conformance-levels-supported
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
level-1	id-val-conformance-level-1	ISO/IEC 10175 conformance level 1
level-1m	id-val-conformance-level-1m	ISO/IEC 10175 conformance level 1M (multiple documents per print-job)
level-2	id-val-conformance-level-2	ISO/IEC 10175 conformance level 2
level-2m	id-val-conformance-level-2m	ISO/IEC 10175 conformance level 2M (multiple-documents per print-job)

9.5.16 Server-resource-context

This attribute allows a sequence of one or more contexts to be associated with a server. Each context is a choice of either a resource-context object reference or a specific server path name. A context provides a pointer to a group of resources (see 9.8); when combined with an appropriate resource name, a fully-qualified name is formed, unambiguously identifying a particular resource within the distributed system. See the **resource-context** document attribute.

The server shall search the contexts specified by (1) the **resource-context** attribute specified with the document to be printed, if any, (2) the printer's **printer-resource-context** and (3) the server's **server-resource-context** in the order specified in the description of the **resource-context** document attribute.

```
server-resource-context ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-server-resource-context
```


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9.5.17 Job-states-supported

This attribute identifies the job-states supported by this server.

```
job-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-states-supported
```

Standard values are defined in the specification for the **current-job-state** job attribute.

9.5.18 Job-state-reasons-supported

This attribute identifies the job-state-reasons supported by this server.

```
job-state-reasons-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-state-reasons-supported
```

Standard values are defined in the specification for the **job-state-reasons** job attribute.

9.5.19 Document-states-supported

This attribute identifies the document-states supported by this server.

```
document-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-document-states-supported
```

Standard values are defined in the specification for the **document-state** document attribute.

9.5.20 Printer-states-supported

This attribute identifies the printer-states supported by this server.

```
printer-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-states-supported
```

Standard values are defined in 9.4.9

9.5.21 Default-distinguished-name-syntax

This attribute identifies the default name-syntax assumed by the server for any attribute that uses the DistinguishedNameString type, if the name-syntax element of the DistinguishedNameString is omitted.

```
default-dist-name-syntax ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-dist-name-syntax
```

The standard values are defined in the specification for the **DistinguishedNameString** type and **distinguishedNameStringSyntax** in 9.1.5.

9.5.22 Distinguished-name-syntaxes-supported

This attribute identifies the name-syntaxes supported by the server for use in the DistinguishedNameString type.

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```
dist-name-syntaxes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-dist-name-syntaxes-supported
```

Standard values are defined in the specification for the **DistinguishedNameString** type and **distinguishedNameStringSyntax** in 9.1.5.

9.5.23 Locale

This attribute contains a locale specification that the server shall use when performing internationalization tasks, constructing error messages, notifications, and log messages, or for any other task requiring the production of human readable messages by a server, unless specifically overridden by other attributes.

```
locale ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        SINGLE VALUE
        ::= id-att-locale
```

The server shall supersede the value of this attribute:

a) by the **operation-locale** attribute in **CommonArguments**, if supplied by the client, when performing an abstract-operation

b) by the **locale** elements of **notification-profile** and **logging-profile** attributes when performing notification and logging, respectively, or

c) by any other attribute that contains specific behavior requirements indicating an alternative to the behavior of this attribute.

The **locale** attribute shall not affect object names.

9.5.24 Locales-supported

This attribute contains the list of locales that are supported by the server.

```
locales-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        MULTI VALUE
        ::= id-att-locales-supported
```

If a server supports the same language and country in several coded character sets, the value of this attribute shall reflect each such combination as a separate supported locale. The server shall perform coded character set conversion when receiving and sending, to accommodate the coded character set requested in the locale specified by the client (see the **operation-locale** attribute).

9.6 Medium object attributes

This object class defines media for printing. There are two kinds of medium objects, logical and physical.

With a logical medium, the desired approximate effect is indicated (e.g. A4-white or Our-Company-Letterhead). A logical medium has a generic set of characteristics. A logical medium shall be realized by the server by using one of the physical media that is associated with this logical medium.

A physical medium is a unique realization of a specified desired effect.

Examples of logical and associated physical media are:

Logical media	Associated physical media
ISO-A4-white	A4-white 90 grams normal grain

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	A4-creme 90 grams
	A4-white 120 grams
Our-Company-Letterhead	NA-letter-white; form 120 (logo)
	Company-Stationery 90 grams
ISO-B5-coloured	ISO-B5-yellow
	ISO-B5-green
	ISO-B5-red 120 grams

The mapping of logical media on physical media is the responsibility of the server and is outside the scope of ISO/IEC 10175.

In the normal day-to-day situation a user would choose from the logical media that are offered at his installation. If the user wants absolute control over the result he can inquire about the available media via the list application and select the exact physical medium of his choice.

All of the attributes defined in this subclause are applicable for both logical media and physical media unless explicitly stated otherwise. However, logical media will generally have fewer attributes defined than physical media.

Often a logical medium object, say **iso-a4-white**, will have only one associated physical medium, say **iso-a4-white-90-grams**. In this case, the system administrator may (1) create a single medium object, (2) give it a generic name, such as **iso-a4-white**, and (3) set the value of its **medium-realization** attribute to **logical-and-physical**, in order to avoid having to define two objects. This combined object would have the physical attributes specified for the 90-gram physical medium. If an additional physical medium object is added later, say **iso-a4-white-120-grams**, that is also to be associated with the logical medium **iso-a4-white**, the system administrator would have to change the value of the **realization** attribute of the **iso-a4-white** object to **logical** and add two physical medium objects, **iso-a4-white-90-grams** and **iso-a4-white-120-grams**.

To satisfy the conformance requirement that a server shall create all objects containing all attributes implemented, a logical medium (**medium-realization** is **logical**) which has associated physical media objects shall have no values for those attributes that vary across its associated physical medium objects. In other words, a logical medium object containing an attribute with an empty value, indicates that the value of that attribute depends on which physical medium is actually used. Physical medium objects (**medium-realization** is **physical**, or **logical-and-physical**) shall have non-empty values for all attributes.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.4	state
9.1.6.5	message
9.1.6.6	availability
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.6.1 Medium-identifier

This attribute identifies a particular medium.

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```
medium-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-identifier
```

The local-form of medium-identifier (i.e., of the nameOrOidSyntax) is intended to facilitate the identification of implementation-defined, or site-specific media. The global-form should always be used for media defined in this International Standard.

Standard values are defined for commonly used media, as listed in the following table (see 9.6.5 for specifications of the corresponding medium sizes):

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-medium-default	The default medium for the output device
iso-a4-white	id-val-medium-iso-a4-white	Specifies the ISO A4 white medium
iso-a4-coloured	id-val-medium-iso-a4-coloured	Specifies the ISO A4 coloured medium
iso-a4-transparent	id-val-medium-iso-a4-transparent	Specifies the ISO A4 transparent medium
iso-a3-white	id-val-medium-iso-a3-white	Specifies the ISO A3 white medium
iso-a3-coloured	id-val-medium-iso-a3-coloured	Specifies the ISO A3 coloured medium
iso-a5-white	id-val-medium-iso-a5-white	Specifies the ISO A5 white medium
iso-a5-coloured	id-val-medium-iso-a5-coloured	Specifies the ISO A5 coloured medium
iso-b4-white	id-val-medium-iso-b4-white	Specifies the ISO B4 white medium
iso-b4-coloured	id-val-medium-iso-b4-coloured	Specifies the ISO B4 coloured medium
iso-b5-white	id-val-medium-iso-b5-white	Specifies the ISO B5 white medium
iso-b5-coloured	id-val-medium-iso-b5-coloured	Specifies the ISO B5 coloured medium
jis-b4-white	id-val-medium-jis-b4-white	Specifies the JIS B4 white medium
jis-b4-coloured	id-val-medium-jis-b4-coloured	Specifies the JIS B4 coloured medium
jis-b5-white	id-val-medium-jis-b5-white	Specifies the JIS B5 white medium
jis-b5-coloured	id-val-medium-jis-b5-coloured	Specifies the JIS B5 coloured medium

The following standard values are defined for North American media:

na-letter white	id-val-medium-na-letter-white	Specifies the North American letter white medium
na-letter coloured	id-val-medium-na-letter-coloured	Specifies the North American letter coloured medium
na-letter transparent	id-val-medium-na-letter-transparent	Specifies the North American letter transparent medium
na-legal white	id-val-medium-na-legal-white	Specifies the North American legal white medium
na-legal coloured	id-val-medium-na-legal-coloured	Specifies the North American legal coloured medium

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iso-b4-envelope	id-val-medium-iso-b4-envelope	Specifies the ISO B4 envelope medium
iso-b5-envelope	id-val-medium-iso-b5-envelope	Specifies the ISO B5 envelope medium
iso-c3-envelope	id-val-medium-iso-c3-envelope	Specifies the ISO C3 envelope medium
iso-c4-envelope	id-val-medium-iso-c4-envelope	Specifies the ISO C4 envelope medium
iso-c5-envelope	id-val-medium-iso-c5-envelope	Specifies the ISO C5 envelope medium
iso-c6-envelope	id-val-medium-iso-c6-envelope	Specifies the ISO C6 envelope medium
iso-designated-long-envelope	id-val-medium-iso-designated-long-envelope	Specifies the ISO Designated Long envelope medium
na-10x13-envelope	id-val-medium-na-10x13-envelope	Specifies the North American 10x13 envelope medium
na-9x12-envelope	id-val-medium-na-9x12-envelope	Specifies the North American 9x12 envelope medium
monarch-envelope	id-val-medium-monarch-envelope	Specifies the Monarch envelope
na-number-10-envelope	id-val-medium-na-number-10-envelope	Specifies the North American number 10 business envelope medium
na-7x9-envelope	id-val-medium-na-7x9-envelope	Specifies the North American 7x9 inch envelope
na-9x11-envelope	id-val-medium-na-9x11-envelope	Specifies the North American 9x11 inch envelope
na-10x14-envelope	id-val-medium-na-10x14-envelope	Specifies the North American 10x14 inch envelope
na-number-9-envelope	id-val-medium-na-number-9-envelope	Specifies the North American number 9 business envelope
na-6x9-envelope	id-val-medium-na-6x9-envelope	Specifies the North American 6x9 inch envelope
na-10x15-envelope	id-val-medium-na-10x15-envelope	Specifies the North American 10x15 inch envelope

The following standard values are defined for the less commonly used media (white-only):

executive-white	id-val-medium-executive-white	Specifies the white executive medium
folio-white	id-val-medium-folio-white	Specifies the folio white medium
invoice-white	id-val-medium-invoice-white	Specifies the white invoice medium
ledger-white	id-val-medium-ledger-white	Specifies the white ledger medium
quarto-white	id-val-medium-quarto-white	Specified the white quarto medium
iso-a0-white	id-val-medium-iso-a0-white	Specifies the ISO A0 white medium
iso-a1-white	id-val-medium-iso-a1-white	Specifies the ISO A1 white medium
iso-a2-white	id-val-medium-iso-a2-white	Specifies the ISO A2 white medium
iso-a6-white	id-val-medium-iso-a6-white	Specifies the ISO A6 white medium
iso-a7-white	id-val-medium-iso-a7-white	Specifies the ISO A7 white medium
iso-a8-white	id-val-medium-iso-a8-white	Specifies the ISO A8 white medium
iso-a9-white	id-val-medium-iso-a9-white	Specifies the ISO A9 white medium
iso-10-white	id-val-medium-iso-10-white	Specifies the ISO A10 white medium
iso-b0-white	id-val-medium-iso-b0-white	Specifies the ISO B0 white medium
iso-b1-white	id-val-medium-iso-b1-white	Specifies the ISO B1 white medium

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iso-b2-white	id-val-medium-iso-b2-white	Specifies the ISO B2 white medium
iso-b3-white	id-val-medium-iso-b3-white	Specifies the ISO B3 white medium
iso-b6-white	id-val-medium-iso-b6-white	Specifies the ISO B6 white medium
iso-b7-white	id-val-medium-iso-b7-white	Specifies the ISO B7 white medium
iso-b8-white	id-val-medium-iso-b8-white	Specifies the ISO B8 white medium
iso-b9-white	id-val-medium-iso-b9-white	Specifies the ISO B9 white medium
iso-b10-white	id-val-medium-iso-b10-white	Specifies the ISO B10 white medium
jis-b0-white	id-val-medium-jis-b0-white	Specifies the JIS B0 white medium
jis-b1-white	id-val-medium-jis-b1-white	Specifies the JIS B1 white medium
jis-b2-white	id-val-medium-jis-b2-white	Specifies the JIS B2 white medium
jis-b3-white	id-val-medium-jis-b3-white	Specifies the JIS B3 white medium
jis-b6-white	id-val-medium-jis-b6-white	Specifies the JIS B6 white medium
jis-b7-white	id-val-medium-jis-b7-white	Specifies the JIS B7 white medium
jis-b8-white	id-val-medium-jis-b8-white	Specifies the JIS B8 white medium
jis-b9-white	id-val-medium-jis-b9-white	Specifies the JIS B9 white medium
jis-b10-white	id-val-medium-jis-b10-white	Specifies the JIS B10 white medium

The following standard values are defined for engineering media:

a	id-val-medium-a	Specifies the engineering A size medium
b	id-val-medium-b	Specifies the engineering B size medium
c	id-val-medium-c	Specifies the engineering C size medium
d	id-val-medium-d	Specifies the engineering D size medium
e	id-val-medium-e	Specifies the engineering E size medium

9.6.2 Medium-associated-media

This attribute identifies the physical/logical media associated with this logical/physical medium.

A logical medium object with its **realization** attribute set to **logical** shall have its **medium-associated-media** attribute set to the name(s) of the associated physical media (**realization** set to either **physical** or **logical-and-physical**) that this logical medium represents. A physical medium object with its **realization** attribute set to **physical** shall have its **medium-associated-media** attribute set to the name(s) of the associated logical media (**realization** set to **logical**) that represent the physical medium A combination logical and physical medium object with its **realization** attribute set to **logical-and-physical** shall have its **medium-associated-media** attribute set to the name of itself and the name(s) of the logical media (**realization** set to **logical**) that represent it, if any.

NOTE – With the above constraints, associated medium references are limited to a depth of one. That is a medium cannot be associated with another medium which is associated with a third medium.

```
medium-associated-media ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-medium-associated-media
```

9.6.3 Medium-realization

This attribute indicates whether this medium object represents a logical or physical medium, or both.

```
medium-realization  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-medium-realization
```


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9.6.4 Medium-type

This attribute identifies the type of this medium. (e.g. stationery, envelope, transparency, etc.)

```
medium-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-medium-type
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
stationery	id-val-medium-type-stationery	Separately cut sheets of an opaque material
transparency	id-val-medium-type-transparency	Separately cut sheets of a transparent material
envelope	id-val-medium-type-envelope	Envelopes that can be used for conventional mailing purposes
envelope-plain	id-val-medium-type-envelope-plain	Envelopes that are not preprinted and have no windows
envelope-window	id-val-medium-type-envelope-window	Envelopes that have windows for addressing purposes
continuous-long	id-val-medium-type-continuous-long	Continuously connected sheets of an opaque material connected along the long edge
continuous-short	id-val-medium-type-continuous-short	Continuously connected sheets of an opaque material connected along the short edge
tab-stock	id-val-medium-type-tab	Media with tabs
multi-part-form	id-val-medium-multi-part-form	Form medium composed of multiple layers not pre-attached to one another; each sheet may be drawn separately from an input source
labels	id-val-medium-labels	Label-stock
multi-layer	id-val-medium-type-multi-layer	Form medium composed of multiple layers which are pre-attached to one another, e.g. for use with impact printers

9.6.5 Medium-size

This attribute specifies the size of this medium by means of a pre-defined object identifier value. The medium size specified in this manner may be one of the standard sizes to which object identifiers have been assigned in ISO/IEC 10175, or another applicable standard, or for which an object identifier has been created in accordance with the rules stated in ISO/IEC 8824.

```
medium-size ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-medium-size
```

The value of this attribute shall be omitted if there is no object identifier defined for its size. The medium's size shall be then defined exclusively by the **medium-dimensions** attribute.

See the explanation in section 9.6.6 (**medium-dimensions**) about the relationship between this attribute and **medium-dimensions**.

The following standard values are defined:

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Descriptive Name	Object Identifier	Descriptor Text
iso-a0	id-val-medium-size-iso-a0	Specifies the ISO A0 size: 841 mm by 1189 mm as defined in ISO 216
iso-a1	id-val-medium-size-iso-a1	Specifies the ISO A1 size: 594 mm by 841 mm as defined in ISO 216
iso-a2	id-val-medium-size-iso-a2	Specifies the ISO A2 size: 420 mm by 594 mm as defined in ISO 216
iso-a3	id-val-medium-size-iso-a3	Specifies the ISO A3 size: 297 mm by 420 mm as defined in ISO 216
iso-a4	id-val-medium-size-iso-a4	Specifies the ISO A4 size: 210 mm by 297 mm as defined in ISO 216
iso-a5	id-val-medium-size-iso-a5	Specifies the ISO A5 size: 148 mm by 210 mm as defined in ISO 216
iso-a6	id-val-medium-size-iso-a6	Specifies the ISO A6 size: 105 mm by 148 mm as defined in ISO 216
iso-a7	id-val-medium-size-iso-a7	Specifies the ISO A7 size: 74 mm by 105 mm as defined in ISO 216
iso-a8	id-val-medium-size-iso-a8	Specifies the ISO A8 size: 52 mm by 74 mm as defined in ISO 216
iso-a9	id-val-medium-size-iso-a9	Specifies the ISO A9 size: 37 mm by 52 mm as defined in ISO 216
iso-a10	id-val-medium-size-iso-a10	Specifies the ISO A10 size: 26 mm by 37 mm as defined in ISO 216
iso-b0	id-val-medium-size-iso-b0	Specifies the ISO B0 size: 1000 mm by 1414 mm as defined in ISO 216
iso-b1	id-val-medium-size-iso-b1	Specifies the ISO B1 size: 707 mm by 1000 mm as defined in ISO 216
iso-b2	id-val-medium-size-iso-b2	Specifies the ISO B2 size: 500 mm by 707 mm as defined in ISO 216
iso-b3	id-val-medium-size-iso-b3	Specifies the ISO B3 size: 353 mm by 500 mm as defined in ISO 216
iso-b4	id-val-medium-size-iso-b4	Specifies the ISO B4 size: 250 mm by 353 mm as defined in ISO 216
iso-b5	id-val-medium-size-iso-b5	Specifies the ISO B5 size: 176 mm by 250 mm as defined in ISO 216
iso-b6	id-val-medium-size-iso-b6	Specifies the ISO B6 size: 125 mm by 176 mm as defined in ISO 216
iso-b7	id-val-medium-size-iso-b7	Specifies the ISO B7 size: 88 mm by 125 mm as defined in ISO 216
iso-b8	id-val-medium-size-iso-b8	Specifies the ISO B8 size: 62 mm by 88 mm as defined in ISO 216
iso-b9	id-val-medium-size-iso-b9	Specifies the ISO B9 size: 44 mm by 62 mm as defined in ISO 216
iso-b10	id-val-medium-size-iso-b10	Specifies the ISO B10 size: 31 mm by 44 mm as defined in ISO 216
na-letter	id-val-medium-size-na-letter	Specifies the North American letter size: 8.5 inches by 11 inches

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na-legal	id-val-medium-size-na-legal	Specifies the North American legal size: 8.5 inches by 14 inches
executive	id-val-medium-size-executive	Specifies the executive size (7.25 X 10.5 in)
folio	id-val-medium-size-folio	Specifies the folio size (8.5 X 13 in)
invoice	id-val-medium-size-invoice	Specifies the invoice size (5.5 X 8.5 in)
ledger	id-val-medium-size-ledger	Specifies the ledger size (11 X 17 in)
quarto	id-val-medium-size-quarto	Specifies the quarto size (8.5 X 10.83 in)

iso-c3	id-val-medium-size-iso-c3	Specifies the ISO C3 size: 324 mm by 458 mm as defined in ISO 269
iso-c4	id-val-medium-size-iso-c4	Specifies the ISO C4 size: 229 mm by 324 mm as defined in ISO 269
iso-c5	id-val-medium-size-iso-c5	Specifies the ISO C5 size: 162 mm by 229 mm as defined in ISO 269
iso-c6	id-val-medium-size-iso-c6	Specifies the ISO C6 size: 114 mm by 162 mm as defined in ISO 269
iso-designated-long	id-val-medium-size-iso-designated-long	Specifies the ISO Designated Long size: 110 mm by 220 mm as defined in ISO 269

na-10x13-envelope	id-val-medium-size-na-10x13-envelope	Specifies the North American 10x13 size: 10 inches by 13 inches
na-9x12-envelope	id-val-medium-size-na-9x12-envelope	Specifies the North American 9x12 size: 9 inches by 12 inches
na-number-10-envelope	id-val-medium-size-na-business-envelope	Specifies the North American number 10 business envelope size: 4.125 inches by 9.5 inches
na-7x9-envelope	id-val-medium-size-na-7x9-envelope	Specifies the North American 7x9 inch envelope size
na-9x11-envelope	id-val-medium-size-na-9x11-envelope	Specifies the North American 9x11 inch envelope size
na-10x14-envelope	id-val-medium-size-na-10x14-envelope	Specifies the North American 10x14 inch envelope size
na-number-9-envelope	id-val-medium-size-na-number-9-envelope	Specifies the North American number 9 business envelope size
na-6x9-envelope	id-val-medium-size-na-6x9-envelope	Specifies the North American 6x9 envelope size
na-10x15-envelope	id-val-medium-size-na-10x15-envelope	Specifies the North American 10x15 envelope size
monarch-envelope	id-val-medium-size-monarch-envelope	Specifies the Monarch envelope size (3.87 x 7.5 in)

a	id-val-medium-size-a	Specifies the engineering A size: 8.5 inches by 11 inches
b	id-val-medium-size-b	Specifies the engineering B size: 11 inches by 17 inches
c	id-val-medium-size-c	Specifies the engineering C size: 17 inches by 22 inches

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d	id-val-medium-size-d	Specifies the engineering D size: 22 inches by 34 inches
e	id-val-medium-size-e	Specifies the engineering E size: 34 inches by 44 inches

jis-b0	id-val-medium-size-jis-b0	Specifies the JIS B0 size: 1030mm x 1456mm
jis-b1	id-val-medium-size-jis-b1	Specifies the JIS B1 size: 728mm x 1030mm
jis-b2	id-val-medium-size-jis-b2	Specifies the JIS B2 size: 515mm x 728mm
jis-b3	id-val-medium-size-jis-b3	Specifies the JIS B3 size: 364mm x 515mm
jis-b4	id-val-medium-size-jis-b4	Specifies the JIS B4 size: 257mm x 364mm
jis-b5	id-val-medium-size-jis-b5	Specifies the JIS B5 size: 182mm x 257mm
jis-b6	id-val-medium-size-jis-b6	Specifies the JIS B6 size: 128mm x 182mm
jis-b7	id-val-medium-size-jis-b7	Specifies the JIS B7 size: 91mm x 128mm
jis-b8	id-val-medium-size-jis-b8	Specifies the JIS B8 size: 64mm x 91mm
jis-b9	id-val-medium-size-jis-b9	Specifies the JIS B9 size: 45mm x 64mm
jis-b10	id-val-medium-size-jis-b10	Specifies the JIS B10 size: 32mm x 45mm

9.6.6 Medium-dimensions

The attribute indicates the x-dimension and the y-dimension of the medium in millimetres, as measured in the Reference Coordinate System (see 6.5.4).

```
medium-dimensions ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumDimensionsSyntax
        SINGLE VALUE
        ::= id-att-medium-dimensions
```

This attribute should have a value so that the server can provide numerical dimensions of the media to clients which don't recognize the object identifier of the **medium-size**.

NOTE – Because **medium-size** is not an object and thus carries no information about itself, such as the dimensions associated with it, this attribute is the place where the medium-dimensions are associated with a **medium-size**, if both attributes are present. The administrator who creates a medium object should take care to make sure that the values for the two belong together. A client can determine the dimensions associated with a **medium-size** object identifier only by searching for media whose **medium-size** matches the specified object identifier, and then by getting the medium-dimensions from the matching media. If more than one medium matches, then the same dimensions should be returned from all of them.

9.6.7 Medium-colour

This attribute indicates the colour of this medium.

```
medium-colour ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-colour
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
white	id-val-medium-colour-white	White colour
pink	id-val-medium-colour-pink	Pink colour
yellow	id-val-medium-colour-yellow	Yellow colour
buff	id-val-medium-colour-buff	Buff colour
goldenrod	id-val-medium-colour-goldenrod	Goldenrod colour

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blue	id-val-medium-colour-blue	Blue colour
green	id-val-medium-colour-green	Green colour
transparent-untinted	id-val-medium-colour-transparent-untinted	Transparent (no colour)

NOTE – These names are taken from the ISO/IEC 10180 (SPDL) standard.

9.6.8 Medium-tooth

This attribute indicates the tooth (or roughness) of this medium. The tooth of a medium is particularly important for those marking engines that use pens (e.g. plotters) to mark the medium. The type of pen used shall match the tooth of the medium for best resolution.

```
medium-tooth ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-tooth
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
fine	id-val-medium-tooth-fine	Specifies fine tooth medium
coarse	id-val-medium-tooth-coarse	Specifies coarse tooth medium

9.6.9 Medium-grain

This attribute indicates the grain of this medium. Grain affects the curl of medium. Some marking engines are sensitive to the resulting curl.

```
medium-grain ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-grain
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
long	id-val-medium-grain-long	Specifies long grain medium
short	id-val-medium-grain-short	Specifies short grain medium

9.6.10 Medium-sides

This attribute indicates the number of sides (or imageable surfaces) of this medium. (e.g. 1 sided media such as transparency medium, or 2 sided medium such as stationery)

```
medium-sides ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        SINGLE VALUE
        ::= id-att-medium-sides
```

9.6.11 Medium-weight

This attribute indicates the weight of this medium in grams per square metre.

```
medium-weight ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-medium-weight
```


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9.6.12 Medium-assured-reproduction-area

This attribute indicates the assured reproduction area of this medium. Units are in millimetres.

```
medium-assured-reproduction-area ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX areaSyntax
        SINGLE VALUE
        ::= id-att-medium-assured-reproduction-area
```

9.6.13 Medium-form-parts

This attribute indicates the number of parts supported by the form associated with this medium.

```
medium-form-parts ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX positiveIntegerSyntax
        SINGLE VALUE
        ::= id-att-medium-form-parts
```

9.6.14 Medium-holes-count

This attribute indicates the number of holes (if any) pre-punched in this medium.

```
medium-holes-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-count
```

9.6.15 Medium-holes-edge

If holes are pre-punched in this medium, this attribute indicates edge to which the holes are adjacent.

```
medium-holes-edge ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX edgeSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-edge
```

9.6.16 Medium-holes-axis-offset

If holes are prepunched in this medium, this attribute indicates the location of the axis that passes through the holes. The holes-axis is parallel to the specified holes-reference-edge, and offset from it by the distance indicated by the value of this attribute. The offset distance measurements are in millimetres.

```
medium-holes-axis-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-axis-offset
```

9.6.17 Medium-holes-locations

If holes are prepunched in this medium, this attribute indicates the positions of the holes along the holes-axis. The locations are specified as linear distances from the RCS coordinate axis intersected by the holes-axis. The location measurements are in millimetres.

```
medium-holes-locations ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        MULTI VALUE
        ::= id-att-medium-holes-locations
```


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9.6.18 Medium-holes-diameter

If holes are prepunched in this medium, this attribute indicates the diameter of the holes. The measurements are in millimetres.

```
medium-holes-diameter ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-diameter
```

9.7 Font object attributes

These attributes provide information about a particular font object.

A font object may be either (1) submitted by the client in a separate print-request that is one of the print-requests of the print-job (see 8.2.1) or (2) installed in the server by means outside the scope of this part of ISO/IEC 10175. The lifetime of a font object submitted by a client as part of a print-job shall be limited to the job in which the font object is contained; that is, if a particular font is required by a succession of jobs, the client shall transmit the font with each job, or the font shall be installed on the server or printer by some other means, not defined by this part of ISO/IEC 10175.

In addition to the attributes specifically defined for this object class in this subclause, certain of the generic attributes and printable document attributes may also be associated with this class. For example, when requesting a list of attribute values for the font object class, the client may identify one or more of the generic, document, or font attributes in the following table, for which the server shall return values if the attributes are implemented.

When a client submits a font object as a separate print-request that makes up the print-job, the server shall create the job object containing the submitted font object (see 8.2.1), just as the server does for submitted documents (and resource objects). When submitting the font, the client shall include the **document-type** attribute with a value of **font** (see the **document-type** document attribute) in order to indicate to the server that this object is a font and shall include the **font-identifier** containing the font name to which the printable documents in the print-job make reference.

The following table specifies (1) which generic, document, and font object attributes shall apply to a font object submitted by the client using the print-request and (2) which attributes shall apply to fonts installed in the server. The table also specifies in which requests the attributes shall be applicable (if the server implements the attribute). The notation **PrintArg** in the table means that the client shall specify the attribute's value explicitly in the **PrintArgument** itself, instead of as an attribute (see 8.2.1).

Clause	Attribute name	Submitted in Operation Argument			Installed in server
		Print	ModifyJob	ListObject Attributes	ListObjectAttributes
9.1.6.1	object-class	no	no	no	yes
9.1.6.2	descriptor	no	no	no	yes
9.1.6.3	descriptive-name	yes	yes	yes	yes
9.1.6.4	state	no	no	no	yes
9.1.6.5	message	no	no	no	yes
9.1.6.6	availability	no	no	no	yes
9.1.6.7	list-of-managers	no	no	no	yes
9.1.6.10	associated-server	no	no	no	yes
9.3.3.1	document-type	**PrintArg**	yes	yes	yes
9.3.3.2	transfer-method	**PrintArg**	yes	yes	no
9.3.3.3	document-format	yes	yes	yes	yes
9.3.3.4	document-content	**PrintArg**	no	no	no
9.3.3.5	non-compulsory-attributes	yes	yes	yes	yes

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9.3.5.1	document-sequence-number	no	no	yes	no
9.3.5.2	document-state	no	no	yes	no
9.3.5.4	file-reference	no	no	yes	yes
9.7.1	font-identifier	yes	yes	yes	yes

9.7.1 Font-identifier

This attribute uniquely identifies the font resource object. The server shall use this attribute to locate a font whether the font was submitted with the print-job or is referenced from the document or its attributes.

The server shall use the **font-identifier** in the ListObjectAttributes request to identify a requested font object that has been installed in the server or printer (by means outside the scope of this part of ISO/IEC 10175).

```
font-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MATCHES FOR EQUALITY
        ::= id-att-font-identifier
```

No standard values are defined by this part of ISO/IEC 10175.

9.8 Resource object attributes

These attributes provide information about a particular resource object. A resource object may include overlays, forms, logos, images, clip art, and signatures, etc.

A resource object may be either (1) submitted by the client in a separate print-request that is one of the print-requests of the print-job (see 8.2.1) or (2) installed in the server by means outside the scope of this part of ISO/IEC 10175.

When a client submits a resource object as a separate print-request that makes up the print-job, the server shall create the job object containing the submitted resource object (see 8.2.1), just as the server does for submitted documents (and font objects). When submitting the resource, the client shall include the **document-type** attribute with a value of **resource** (see the **document-type** document attribute) in order to indicate to the server that this object is a resource and shall include the **resource-name** containing the resource name to which the printable documents in the print-job make reference.

The lifetime of a resource object submitted by a client as part of a print-job shall be limited to the job in which the resource object is contained; that is, if a particular resource is required by a succession of jobs, the client shall transmit the resource with each job, or the resource shall be installed on the server or printer by some other means, not defined by this part of ISO/IEC 10175.

When a document makes a reference to one or more resources, either by the document's **default-resource** attribute, or from the document contents, the server shall use the search order specified in the description of the **resource-context** document attribute to locate the resources.

In addition to the attributes specifically defined for this object class in this subclause, certain of the generic attributes and printable document attributes may also be associated with this class. For example, when requesting a list of attribute values for the resource object class, the client may identify one or more of the generic, document, or resource attributes in the following table, for which the server shall return values if the attributes are implemented.

The following table specifies (1) which generic, document, and resource object attributes shall apply to a resource object submitted by the client using the print-request and (2) which attributes shall apply to resources installed in the server. The table also specifies in which requests the attributes shall be applicable (if the server implements the attribute). The notation **PrintArg** in the table means that the client shall specify the attribute's value explicitly in the **PrintArgument** itself, instead of as an attribute (see 8.2.1).

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Clause	Attribute name	Submitted in Operation Argument			Installed in server
		Print	ModifyJob	ListObject Attributes	ListObjectAttributes
9.1.6.1	object-class	no	no	no	yes
9.1.6.2	descriptor	no	no	no	yes
9.1.6.3	descriptive-name	yes	yes	yes	yes
9.1.6.4	state	no	no	no	yes
9.1.6.5	message	no	no	no	yes
9.1.6.6	availability	no	no	no	yes
9.1.6.7	list-of-managers	no	no	no	yes
9.1.6.10	associated-server	no	no	no	yes
9.3.3.1	document-type	**PrintArg**	yes	yes	yes
9.3.3.2	transfer-method	**PrintArg**	yes	yes	no
9.3.3.3	document-format	yes	yes	yes	yes
9.3.3.4	document-content	**PrintArg**	no	no	no
9.3.3.5	non-compulsory-attributes	yes	yes	yes	yes
9.3.5.1	document-sequence-number	no	no	yes	no
9.3.5.2	document-state	no	no	yes	no
9.3.5.4	file-reference	no	no	yes	yes
9.8.1.	resource-name	yes	yes	yes	yes
9.8.2	resource-type	yes	yes	yes	yes

9.8.1 Resource-name

This attribute specifies a name for the resource object. The server shall use this attribute to locate a resource whether the resource was submitted with the print-job or is referenced from the document or its attributes.

When locating resource objects that are referenced by documents or by document attributes, such as the **default-resource** attribute, the server shall use the search order specified in the description of the **resource-context** document attribute. This search order starts with searching the job for submitted resources with the name **resource-name**, followed by using the **resource-name** in conjunction with the various resource-context attributes (the document's **resource-context**, the printer's **printer-resource-context**, and the server's **server-resource-context** attribute)

The server shall use the **resource-name** in the ListObjectAttributes request to identify a requested resource object that has been installed in the server or printer (by means outside the scope of this part of ISO/IEC 10175).

```
resource-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-resource-name
```

No standard values are defined by this part of ISO/IEC 10175.

9.8.2 Resource-type

This attribute identifies the type of the resource object, e.g., overlay, forms, logos, images, clip art, and signatures.

```
resource-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-resource-type
```

The following standard values are defined:

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Descriptive Name	Object Identifier	Descriptor Text
overlay	id-val-resource-type-overlay	This value indicates that the resource is an overlay. An overlay is merged with each page image of a document depending on the document format.

9.9 Transfer-method object attributes

These attributes provide information about a particular transfer-method.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.5	message
9.1.6.10	associated-server

9.9.1 Transfer-method-identifier

This attribute identifies the transfer-method.

```
transfer-method-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method-identifier
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
with-request	id-val-transfer-method-with-request	This value indicates that the document is transferred as the value component of the **document-content** attribute
referenced-data-transfer	id-val-transfer-method-referenced-data-transfer	This value indicates that the document is transferred by means of referenced data transfers defined in ISO/IEC 10740. The **document-content** attribute contains a reference to the document (i.e., a DOR), instead of the document itself
ftam-by-client	id-val-transfer-method-ftam-by-client	This value specifies the use of FTAM by the client to transfer the contents of the document or file to be printed to the print-server. The server returns a **file-reference** attribute reference (DOR) to an FTAM filestore to which the document(s) is to be transferred
ftam-by-server	id-val-transfer-method-ftam-by-server	This value specifies the use of FTAM by the server to transfer the contents of the document or file to be printed. The client shall provide a reference (DOR) to an FTAM filestore by means of the **document-content** attribute

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9.9.2 Transfer-method-type

This attribute identifies the type of the transfer-method. (e.g. push, pull, immediate)

```
transfer-method-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method-type
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
push	id-val-transfer-method-type-push	In this transfer-method the client "pushes" documents to the server, possibly in a deferred manner, e.g., to a file store location referenced by the server
pull	id-val-transfer-method-type-pull	In this transfer-method the server "pulls" documents, e.g., from a file-store location referenced by the client
immediate	id-val-transfer-method-type-	This value indicates document transfer is immediate; i.e., the document is transferred in the attribute **document-content**

9.9.3 Document-reference-type

This attribute identifies the type of the document reference required by this transfer-method. [e.g. **DistinguishedObjectReference** (DOR)]

```
document-reference-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-reference-type
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
immediate	id-val-document-ref-type-immediate	This value indicates that document transfer is immediate; i.e., the value of the attribute **document-content** is the document itself
dor	id-val-document-ref-type-dor	This value indicates that the attribute **document-content** contains a reference (DOR) to a file-store location from which the server is to obtain the document to be printed

9.10 Delivery-method object attributes

Delivery-method objects define the existence and characteristics of methods for delivering job results, logs and notifications, as specified in the constructed data types **ResultsProfile** (see the **results-profile** job attribute) and **EventHandlingProfile** (see the **notification-profile** and **logging-profile** generic attributes). A few standard instances of delivery-methods are defined in this part of ISO/IEC 10175 to ensure interoperability.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client

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may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.5	message
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.10.1 Delivery-method-identifier

This attribute uniquely identifies the delivery-method.

```
delivery-method-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-delivery-method-identifier
```

9.10.2 Delivery-methods for various categories of delivery

The following subsections contain standard values of delivery-methods for various categories of delivery:

9.10.2.1 Delivery-methods for hard copy output of a job result set

This section contains standard values of delivery-methods for specifying hardcopy output of a print-job in the **results-profile** attribute.

These delivery-methods shall not be used for event notifications or logging.

The elements of the **results-profile** have the following common behavior for these hardcopy output delivery-methods.

a) **results-set-comment**: If it has a value, it is printed on some job-sheet and it contains information for an operator or recipient of the hardcopy output (see section 9.2.2.1 for details). Examples include: "Please try to make the 5pm pick-up." or "Please telephone me when my job is done". The **results-set-comment** value for each of the delivery-methods below is optional.

b) **delivery-address**: If the **delivery-method** implies the use of a mail service, then a **delivery-address** is required; otherwise, its value, if any, is ignored.

c) **job-copies**: If it has a value, it is the number of job-copies to include in the result-set.

d) **output-bin**: if it has a value, it specifies the output-bin on the printer that receives the output. Because the actions requested by the delivery-methods below will usually be carried out by an operator rather than the printer, the selection of the output bin is usually independent of the delivery-method. For some sites some delivery-methods may be supported only by some output-bins.

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Descriptive Name	Object Identifier	Descriptor Text
pick-up	id-val-delivery-method-pick-up	This value specifies that the hardcopy output of job result set is to be picked up at a system-administrator defined place which may be the printer's output-bin or the place where someone, such as an operator, leaves the output. The **delivery-address** is ignored for this delivery-method. NOTE – This value is typically the server default for a results-profile.
secure-pick-up	id-val-delivery-method-secure-pick-up	This value specifies that the hardcopy output of job result set is to be picked up at a system-administrator defined place which shall be protected against unauthorized access. This place may be a locked output bin (selected by the output-bin element) or it may be a secure place where someone, such as an operator, leaves the output. For the latter place, the job-sheet should indicate that security is required. The server is not required to check if the selected output-bin or printer is secure. The **delivery-address** is ignored for this delivery-method.
interoffice-mail	id-val-delivery-method-interoffice-mail	This value specifies that the hardcopy output of job-result set is to be mailed via interoffice mail to the address specified by the **delivery-address**, which should follow the local administrative conventions for inter office mail.
postal-mail	id-val-delivery-method-postal-mail	This value specifies that the hardcopy output of job-result set is to be mailed via postal mail to the address specified by the **delivery-address**, which should follow the international conventions for postal mail. This type of mail is intended to ensure delivery within a few days and corresponds to "first class" in the US (also called "priority mail").
printed-matter-mail	id-val-delivery-method-printed-matter-mail	This value specifies that the hardcopy output of job-result set is to be mailed via postal mail to the address specified by the **delivery-address**, which should follow the international conventions for postal mail. This type of mail may take longer than postal mail, but it requests economy prices that printed matter or books sometime receive.
bulk-mail	id-val-delivery-method-bulk-mail	This value specifies that the hardcopy output of job-result set is to be mailed via postal mail to the address specified by the **delivery-address**, which should follow the international conventions for postal mail. This type of mail may take longer than postal mail, but it requests economy prices that large volumes of mail sometime receive.
express-mail	id-val-delivery-method-express-mail	This value specifies that the hardcopy output of job-result set is to be mailed via some mail carrier to the address specified by the **delivery-address**, which should follow the international conventions for postal mail and/or the express-mail carrier's requirements. This type of mail gives the fastest possible delivery, and the cost may be high.

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budget-express-mail	id-val-delivery-method-budget-express-mail	This value specifies that the hardcopy output of job-result set is to be mailed via some mail carrier to the address specified by the **delivery-address**, which should follow the international conventions for postal mail and/or the express-mail carrier's requirements. This type of mail probably uses the same carrier as the express mail, but is less costly because it may be delayed a day or so. It is intended to be faster than **postal-mail**.

9.10.2.2 Delivery-methods for hardcopy output of logs

This section contains standard values of delivery-methods for specifying hardcopy output of logs in the **logging-profile** attribute.

These delivery-methods shall not be used for event notifications or job-result-sets.

The elements of the logging-profile have the following behavior for these delivery-methods.

a) **event-comment**: If it has a value, that value is inserted into each log message in an implementation-dependent manner.

b) **delivery-address**: Its value, if any, is ignored.

Descriptive Name	Object Identifier	Descriptor Text
with-job-result-set	id-val-delivery-method-with-job-result-set	This value specifies that the log messages generated during the printing of a job result set are to be printed with the hardcopy output of that job result set, and such logs should be printed on an ending sheet of the job result set, or some similar sheet. These sheets are not a part of any job-copy.

If a job is printed in reverse order, the log pages printed when the job is ending will be physically located just before the beginning of the first document.

If the **delivery-method** for a job result set is **file**, then there is no hardcopy output to put the log with; instead it is put in a file with the name of the job result suffixed with **.log**.

NOTE – The action associated with this value will often be the default action of a server when errors occur during the processing of the print-job.

9.10.2.3 Delivery-methods for soft copy output of job result sets

This section contains standard values of delivery-methods for specifying soft copy output of a job result set in the **results-profile** attribute.

These delivery-methods shall not be used for event notification or logging.

The elements of the results-profile have the following behavior for the delivery-method.

a) **event-comment**: For **job-file**, the value appears on job-sheets as it would for hard-copy job-result-set delivery-methods. For **doc-file**, its value, if any, is ignored.

b) **delivery-address**: A value must be present to name a file. For **doc-file**, it may name a directory, too.

c) **job-copies**: For **job-file**, the value is used. For **doc-file**, its value, if any is ignored. The value of 1 is always assumed.

d) **output-bin**: Its value, if any, is ignored.

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Descriptive Name	Object Identifier	Descriptor Text
doc-file	id-val-delivery-method-doc-file	This value specifies that an electronic output of a print-job is to be copied to the file specified by the **delivery-address** value in an implementation-dependent manner. This electronic output shall have the format that it would have if it were sent to the requested printer. If there is no requested printer, then it shall keep the format in which it was received. The file is truncated if it exists, and the file is created if it doesn't exist. The electronic image of the document is written into the file, but no job-sheets or document-sheets are included. If the job-copy contains more than one document, they appear in sequence in the file. Only one copy of each document appears regardless of the value of **copy-count** or **job-copies**. If the file names a directory, the server may return an error or it may create a separate file for each document in the job-copy with an implementation-dependent name. If this file already exists, it is overwritten. The **copy-count**, **job-copies**, **job-sheets** and **document-sheets** attributes are also ignored in this case.
job-file	id-val-delivery-method-job-file	This value specifies that an electronic output of a print-job is to be copied to the file specified by the **delivery-address** value in an implementation-dependent manner. This electronic output shall have the format that it would have if it were sent to the requested printer. If there is no requested printer, then it shall keep the format in which it was received. The file is truncated if it exists, and it is created if it doesn't. The electronic image of the job is written into the file, including job-sheets and document-sheets. If the job-copy contains more than one document, they appear in sequence in the file. The values of copy-count and job-copy are honored. If the job contains multiple job-result-sets, the server puts the output they would generate into the single file.

9.10.2.4 Delivery-methods for soft copy output of event notifications and logging

This section contains standard values of delivery-methods for specifying soft copy output of an event notification in the **notification-profile** and an event logging in the **logging-profile** attribute.

These delivery-methods shall not be used for the delivery of job-result-sets.

The elements of the **notification-profile** and **logging-profile** have the following common behavior for these delivery-methods.

a) **event-comment**: If it has a value, that value is inserted into each notification or log message in an implementation-dependent manner.

b) **delivery-address**: Its value is required unless the text states that the delivery-method ignores its value.

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Descriptive Name	Object Identifier	Descriptor Text
electronic mail	id-val-delivery-method-electronic-mail	This value specifies that notification messages or logging messages of events are to be sent via electronic mail to the recipient indicated by the **delivery-address**. This **delivery-address** must be of the proper type for the electronic mail service. For notification, each event causes the server to send a separate e-mail message. For logging, the server holds all the logging messages for a job until it has completed and then sends them all as a single e-mail message.
file	id-val-delivery-method-file	This value specifies that notification messages or logging messages are to be copied to the file specified by the **delivery-address** value in an implementation-dependent manner. If the file named by the **delivery-address** doesn't exist at the beginning of a job, the server creates it, otherwise, the server truncates the file. The server copies each message generated during the job to the file.
file-add-to	id-val-delivery-method-file-add-to	This value is identical to **id-val-delivery-method-file** except that if the file named by **delivery-address** exists at the beginning of a job, the server does not truncate it. Thus the file can contain a history of messages for many jobs.
notification-service	id-val-delivery-method-notification-service	This value specifies that notification or logging messages are to be sent to the recipient process indicated by the **delivery-address**. This **delivery-address** must be of the proper type for the notification service. For event notification, each event causes the server to send a separate notification message. For event logging, the server holds all the logging messages for a job until it has completed and then sends them all as a single notification message.
none	id-val-generic-none	This value specifies that notification or logging messages should not be delivered. This value is intended to provide a way of turning off server notification defaults or server logging defaults.

9.11 Auxiliary-sheet-package object attributes

An **auxiliary-sheet-package** object is referenced by the **job-sheets** job attribute or **document-sheets** job attribute. When the **auxiliary-sheet-package** object is referenced by the **job-sheets** attribute, specifies a set of auxiliary-sheets for a job component (job result set or job copy), and when the **auxiliary-sheet-package** object is referenced by the **document-sheets** attribute, the **auxiliary-sheet-package** object specifies a set of auxiliary the **auxiliary-sheet-package** object sheets for a document component (document set or document copy). In both cases, the **auxiliary-sheet-package** object specifies the position of each auxiliary-sheet relative to the component. There are 6 possible positions and an **auxiliary-sheet-package** object may contain any combination of positions.

Below is a list of the names of the six positions and a description of where the server shall place an auxiliary-sheet in a job component and in a document component:

Position	Description
separator-sheet-of-set	auxiliary-sheet separates 2 adjacent job-result-sets in the same job or 2 adjacent document-sets in the same job-copy.
start-sheet-of-set	auxiliary-sheet starts a job-result-set or a document-set.

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end-sheet-of-set	auxiliary-sheet ends a job-result-set or a document-set.
separator-sheet-of-copy	auxiliary-sheet separates 2 adjacent job-copies in a job-result-set or 2 adjacent document-copies in a document-set.
start-sheet-of-copy	auxiliary-sheet starts a job-copy or a document-copy.
end-sheet-of-copy	auxiliary-sheet ends a job-copy or a document-copy.

NOTE – The six positions correspond to the six attributes defined for the **auxiliary-sheet-package** object. See the **results-profile** attribute for a description of the job-result-set and the document-set.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.4	state
9.1.6.5	message
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.11.1 Auxiliary-sheet-package-identifier

This attribute uniquely identifies the auxiliary-sheet-package.

```
auxiliary-sheet-package-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-package-identifier
```

The standard values are defined in Tables 1 and 2. Table 1 contains the standard values intended for the **job-sheets** job attribute, and Table 2 contains the standard values intended for the **document-sheets** job attribute.

If the **auxiliary-sheet-package** object is not implemented, then the relationships between the standard **auxiliary-sheet-packages** and standard **auxiliary-sheets** are fixed according to the tables below and cannot be changed by an administrator. Otherwise, an administrator can change this relationship, but it is not recommended for reasons of interoperability.

If an **auxiliary-sheet-package** value, designed for the **job-sheets** job attribute, is used with the **document-sheets** job attribute, the auxiliary-sheets shall have the format specified for them, but their position shall be relative to document components rather than job components. If an **auxiliary-sheet-package** value, designed for the document-sheets attribute, is used with the **job-sheets** job attribute, the auxiliary-sheets shall have the format specified for them, but their position shall be relative to job components rather than document components.

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Table 1 - Auxiliary-sheet-packages intended for use as values of the job-sheets job attribute:

Descriptive Name	Object Identifier	Descriptor text
none	id-val-generic-none	No auxiliary-sheets
job-separators	id-val-aux-pkg-job-separators	Auxiliary-sheet separates adjacent job-result-sets and adjacent job-copies
job-set-start	id-val-aux-pkg-job-set-start	Auxiliary-sheet starts each job-result-set
job-set-end	id-val-aux-pkg-job-set-end	Auxiliary-sheet ends each job-result-set
job-set-wrap	id-val-aux-pkg-job-set-wrap	Auxiliary-sheets start and end each job-result-set
job-set-start-copies-separate	id-val-aux-pkg-job-set-start-copies-separate	Auxiliary-sheets start each job-result-set and separate adjacent job-copies in a job-result-set
job-set-end-copies-separate	id-val-aux-pkg-job-set-end-copies-separate	Auxiliary-sheets end each job-result-set and separate adjacent job-copies in a job-result-set
job-set-wrap-copies-separate	id-val-aux-pkg-job-set-wrap-copies-separate	Auxiliary-sheets start and end each job-result-set and separate adjacent job-copies in a job-result-set
job-copy-start	id-val-aux-pkg-job-copy-start	Auxiliary-sheet starts each job-copy in a job-result-set
job-copy-end	id-val-aux-pkg-job-copy-end	Auxiliary-sheet ends each job-copy in a job-result-set
job-copy-wrap	id-val-aux-pkg-job-copy-wrap	Auxiliary-sheet starts and ends each job-copy in a job-result-set

The following table shows the attributes of the auxiliary-sheet-package object that shall specify an auxiliary-sheet for each auxiliary-sheet-package object:

auxiliary-sheet-package	Auxiliary-sheet-package attribute that specifies the auxiliary-sheet to be used					
	separator-sheet-of-set	**start-sheet-of-set**	**end-sheet-of-set**	**separator-sheet-of-copy**	**start-sheet-of-copy**	**end-sheet-of-copy**
none						
job-separators	X			X		
job-set-start		X				
job-set-end			X			
job-set-wrap		X	X			
job-set-start-copies-separate		X		X		
job-set-end-copies-separate			X	X		
job-set-wrap-copies-separate		X	X	X		
job-copy-start					X	
job-copy-end						X
job-copy-wrap					X	X

NOTE – The first row of each table is **none**, and it has no sheets.

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The following subtable shows the auxiliary-sheet contained by the auxiliary-sheet-package object attribute if an X is present in the column in the above table:

Auxiliary-sheet-package attribute	Contained Auxiliary-Sheet
start-sheet-of-set	**job-set-start-sheet**
separator-sheet-of-set	**job-set-separator-sheet**
end-sheet-of-set	**job-set-end-sheet**
start-sheet-of-copy	**job-copy-start-sheet**
separator-sheet-of-copy	**job-copy-separator-sheet**
end-sheet-of-copy	**job-copy-end-sheet**

Table 2 - Auxiliary-sheet-packages intended for use as values of the document-sheets **job attribute:**

Descriptive Name	Object Identifier	Descriptor text
none	id-val-generic-none	No auxiliary-sheets
doc-separators	id-val-aux-pkg-doc-separators	Auxiliary-sheet separates adjacent document-sets and adjacent document-copies
doc-set-start	id-val-aux-pkg-doc-set-start	Auxiliary-sheet starts each document-set
doc-set-end	id-val-aux-pkg-doc-set-end	Auxiliary-sheet ends each document-set
doc-set-wrap	id-val-aux-pkg-doc-set-wrap	Auxiliary-sheets start and end each document-set
doc-set-start-copies-separate	id-val-aux-pkg-doc-set-start-copies-separate	Auxiliary-sheets start each document-set and separate adjacent document-copies in a document-set
doc-set-end-copies-separate	id-val-aux-pkg-doc-set-end-copies-separate	Auxiliary-sheets end each document-set and separate adjacent document-copies in a document-set
doc-set-wrap-copies-separate	id-val-aux-pkg-doc-set-wrap-copies-separate	Auxiliary-sheets start and end each document-set and separate adjacent document-copies in a document-set
doc-copy-start	id-val-aux-pkg-doc-copy-start	Auxiliary-sheet starts each document-copy in a document-set
doc-copy-end	id-val-aux-pkg-doc-copy-end	Auxiliary-sheet ends each document-copy in a document-set
doc-copy-wrap	id-val-aux-pkg-doc-copy-wrap	Auxiliary-sheet starts and ends each document-copy in a document-set

The following table shows the attributes of the auxiliary-sheet-package object that shall specify an auxiliary-sheet for each auxiliary-sheet-package object:

auxiliary-sheet-package	Auxiliary-sheet-package attribute that specifies the auxiliary-sheet to be used					
	separator-sheet-of-set	**start-sheet-of-set**	**end-sheet-of-set**	**separator-sheet-of-copy**	**start-sheet-of-copy**	**end-sheet-of-copy**
none						
doc-separators	X			X		
doc-set-start		X				
doc-set-end			X			
doc-set-wrap		X	X			

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doc-set-start-copies-separate		X		X		
doc-set-end-copies-separate			X	X		
doc-set-wrap-copies-separate		X	X	X		
doc-copy-start					X	
doc-copy-end						X
doc-copy-wrap					X	X

NOTE – The first row of each table is **none**, and it has no sheets.

The following subtable shows the auxiliary-sheet contained by the auxiliary-sheet-package object attribute if an X is present in the column in the above table:

Auxiliary-sheet-package attribute	Contained Auxiliary-Sheet
start-sheet-of-set	**doc-set-start-sheet**
separator-sheet-of-set	**doc-set-separator-sheet**
end-sheet-of-set	**doc-set-end-sheet**
start-sheet-of-copy	**doc-copy-start-sheet**
separator-sheet-of-copy	**doc-copy-separator-sheet**
end-sheet-of-copy	**doc-copy-end-sheet**

9.11.2 Separator-sheet-of-set

This attribute identifies the auxiliary-sheet that shall be placed between adjacent job-result-sets in the same job or between adjacent document-sets in the same job-copy. The server shall not use the value of this attribute unless there is more than one job-result-set in a job or more than one document-set in a job-copy. If this attribute is omitted from the auxiliary-sheet-package object or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the separator-sheet-of-set position.

```
separator-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-separator-sheet-of-set
```

9.11.3 Start-sheet-of-set

This attribute identifies the auxiliary-sheet that shall be placed at the start of each job-result-set or document-set. If this attribute is omitted or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the start-sheet-of-set position.

```
start-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-start-sheet-of-set
```

9.11.4 End-sheet-of-set

This attribute identifies the auxiliary-sheet that shall be placed at the end of each job-result-set or document-set. If this attribute is omitted from the auxiliary-sheet-package object or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the end-sheet-of-set position.

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```
end-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-end-sheet-of-set
```

9.11.5 Separator-sheet-of-copy

This attribute identifies the auxiliary-sheet that shall be placed between adjacent job-copies in the same job-result-set or between adjacent document-copies in the same document-set. The server shall not use the value of this attribute unless there is more than one job-copy in a job-result-set or more than one document-copy in a document-set. If this attribute is omitted from the auxiliary-sheet-package object or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the separator-sheet-of-copy position.

```
separator-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-separator-sheet-of-copy
```

9.11.6 Start-sheet-of-copy

This attribute identifies the auxiliary-sheet that shall be placed at the start of each job-copy or document-copy. If this attribute is omitted from the auxiliary-sheet-package object or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the start-sheet-of-copy position.

```
start-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-start-sheet-of-copy
```

9.11.7 End-sheet-of-copy

This attribute identifies the auxiliary-sheet that shall be placed at the end of each job-copy or document-copy. If this attribute is omitted from the auxiliary-sheet-package object or the value is **id-val-generic-none**, then no auxiliary-sheet shall be placed at the end-sheet-of-copy position.

```
end-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-end-sheet-of-copy
```

9.12 Auxiliary-sheet object attributes

Auxiliary-sheet objects define the information to be printed on a start sheet, separator sheet or end sheet. It is expected that many implementation and installation specific auxiliary-sheets may be defined. To ensure basic interoperability of print-systems, ISO/IEC 10175 specifies standard identifiers for a few auxiliary- sheet types.

ISO/IEC 10175 does not specify any particular format or content for these standard instances. The characteristics of standard and non-standard auxiliary-sheets are expected to be implementation and site-specific.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class

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9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.4	state
9.1.6.5	message
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.12.1 Auxiliary-sheet-identifier

This attribute uniquely identifies the auxiliary-sheet.

```
auxiliary-sheet-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-identifier
```

Twelve standard auxiliary-sheets are defined below, six for use in auxiliary-sheet-packages intended for reference by the **job-sheets** job attribute and six for use in auxiliary-sheet-packages intended for reference by the **document-sheets** job attribute. When used in the standard auxiliary-sheet-packages, each standard auxiliary-sheet has a particular auxiliary-sheet-package attribute (of the six possible ones) that it can be associated with, and thus, when printed, each auxiliary-sheet has a standard position relative to a job component or document component (e.g. it always comes before the start of a document). See section 9.11 on auxiliary-sheet-packages for details.

A standard auxiliary-sheet's format and appearance, however, is defined by an implementation, and some implementations may allow the administrator to edit its format and appearance. If such a sheet is changed, then any auxiliary-sheet-package referencing the changed sheet has its appearance changed as well.

The following standard values are defined:

The standard auxiliary-sheets for use with the **job-sheets** job attribute are:

Descriptive Name	Object Identifier	Descriptor Text
job-set-separator-sheet	id-val-aux-sheet-job-set-separator-sheet	auxiliary-sheet to separate job-result-sets
job-set-start-sheet	id-val-aux-sheet-job-set-start-sheet	auxiliary-sheet to start a job-result-set
job-set-end-sheet	id-val-aux-sheet-job-set-end-sheet	auxiliary-sheet to end a job-result-set
job-copy-separator-sheet	id-val-aux-sheet-job-copy-separator-sheet	auxiliary-sheet to separate job-copies
job-copy-start-sheet	id-val-aux-sheet-job-copy-start-sheet	auxiliary-sheet to start a job-copy
job-copy-end-sheet	id-val-aux-sheet-job-copy-end-sheet	auxiliary-sheet to end a job-copy

The standard auxiliary sheets for use with the **document-sheets** job attribute are:

Descriptive Name	Object Identifier	Descriptor Text
doc-set-separator-sheet	id-val-aux-sheet-doc-set-separator-sheet	auxiliary-sheet to separate document-sets
doc-set-start-sheet	id-val-aux-sheet-doc-set-start-sheet	auxiliary-sheet to start a document-set
doc-set-end-sheet	id-val-aux-sheet-doc-set-end-sheet	auxiliary-sheet to end a document-set

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doc-copy-separator-sheet	id-val-aux-sheet-doc-copy-separator-sheet	auxiliary-sheet to separate document-copies
doc-copy-start-sheet	id-val-aux-sheet-doc-copy-start-sheet	auxiliary-sheet to start a document-copy
doc-copy-end-sheet	id-val-aux-sheet-doc-copy-end-sheet	auxiliary-sheet to end a document-copy

9.12.2 Auxiliary-sheet-medium

This attribute identifies the medium that the server shall use when this object is selected.

```
auxiliary-sheet-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-medium
```

Standard values are defined in 9.6.1.

9.13 Finishing object attributes

As introduced in 6.3.11, finishing encompasses the operations that may be applied to the media output of a document or of the entire print-job as a whole. Examples include stapling, saddle-stitching, hole-drilling, binding with tape, etc.

9.13.1 Finishing Model

The term *finishing* refers to the final document production processes applied to a document subsequent to its imaging and prior to its delivery. Finishing processes are normally applied to documents which are presented on one or more instances of rectangular sheet media such as paper. The following definitions refer to the instances of media on which the document has been presented as "sheets", and assume that all of the presentation surfaces used for document presentation are on rectangular sheet media. This International Standard defines the application of finishing processes to such documents only. The application of finishing processes to documents which have been presented on other media is system-dependent.

Finishing is applied by a collection of processes which are commonly provided by a traditional print shop bindery. Each of these processes is referred to as a finishing process. This International Standard defines a comprehensive and extensible set of finishing processes which may be applied to either the individual documents of a job, or to complete job-copies, or both.

A *finishing process* is typically applied by a machine. Examples of finishing processes include operations such as trimming a document, folding the sheets in a document, and applying binding to a document. In this International Standard, each finishing process and all of the parameters required to specify its application are collected into a sequence structure which is referred to as a *finishing process specification.*

Multiple finishing processes may be specified by incorporating multiple finishing process specifications in a single compound *finishing specification.* Finishing process specifications are serialized in the value of the finishing specification according to their intended sequence of application. This sequencing is significant. For example, the effect of first folding the sheets in a document and then trimming will yield a different result than trimming the sheets and then folding them.

A finishing process is applied to a document by one or more physical mechanisms. For example, a finishing process which applies a corner staple may use only one physical mechanism for stapling, whereas a finishing process which applies a three-hole punch may use three physical mechanisms.

Each finishing process is defined means of *finishing process parameters*; some of these are generic, and may appear in any of the finishing process specifications, while other parameters are unique to a particular type of finishing

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process. The generic finishing process parameters are summarized in the following table, and illustrated in Figure 9-5.

Name	Affects
reference-size	affects finishing processes based on document size
reference-edge	sheet alignment and location and orientation of process axis
jog-edge	sheet alignment
process-offset	distance of process axis from reference-edge
head-locations	location of heads on process axis

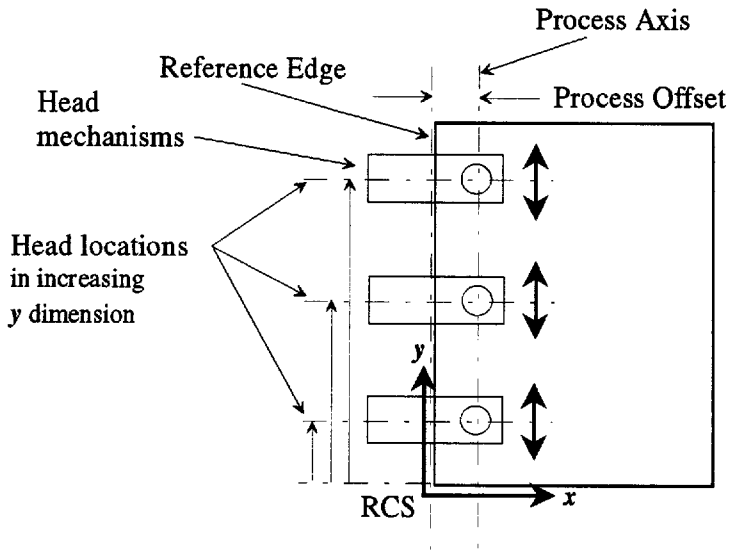

Figure 9-5 - Finishing Process Parameters

Each physical mechanism used in the application of a finishing process is referred to as a *head*. In some machines which apply a finishing process, head positioning is fixed, whereas with more capable machines, head positions can be moved subject only to certain machine-specific physical constraints. However, even in the case of more capable machines, heads can usually be positioned only in a line relative to each other. This physical constraint on head positioning means that heads cannot be positioned arbitrarily. The specification of the finishing processes in this International Standard constrains the ability to specify head positions in a manner which is consistent with most physical systems.

Heads are positioned along a *process axis*, which is an imaginary on-centre-line which transects each head. The exact location at which the line transects a given head is formally unspecified since it is specific to the finishing process. However, the position at which the process axis transects each of the heads associated with the finishing process is consistent across each of the head mechanisms.

The process axis is used as a reference for positioning heads associated with a finishing process. This makes explicit the constraint that for any single finishing process, head positioning must be along a single process axis.

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While head motion perpendicular to the process axis is constrained, linear motion along the process axis is not formally constrained. The only constraint on linear motion of heads along the process axis is subject to the physical capabilities of the machine.

The edge of the document relative to which the finishing process is applied is referred to as the *reference-edge*. Since bindery systems can typically reposition a document to any edge, it would not be sufficient to constrain the reference-edge to a static edge of the document. The reference-edge can be any edge of the document. Documents are therefore repositioned implicitly through changing the reference-edge associated with a given finishing process. This International Standard provides an explicit parameter of the Finishing Document Production Instruction, the *reference-edge* parameter, in order to enable this flexible positioning.

When a document consists of multiple sheets of different sizes, it is necessary to specify the relative locations of the sheets for finishing. This is accomplished by one convention and one additional parameter.

The convention is that for finishing processes all of the sheets are aligned so that the edges of the sheets which correspond to the reference-edge coincide. For example, if the reference-edge is the left edge, all of the sheets will be aligned so that the *y*-axis of the Reference Coordinate Systems (of the obverse side of the sheet if printing on two sides of the medium) coincides.

The additional parameter is the *jog-edge* parameter. The value of the jog-edge parameter is one of the two edges which is perpendicular to the reference-edge. When the jog-edge parameter is specified, all of the sheets are aligned so that the edges of the sheets which correspond to the value of the jog-edge parameter coincide.

9.13.2 Finishing objects

A finishing object is composed of, or contains references to, one or more finishing processes that together specify the characteristics of a logical or physical finishing method that may be applied to an output document or job by one or more printers.

A finishing object may be classified as either *single-process* or *compound.* A *single-process finishing object* consists of just one finishing process. A *compound finishing object* may consist of any number of finishing processes

Each defined finishing object installed in the server shall contain at least a **finishing-identifier** attribute containing the object identifier or simple-name by which the finishing object is referenced. The other finishing object attributes may be included as needed to properly describe and specify the effect that shall result when the finishing object is applied.

When a particular finishing object is referenced in a print-request, all of the processes contained in the defined finishing object shall be applied to the output document or job, in the sequence specified. That is, if a logical finishing object is defined which includes both stapling and punching, for example, then when that object is invoked, both processes shall be applied to the output, in the sequence specified in the finishing object definition.

9.13.3 Two-stage finishing

ISO/IEC 10175 permits finishing objects and/or sequences of explicit finishing processes to be applied in two stages, specified respectively by the **finishing** document attribute defined in 9.3 and by the **job-finishing** job attribute defined in 9.2. That is, in multi-document jobs, one or more finishing processes may be applied to each of the documents printed in a job, after which, one or more finishing processes may be applied to each *set* of documents that compose a job-copy.

Common examples of multi-stage finishing can be seen in the publishing industry. For instance, books are often constructed of several segments which have been printed and finished as separate units, then assembled and bound together to form the book.

The **finishing** attribute is a per-document attribute; that is, each **PrintArgument** may carry one distinct **finishing** attribute. Each **finishing** attribute applies only to the document specified for printing by that same **PrintArgument.** The usual practice is to specify the same sequence of finishing processes for each document of a job, but it is possible to specify completely different finishing process sequences for the different documents of a job. However, if multiple

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copies of a single document are to be printed, each copy shall receive the same sequence of finishing processes specified for that document.

The **job-finishing** attribute, in contrast, is a per-job attribute; that is, the first **PrintArgument** of the job may contain one **job-finishing** attribute, which applies to the entire job as a unit. The **job-finishing** attribute specifies the finishing processes that the server shall apply to the set of documents that compose one job-copy (i.e., all of the printable documents specified in the respective arguments of the **Print** abstract-operations that compose the print-job). The server shall apply all of the finishing processes specified in a **job-finishing** attribute, in the sequence specified, to each job-copy.

In addition to the server-installed finishing-object(s) referenced in the **job-finishing** and **finishing** attributes, the **job-finishing** and **finishing** attributes may also contain *explicit* finishing process specifications to enable the user/client to provide ad hoc user/client-defined sequences of finishing processes. These explicit finishing processes are specified using the **Finishing** choice type which is also the type that the server-installed finishing objects use to specify the sequence of finishing processes.

NOTES

1 The **job-finishing** and **finishing** attribute do not apply to job and document start and end sheets unless this is specified by **the finishing-includes-job-sheets** and **finishing-includes-document-sheets** attributes.

2 Logical finishing-objects specify an effect, not the method of achieving the effect; some or all of a specified set of finishing actions could be performed by a human rather than a machine, depending upon implementation and site-specific considerations.

9.13.4 Generic attributes

In addition to the attributes specifically defined for the finishing object class, certain of the generic attributes may also be associated with this class. For example, when requesting attribute values for an object of this class, the client may identify one or more of the generic attributes listed in the following table; in response, the server shall return values for any of the requested attributes if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.4	state
9.1.6.5	message
9.1.6.6	availability
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.13.5 Finishing-identifier

This attribute identifies the finishing-object that contains it. The attribute syntax permits the object to be identified by either an object identifier or a simple-name.

The simple-name form is provided as a convenience for implementors and system administrators when it is necessary to create temporary finishing methods to provide special effects, or to test a new finishing-method, pending issuance of the object identifier by the proper registration authority.

However, note that simple-names are *not* guaranteed to be unique, since they are not controlled by any registration authority or procedures. Finishing-objects that are to be standardized across a network should *always* be identified by means of the object identifier form, to avoid the problems that can arise from the possibility of duplication of simple-names in different systems or servers on the same network.

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```
finishing-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-finishing-identifier
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
staple	id-val-finishing-staple	This indicates that staples are to be used to bind the document. The exact number and placement of the staples is site-defined; other finishing object attributes may be included to provide this information.
staple-top-left	id-val-finishing-staple-top-left	This indicates that one or more staples should be placed on the top left corner of the document
staple-bottom-left	id-val-finishing-staple-bottom-left	This indicates that one or more staples should be placed on the bottom left corner of the document
staple-top-right	id-val-finishing-staple-top-right	This indicates that one or more staples should be placed on the top right corner of the document
staple-bottom-right	id-val-finishing-staple-bottom-right	This indicates that one or more staples should be placed on the bottom right corner of the document
saddle-stitch	id-val-finishing-saddle-stitch	This indicates that one or more staples (wire stitches) are to be used to bind the document along the middle fold. The exact number and placement of the stitches is site-defined.
edge-stitch	id-val-finishing-edge-stitch	This indicates that one or more staples (wire stitches) are to be used to bind the document along one edge. The exact number and placement of the staples is site-defined.
punch	id-val-finishing-punch	This indicates that holes are required in the finished document. The exact number and placement of the holes is site-defined The punch specification may be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting predrilled media.
cover	id-val-finishing-cover	This value is specified when it is desired to select a non-printed (or pre-printed) cover for the document. This does not supplant the specification of a printed cover (on cover stock medium) by the document itself.
bind	id-val-finishing-bind	This indicates that a binding is to be applied to the document; the type and placement of the binding is site-defined.
none	id-val-generic-none	Perform no finishing. See 9.1.2

9.13.6 Finishing-associated-finishings

This attribute identifies the physical/logical finishing-objects associated with this logical/physical finishing-object.

A logical finishing object with its **realization** attribute set to **logical** shall have its **finishing-associated-finishings** attribute set to the name(s) of the associated physical finishing(s) (**realization** set to either **physical** or **logical-and-physical**) that this logical finishing represents. A physical finishing object with its **realization** attribute set to **physical** shall have its **finishing-associated-finishings** attribute set to the name(s) of the associated logical finishing(s) (**realization** set to **logical**) that represent the physical finishing A combination logical and physical finishing object with its **realization** attribute set to **logical-and-physical** shall have its **finishing-associated-finishings** attribute set to the name of itself and the name(s) of the logical finishing(s) (**realization** set to **logical**) that represent it, if any.

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NOTE – With the above constraints, associated finishing references are limited to a depth of one. That is, a finishing cannot be associated with another finishing which is associated with a third finishing.

```
finishing-associated-finishings ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishing-associated-finishings
```

9.13.7 Finishing-realization

This attribute indicates whether this object represents a logical or physical finishing-object, or both.

```
finishing-realization ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-finishing-realization
```

9.13.8 Finishing type and finishing-specification attribute

This attribute defines the semantics of a finishing object. The semantics are specified either:

- explicitly, as a sequence of finishing process specifications, or
- by reference to a named-finishing object.

The former is for servers capable of representing the **Finishing** type which specifies each finishing process precisely; the latter provides a simpler representation of the object as a name or object identifier which the server may interpret appropriately; that is, in order to be invoked by a client, the named-finishing object must have been installed previously on the server by some means outside the scope of this part of ISO/IEC 10175.

Each finishing process may also be specified in one of two ways:

- explicitly, by providing parameter values appropriate to the particular finishing process, or
- by identifying a single-process finishing object of that process type.

The server shall carry out the sequence of finishing processes within each finishing object in the order specified by the object.

The syntax of the **Finishing** type is defined below, including all of its components and parameters, followed by the syntax definition of the **finishing-specification** attribute. Semantic definitions for the finishing parameters and processes follow in subsequent subclauses.

NOTES

1 The **Finishing** type has been adapted from ISO/IEC 10180 (SPDL) and provides the same functionality in the form of an attribute that an SPDL document can contain as a Finishing document production instruction.

2 Syntax definitions for the **finishing** document attribute and the **job-finishing** job attribute are in 9.3 and 9.2, respectively; all three of these attributes employ the **finishingSyntax** definition located in 9.2 with the **job-finishing** attribute.

```
Finishing ::= SEQUENCE {
    finishing-message         [0] Message OPTIONAL,
    finishing-spec          CHOICE {
        named-finishing         [1] NameOrOid,
        finishing-spec-list     [2] SEQUENCE OF FinishingProcSpec } }
```


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```
FinishingProcSpec ::= CHOICE {
    stitching-spec        [0] StitchingSpec,
    binding-spec          [1] BindingSpec,
    trimming-spec         [2] TrimmingSpec,
    die-cutting-spec      [3] DieCuttingSpec,
    punching-spec         [4] PunchingSpec,
    perforating-spec      [5] PerforatingSpec,
    slitting-spec         [6] SlittingSpec,
    insert-spec           [7] InsertSpec,
    cover-spec            [8] CoverSpec,
    folding-spec          [9] FoldingSpec,
    other-finishing-spec [10] OtherFinishingSpec }

StitchingSpec ::= CHOICE {
    named-stitching    [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        process-offset     [3] Dimension OPTIONAL,
        head-locations     [4] Locations OPTIONAL,
        stitch-type        [5] NameOrOid DEFAULT id-val-stitch-type-default } }

BindingSpec ::= CHOICE {
    named-binding      [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        binding-type       [3] NameOrOid DEFAULT id-val-binding-type-default,
        binding-colour     [4] NameOrOid
                               DEFAULT id-val-binding-colour-default } }

TrimmingSpec ::= CHOICE {
    named-trimming     [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        trim-offset        [3] Dimension,
        trim-dimensions    [4] XYDimensions } }

DieCuttingSpec ::= CHOICE {
    named-die-cutting  [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        die-cut-location   [5] XYDimensions,
        die-cut-name       [6] NameOrOid } }
```


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```
PunchingSpec ::= CHOICE {
    named-punching      [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        process-offset      [3] Dimension OPTIONAL,
        head-locations      [4] Locations,
        punch-diameter      [5] Dimension OPTIONAL } }

PerforatingSpec ::= CHOICE {
    named-perforating   [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations,
        perforation-type    [5] NameOrOid
                                DEFAULT id-val-perforation-type-default } }

SlittingSpec ::= CHOICE {
    named-slitting      [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations } }

InsertSpec ::= CHOICE {
    named-inserting     [0] NameOrOid,
    parameters          [1] SET {
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        insert-sheet-list   [5] SEQUENCE OF InsertSheet } }

InsertSheet ::= SET {
    insert-id               CHOICE {
        insert-name             [0] NameOrOid,
        insert-bin              [1] Cardinal },
    insert-size         [2] XYDimensions OPTIONAL,
    insert-edge         [3] Edge OPTIONAL,
    insert-top-surface  [4] ENUMERATED {
                            top (0),
                            bottom (1) } DEFAULT top,
    insert-after        [5] Cardinal,
    insert-message      [6] Message OPTIONAL }

CoverSpec ::= CHOICE {
    named-covers        [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        front-cover         [5] NameOrOid OPTIONAL,
        back-cover          [6] NameOrOid OPTIONAL } }
```


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```
FoldingSpec ::= CHOICE {
    named-folding       [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations } }

OtherFinishingSpec ::= SET {
    finishing-op-type    [0] NameOrOid,
    finishing-op-spec        CHOICE {
        named-finishing-op      [1] NameOrOid OPTIONAL,
        parameters              [2] SET {
            reference-size          [0] XYDimensions OPTIONAL,
            reference-edge          [1] Edge OPTIONAL,
            jog-edge                [2] Edge OPTIONAL,
            process-offset          [3] Dimension OPTIONAL,
            head-locations          [4] Locations OPTIONAL,
            other-parameters        [5] ANY } } }

finishing-specification ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-finishing-specification
```

9.13.8.1 Finishing-message

One **finishing-message** may be included in an instance of the **Finishing** type (regardless of whether the instance is included in a finishing object, or in a **finishing** document attribute or **job-finishing** job attribute). This International Standard does not stipulate the precise semantics or usage of the **finishing-message**; however, the expected usage is to enable the client, or creator of a finishing object to convey special instructions or other information to a system operator.

9.13.8.2 Named-finishing

The **Finishing** type permits a choice of either:

a) one **named-finishing** value, which identifies a particular finishing object, or

b) a sequence of finishing process specifications.

The **named-finishing** choice would normally appear only in a **finishing** document attribute or **job-finishing** job attribute, however its use in a **finishing-specification** attribute is not precluded by this International Standard. The main purpose of the **named-finishing** choice is to enable a client to invoke a complex sequence of finishing processes by specifying only a single identifer that references a predefined finishing object.

Before a client can invoke a particular finishing object, it must be defined and installed on the server to which the print-request is directed; the means of defining and installing finishing objects on servers is outside the scope of this part of ISO/IEC 10175.

9.13.8.3 Finishing process parameters

Each finishing process has associated with it several parameters. The values of these parameters may be specified by the finishing process component structure which specifies the finishing process, or inherited from previous finishing processes, or specified by default values specific to the finishing process.

9.13.8.3.1 Inherited finishing process parameters

There are three generic parameters whose values may be inherited from one finishing process to another. These are:

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- reference-size
- reference-edge
- jog-edge

The server shall determine the values of these parameters which apply to a particular finishing process as follows:

a) At the beginning of the **finishing-specification,** prior to evaluating the first finishing process specification in the **finishing-spec-list**, the server shall initialize those parameters which may be inherited to their default values.

b) The server shall evaluate each finishing process in the sequence specified in the **finishing-spec-list**. If a finishing process specifies a value for any of the inherited parameters, the server shall modify the set of inherited parameters accordingly. The set of parameters that apply to that particular finishing process is then the set of inherited parameters, as modified, plus any other parameter specifications in the finishing process specification.

c) At the end of each finishing process, the server shall retain the set of inherited parameters, as modified by that process, for input to the next finishing process in the sequence (if any). The server shall continue evaluating the **finishing-spec-list**, as defined in b), above, until all finishing processes have been evaluated.

9.13.8.3.2 Other generic finishing process parameters

Two other generic parameters are set independently for each finishing process. These process parameters are:

- process-offset
- head-locations

There are no default values for these parameters.

9.13.8.3.3 Reference-size

The value of the **reference-size** parameter specifies the nominal medium size in millimeters for all calculations in the associated finishing process. The meaning of a value of (x, y) is that the finishing process shall be as defined for a document consisting of sheets whose size is x mm by y mm, for which the Reference Coordinate System is associated with a sheet in such a way that:

- one of the edges of length x mm corresponds to the positive x-axis of the Reference Coordinate System;
- one of the edges of length y mm corresponds to the positive y-axis of the Reference Coordinate system.

The default value of the **reference-size** parameter shall be equal to the value of the **medium-dimensions** attribute of the first medium selected by the page select document attribute.

9.13.8.3.4 Reference edge

The **reference-edge** parameter specifies the edge of the document relative to which a finishing process is applied. The **reference-edge** parameter also specifies the alignment of the sheets on which the document is presented: all sheets shall be aligned so that the edges of the sheets which correspond to the reference-edge coincide. The resulting edge shall be referred to as the reference-edge of the document.

The default value of the **reference-edge** parameter shall be left-edge

9.13.8.3.5 Jog edge

The value of the **jog-edge** parameter specifies a second edge of the document along which instances of the media are aligned. The value of the **jog-edge** parameter shall be one of the two edges which are perpendicular to the reference-edge. The edge which is identified by the value of the **jog-edge** parameter is called the jog edge. All sheets shall be aligned so that the edges of the sheets which correspond to the jog edge coincide.

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The default value of the **jog-edge** parameter depends on the value of the **reference-edge** parameter:

- if the value of **reference-edge** is **left edge** or **right edge**, the default value of **jog-edge** shall be **bottom edge**;
- if the value of **reference-edge** is **top edge** or **bottom edge**, the default value of **jog-edge** shall be **left edge**.

9.13.8.3.6 Process offset

The **process-offset** parameter specifies the offset from the reference-edge to the process axis in millimeters. Changes to the **process-offset** parameter value shall cause all of the heads along the process axis to be repositioned uniformly.

The value of the **process-offset** parameter shall be a real number.

9.13.8.3.7 Head locations

The **head-locations** parameter specifies a set of locations at which one or more heads apply a finishing process. Heads are on-centre relative to the process axis, and are positioned linearly along the process axis as specified in the value of the **head-locations** finishing parameter.

The value of the **head-locations** parameter shall be a sequence of non-negative real numbers. If the **reference-edge** value is either **top edge** or **bottom edge**, then the sequence of values $x_1, \ldots, x_n$ shall represent offsets from the x-axis of the Reference Coordinate System. If the **reference-edge** value is either **left edge** or **right edge**, then the sequence of values $x_1, \ldots, x_n$ shall represent offsets from the y-axis of the Reference Coordinate System.

9.13.8.4 Finishing process specification

A finishing process is specified by means of the FinishingProcSpec type and one of the component types that may be choices of a FinishingProcSpec instance, as defined in a preceding subclause. Each finishing process may be specified as either:

- a named finishing process identified by a simple name or object identifier;
- a parameterized finishing process specified by the set of parameters that compose the particular finishing process type (e.g., the parameters of the StitchingSpec type).

A named finishing process is a simple finishing object; i.e., a finishing object composed of just one finishing process. A finishing object referenced in a named finishing process specification shall have been defined and installed on the server prior to its invocation, and shall be of the same type as the finishing process specification that references it.

A finishing process specification shall be one of:

- a stitching specification;
- a binding specification;
- a trimming specification;
- a die cutting specification;
- a punching specification;
- a perforating specification;
- a slitting specification;
- an insert specification;
- a cover specification;
- a folding specification;
- an other finishing process specification.

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9.13.8.5 Stitching specification

A stitching specification shall be either:

- a named stitching identifier;
- a stitching parameters set.

A stitching specification specifies a finishing process which applies one or more stitches to the document (or job copy). It is a general specification for invoking application of various types of stitches, including staples and brads as well as sewn stitches. Specially positioned types of stitching such as saddle stitching can also be specified. The type of stitching can be separated into two general types:

- discrete stitching, which consists of placing one or more discrete stitches, staples, or similar fastenings at one or more head locations along the Process axis;
- continuous stitching, which consists of placing a continuous line of stitching along the process axis.

If the stitching specification specifies a *process-offset* which specifies head positioning outside of the achievable range, the system shall use a default offset and a warning shall be generated.

9.13.8.5.1 Named stitching

The value of a named stitching element shall identify a stitching finishing object. The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-stitching-default	A site-defined default stitching operation is to be applied.
staple	id-val-stitching-staple	A site-defined staple operation is to be applied to the document
staple-top-left	id-val-stitching-staple-top-left	One or more staples will be applied to the top-left corner of the document
staple-bottom-left	id-val-stitching-staple-bottom-left	One or more staples will be applied to the bottom-left corner of the document
staple-top-right	id-val-stitching-staple-top-right	One or more staples will be applied to the top-right corner of the document
staple-bottom-right	id-val-stitching-staple-bottom-right	One or more staples will be applied to the bottom-right corner of the document
saddle-stitch	id-val-stitching-saddle-stitch	A row of stitches is to be applied along the middle-fold of the document.
edge-stitch	id-val-stitching-edge-stitch	A site-defined edge-stitching operation is to be applied to the document.
edge-stitch-right	id-val-stitching-edge-stitch-right	A row of stitches is to be applied to the right edge of the document.
edge-stitch-left	id-val-stitching-edge-stitch-left	A row of stitches is to be applied to the left edge of the document.
edge-stitch-top	id-val-stitching-edge-stitch-top	A row of stitches is to be applied to the top edge of the document.

9.13.8.5.2 Stitching parameters

A stitching parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;

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- zero or one process offset parameter;
- zero or one head locations parameter;
- zero or one stitch type parameter.

The parameters may occur in any order.

9.13.8.5.3 Stitching type

The value of a stitching type parameter shall identify a type of stitching or fastening. These values include stapling as well as stitching with thread. The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-stitching-type-default	A site-defined stitching process is specified.
staple	id-val-stitching-type-staple	A staple process type is specified.
edge-stitch	id-val-stitching-type-edge-stitch	An edge-stitching process type is specified.
saddle-stitch	id-val-stitching-type-saddle-stitch	A site-defined default saddle stitching process type is specified.

9.13.8.6 binding specification

The binding operation specifies a finishing process which binds the document along the reference-edge. The binding material is specified by the combination of the binding type and binding colour finishing properties.

A binding specification shall be either

- a named binding identifier;
- a binding parameter set.

9.13.8.6.1 named binding

The value of a named binding structure element shall identify a binding operation. One standard value is defined for use in the binding process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-binding-default	A site-defined binding process is to be applied.

9.13.8.6.2 binding parameters

A binding parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- zero or one binding type parameter;
- zero or one binding colour parameter.

The parameters may occur in any order.

9.13.8.6.3 binding type

The value of a binding type parameter shall identify a type of binding to be applied to the document. The following standard values are defined as binding types for use in the binding process step:

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Descriptive Name	Object Identifier	Descriptor Text
default	id-val-binding-type-default	A site-defined binding process step.
tape	id-val-binding-type-tape	A tape binding
plastic	id-val-binding-type-plastic	A plastic binding
velo	id-val-binding-type-velo	A velo binding
perfect	id-val-binding-type-perfect	A perfect binding
spiral	id-val-binding-type-spiral	A spiral binding.

9.13.8.6.4 binding colour

The value of a binding colour parameter shall identify the colour of the binding to be applied. The following standard values are defined for binding colour for use in the binding process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-binding-colour-default	A site-defined default binding colour.
black	id-val-binding-colour-black	A black binding.
blue	id-val-binding-colour-blue	A blue binding.
gray	id-val-binding-colour-gray	A gray binding.
brown	id-val-binding-colour-brown	A brown binding.

9.13.8.7 Trimming specification

A trimming specification specifies a finishing process which cuts all the edges of the set of sheets being finished except the edge specified by the value of **reference-edge**. The effect of trimming shall always be to trim along three edges regardless of whether the physical process is applied by a trimmer with three blades.

The finishing process specified by a trimming specification for which the value of **trim-dimensions** is (x, y) and the value of **reference-edge-offset** is z shall be to trim the document such that the size of the document after trimming shall be x mm by y mm. The trimming operation is be applied with an offset of z mm from the reference-edge as shown in Figure 9-6

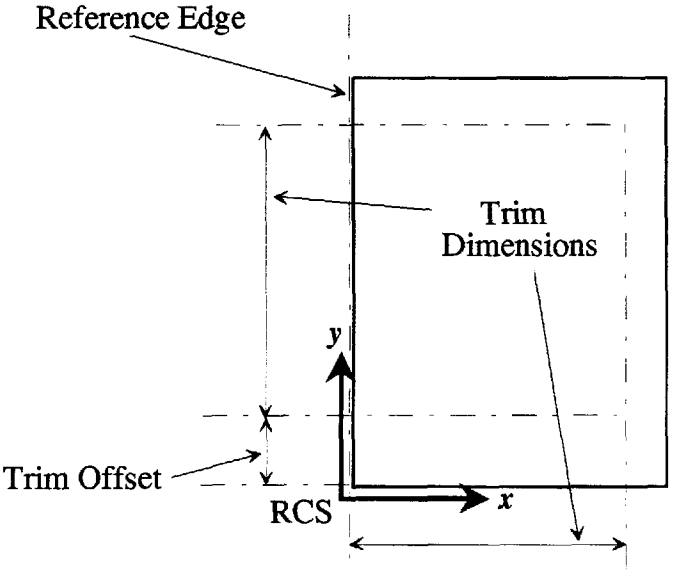

Figure 9-6 - Trimming Finishing Process

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The trimming finishing process changes the value of the **reference-size** parameter to the value of **trim-dimensions**. Subsequent finishing processes which are dependent on the value of the **reference-size** parameter may be affected. The Reference Coordinate System shall be associated with the trimmed document in such a way that:

- one of the edges of the length x mm corresponds to the positive x-axis of the Reference Coordinate System;
- one of the edges of the length y mm corresponds to the positive y-axis of the Reference Coordinate System.

A trimming specification shall be either:

- a named trimming identifier;
- a trimming parameter set.

9.13.8.7.1 Named trimming

The value of a named trimming identifier shall identify a method of trimming the document. One standard value is defined for use in the trimming process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-trimming-default	A site-defined trimming process is to be applied.

9.13.8.7.2 Trimming parameters

A trimming parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- one trim offset parameter;
- one trim dimensions parameter.

The parameters may occur in any order.

The **trim-offset** parameter default value shall be zero.

The default value for **trim-dimensions** shall be the value of the **reference-size** parameter specified in the trimming specification; if **reference-size** is not specified by the trimming specification, the default value for **trim-dimensions** shall be the **reference-size** value inherited from a preceding finishing process specification.

9.13.8.8 Die cutting specification

A die cutting specification specifies a process which applies a die cut constrained to a predetermined and possibly arbitrary shape. A die cut position value of (x, y) specifies that the die used for die cutting is positioned at a location (x, y) in the Reference Coordinate System. The offset for the die cut relative to its actual shape is a property of the die cut itself. The die cutting finishing process specified such a die cutting specification is shown in Figure 9-7.

A die cutting specification shall be either:

- a named die cutting identifier;
- a die cutting parameter set.

9.13.8.8.1 Named die cutting

The value of a named die cutting parameter shall identify a die cutting operation. There are no standard values for named die cutting defined by this International Standard.

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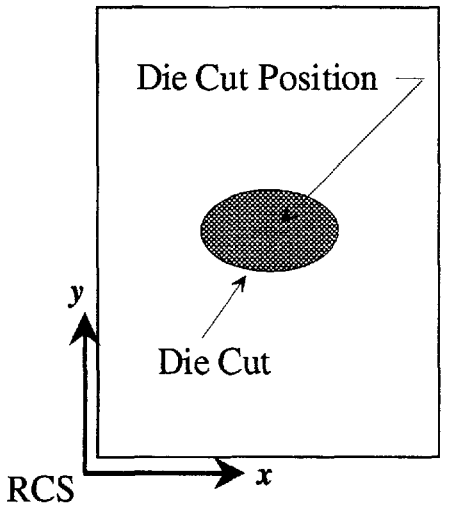

Figure 9-7 - Die Cutting Finishing Process

9.13.8.8.2 Die cutting parameters

A die cutting parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- one die cut position parameter;
- one die cut name parameter.

The parameters may occur in any order.

9.13.8.8.3 Die cut position

A die cut position parameter shall be an XYDimensions type. There is no default value for die cut position.

9.13.8.8.4 Die cut name

The value of die cut name specifies the identifier of a die cut to be applied by the die cutting finishing process. There is no default value for die cut name.

9.13.8.9 Punching specification

The finishing process which is specified by a punching specification for which the value specified by process offset is y and the value specified by head locations is $x_1, \ldots, x_n$, and the value specified by punch diameter is d, shall punch or drill n holes of diameter d mm in the document along a process axis which is offset y mm from the reference-edge, at locations $x_1, \ldots, x_n$ mm from the x-axis or y-axis of the Reference Coordinate System.

If the heads which apply the punching operation are positionable within only a limited range along the process axis, the system shall use default locations and a warning shall be generated if a client specifies values outside that range.

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If the punching specification specifies a **process-offset** which specifies head positioning outside of the achievable range, the system shall use a default offset and a warning shall be generated if a client specifies values outside that range.

A punching specification shall be either:

- a named punching identifier;
- a punching parameter set.

9.13.8.9.1 Named punching

The value of a named punching identifier shall identify a punching operation. One standard value is defined for use in the punching process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-punching-default	A site-defined punching process is to be applied.

9.13.8.9.2 Punching parameters

A punching parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- zero or one process offset parameter;
- zero or one head locations parameter;
- zero or one punch diameter parameter.

The parameters may occur in any order.

The default behavior shall be to position the punched holes parallel to and near the reference-edge.

9.13.8.9.3 Punch diameter

The default value for punch diameter shall be system-dependent.

9.13.8.10 Perforating specification

A perforating specification specifies a finishing process which applies one or more runs of perforations perpendicular to the reference-edge. The number of perforations along a run is system-dependent. The length of the run of perforations is the length of the edge perpendicular to the reference-edge. The heads which apply perforations are positioned along the reference-edge using the head locations value.

The finishing process which is specified by a perforating specification for which the value specified by head locations is $x_1, \ldots, x_n$, shall apply n runs of perforations in the document perpendicular to the process axis at locations $x_1, \ldots, x_n$ mm from the x-axis or y-axis of the Reference Coordinate System.

If the heads which apply the perforating operation are positionable within only a limited range, the system shall use default locations and a warning shall be generated if the client specifies locations outside the limited range.

A perforating specification shall be either:

- a named perforation identifier;
- a perforation parameter set.

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9.13.8.10.1 Named perforation

The value of a named perforation identifier shall identify a perforation operation. One standard value is defined for use in the perforation process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-perforation-default	A site-defined perforation process is to be applied.

9.13.8.10.2 Perforation parameters

A perforation parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- one process offset parameter;
- one head locations parameter;
- one perforation type parameter.

The parameters may occur in any order.

9.13.8.10.3 Perforation type

The value of a perforation type parameter element shall identify a type of perforating. One standard value is defined:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-perforation-type-default	A site-defined perforation type is to be applied.

9.13.8.11 Slitting specification

A slitting specification specifies a finishing process which cuts the set of sheets being finished perpendicular to the reference-edge in one or more places. The length of a slit is the length of the edge perpendicular to the reference-edge. The heads which apply slitting are positioned along the reference-edge using the **head-locations** values.

The finishing process which is specified by a slitting specification for which the value specified by head locations is $x_1, \ldots, x_n$, shall cut n slits in the document perpendicular to the process axis at locations $x_1, \ldots, x_n$ mm from the x-axis or y-axis of the Reference Coordinate System.

If the heads which apply the slitting operation are positionable within only a limited range, the system shall use default locations and a warning shall be generated if the client specifies locations outside the limited range.

A slitting specification shall be either:

- a named slitting identifier;
- a slitting parameter set.

9.13.8.11.1 Named slitting

The value of a named slitting identifier shall identify a slitting operation. One standard value is defined for use in the slitting process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-slitting-default	A site-defined slitting process is to be applied.

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9.13.8.11.2 Slitting parameters

A slitting parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- one head locations parameter.

The parameters may occur in any order.

9.13.8.12 Insert specification

An insert specification specifies a finishing process which inserts sheets into a collated set of imaged pages. All insert sheets must have a "normal orientation", and identifiable top, bottom, left and right edges and top and bottom surfaces. Each insert sheet is introduced into a collated set of printed sheets created by the marking device after the marking phase has completed for the physical sheet preceding the preprinted insert (some inserting mechanisms may insert sheets after all pages in the job have been marked).

A sheet insertion process uses an inserting mechanism which is generally provided with the capability to insert sheets from one or more of several input bins. Insert sheets are not identified through the **page-media-select** attribute, and are not expected to be input to the finishing process from input bins designed for the marking engine proper.

An insert specification shall be either:

- a named inserting identifier;
- an inserting parameter set.

9.13.8.12.1 Named inserting

The value of a named inserting structure element shall identify an inserting operation. There are no standard values for named inserting defined by this International Standard.

9.13.8.12.2 Inserting parameters

An inserting parameter set shall have the following components:

- zero or one reference edge parameter;
- zero or one jog edge parameter;
- one insert sheet list parameter.

The parameters may occur in any order.

9.13.8.12.3 Insert sheet list

The insert sheet list parameter shall be a sequence of one or more insert sheet parameters.

Each insert sheet parameter specifies a set of properties which identify a sheet to be inserted in the document by an inserting Finishing Process.

9.13.8.12.4 Insert sheet

An insert sheet parameter shall have the following components:

- one insert identifier parameter;
- zero or one insert top surface parameter;
- one insert after parameter;
- zero or one insert message parameter.

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These structure elements may occur in any order.

9.13.8.12.5 Insert identifier

An insert identifier element shall be one of:

- an insert name identifier;
- an insert bin value.

9.13.8.12.6 Insert name

The value of an insert name element shall identify an insert sheet to be inserted into the document. There are no standard values for insert name defined by this International Standard.

9.13.8.12.7 Insert bin

An insert bin value shall identify a bin from which the insert sheet can be obtained by the inserting finishing process. The mapping from Cardinal values (bin numbers) to physical bins is system-dependent.

Insert bin should be used only locally and in conjunction with an insert message or **job-message-to-operator** attribute which specifies to the operator the insert sheet which is to be loaded into the specified insert bin.

9.13.8.12.8 Insert top surface

An insert top surface element shall identify the insert sheet surface which shall face in the same direction as the normal reading order of the other sheets in the associated document. The names of the values of this type and the insert top surface identified shall be:

Value	Meaning
top	The normal top surface of the insert sheet;
bottom	The normal bottom surface of the insert sheet.

The default value of insert top surface shall be **top**.

9.13.8.12.9 Insert after

The value of an insert after element shall identify the ordinal number of the page of the document after which the insert sheet should be inserted. If multiple page images are placed on a single instance of the medium, the insert sheet shall be inserted after the instance of the medium on which the designated page image has been printed.

9.13.8.12.10 Insert message

An insert message specifies a message which may describe the insert sheet, the suggested fallback action, or provide other information. It is intended that this message be delivered to an operator prior to and as close as possible to the finishing of the document. The insert message may effect printing management, but any such effect shall be system-dependent. The insert message may also be ignored.

9.13.8.13 Covers specification

A covers specification specifies a finishing process that adds a front cover, a back cover, or both to the document.

A covers specification shall be either;

- a named covers identifier;
- a covers parameter set.

9.13.8.13.1 Named covers

The value of a named covers parameter shall identify a set of covers to be applied to a document. One standard value is defined for use in the covers process step:

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Descriptive Name	Object Identifier	Descriptor Text
default	id-val-covers-default	A site-defined set of covers are to be applied.

9.13.8.13.2 Covers parameters

A covers parameter set shall have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- zero or one front cover parameter;
- zero or one back cover parameter.

The parameters may occur in any order.

9.13.8.13.3 Front cover

A front cover parameter value shall identify a cover to be added to the front of a document. One standard value is defined for use in the front cover parameter:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-cover-name-default	A site-defined cover is to be applied.

9.13.8.13.4 Back cover

A back cover parameter value shall identify a cover to be added to the back of a document. See *front cover*, above for standard cover name values.

9.13.8.14 Folding specification

A folding specification specifies a finishing process which applies one or more folds to the document. The folds are oriented perpendicular to the reference-edge. The heads which apply folding are positioned along the reference-edge using the head locations value.

The folding finishing process changes the value of the **reference-size** parameter. Subsequent operations which are dependent on the value of the **reference-size** parameter may be affected.

If the folding specification specifies a **process-offset** which specifies head positioning outside of the achievable range, the system shall use a default offset and a warning shall be generated.

A folding specification shall be either:

- a named folding identifier;
- a folding parameter set.

9.13.8.14.1 Named folding

The value of a named folding structure element shall identify a folding operation. One standard value is defined for use in the folding process step:

Descriptive Name	Object Identifier	Descriptor Text
default	id-val-folding-default	A site-defined folding process is to be applied.

9.13.8.14.2 Folding parameters

A folding parameter set shall have the following components:

- zero or one reference size structure element;

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- zero or one reference edge structure element;
- zero or one jog edge structure element;
- zero or one head location set.

The parameters may occur in any order.

9.13.8.15 Other finishing specification

The Finishing type syntax allows the inclusion of additional finishing specifications by means of **other-finishing-spec** parameters. Each **other-finishing-spec** consists of a finishing process name and a set of parameters which specify the finishing process. The set of parameters that may or shall be specified depends on the finishing process being specified. The **other-finishing-spec** syntax allows for the specification of finishing process parameters either by a **named-finishing-op** element or by a parameter list similar to those used for the finishing specifications defined by this International Standard.

An other finishing specification shall have the following components:

- one **finishing-op-type** identifier;
- zero or one finishing op details parameter set.

9.13.8.15.1 Finishing op type

The value of a finishing op type element shall identify an finishing specification extension, i.e., a finishing process not defined by this International Standard. The purpose of this parameter is to identify a certain *kind* of finishing process, but not a specific named instance of that kind. For example, stitching and binding are different kinds of finishing processes that are already defined in this clause; a **finishing-op-type** value would identify a kind of finishing process *not* defined in this International Standard.

There are no standard values for **finishing-op-type** elements defined by this International Standard.

9.13.8.15.2 Finishing op specification

A finishing op specification shall be either:

- a **named-finishing-op** identifier;
- a specified finishing op parameters set.

9.13.8.15.3 Named finishing op

A **named-finishing-op** parameter shall identify a particular instance of an **OtherFinishingSpec** type. Before the named finishing operation can be invoked on a server, it shall have been defined and/or installed on the server by some means outside the scope of this part of ISO/IEC 10175.

9.13.8.15.4 Specified finishing op parameters

A specified finishing op parameter set have the following components:

- zero or one reference size parameter;
- zero or one reference edge parameter;
- zero or one jog edge parameter;
- zero or one process offset parameter;
- zero or one head locations parameter;
- zero or one additional parameter.

The parameters may occur in any order.

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9.13.8.15.5 Additional parameters

An additional parameter set may include additional parameter types, depending on the value of the finishing op type of the other finishing specification.

9.13.8.15.6 Other finishing specification process definition

The definition of the syntax of the finishing process specified by an other finishing specification shall be the responsibility of the owner of the identifier which is the value of the **finishing-op-type**. Likewise, details of the finishing process itself are the responsibility of the owner of that identifier, and are outside the scope of this International Standard.

9.14 Output-method object attributes

This object class is to be used to define standard output specification methods, such as collate, burst. See 9.14.1.

In addition to the attribute specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.4	state
9.1.6.5	message
9.1.6.10	associated-server

9.14.1 Output-identifier

This attribute uniquely identifies the output-method.

```
output-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-output-identifier
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
Page-Collate	id-val-output-page-collate	This value specifies that the pages of a document are to be in sequence, when multiple copies of the document are specified by the **copy-count** attribute (possibly up to some implementation-defined maximum number of copies). Whether this effect is achieved by placing copies of the document in multiple output bins or in the same output bin with implementation-defined document separation is implementation-dependent. Also whether it is achieved by making multiple passes over the document or by using an output sorter is implementation-dependent

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No Page-Collate	id-val-output-no page-collate	This value specifies that the copies of the pages of a document are to follow one another when multiple copies are specified by the **copy-count** attribute. That is, if 3 copies are specified, three copies of page 1 are printed then three copies of page 2, etc., and no collating of these pages is desired. This may be useful in some implementations where multiple copies requires re-interpretation of the document format and the document contains some compute intensive pages (such as images)
Decollate	id-val-output-decollate	The parts of a multi-part form are to be separated and sorted into stacks for each part
No Decollate	id-val-output-no decollate	The parts of a multi-part form are to remain intact
Burst	id-val-output-burst	Continuous media is to be separated into individual sheets, generally by bursting along perforations
No Burst	id-val-output-no burst	Continuous media is to remain continuous, no bursting is desired
Stacking-Default	id-val-output-stacking-default	A site-defined output-stacking operation is to be applied

9.15 Imposition object attributes

As introduced in 6.3.13, imposition affects the placement, orientation and scaling of page images on the selected media of a document. The primary purposes of the convenience impositions are to enable users to request that the document be formatted and printed according to certain pre-defined models such as a simple pamphlet, for example.

Commonly used imposition functions may be defined by a systems-administrator, and installed in a server as *imposition-objects*. An imposition-object instance consists of a named collection of attributes of the imposition object-class that specifies its effect.

The **number-up** document attribute identifies, at most, a single number-up operation which shall be applied once per impression (or result-surface) if the attribute is present and not 0. Otherwise, no number-up operation is applied.

Standard convenience imposition functions may be associated with imposition objects. These imposition functions can then be requested in a print-request by supplying their identifiers via the **number-up** document attribute.

Each defined imposition object shall include at least an imposition-identifier attribute containing the object identifier or simple-name by which it is referenced. Other imposition object attributes may be included as needed to properly describe and specify the effect that shall result when the imposition object is applied.

In addition to the attributes specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.5	message
9.1.6.10	associated-server

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9.15.1 Imposition-identifier

This attribute identifies the imposition-object that contains it. The attribute syntax permits the object to be identified by either an object identifier (**global-form**) or a simple-name (**local-form**).

The simple-name form is provided as a convenience for implementors and system administrators when it is necessary to create temporary imposition functions to provide special effects, or to test a new imposition function, pending issuance of the object identifier by the proper registration authority.

However, note that simple-names are *not* guaranteed to be unique, since they are not controlled by any registration authority or procedures. Imposition-objects that are to be standardized across a network should *always* be identified by means of the object identifier form, to avoid the problems that can arise from the possibility of duplication of simple-names in different systems on the same network.

```
imposition-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-imposition-identifier
```

Standard values for this attribute are defined in the specification for the **number-up** document attribute.

9.15.2 Imposition-n-up

This attribute specifies the number of source page-images that are to be imposed upon a single instance of the selected medium by the object instance (containing this imposition-n-up attribute).

```
imposition-n-up ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-imposition-n-up
```

NOTE – This attribute may be absent. A server may know implicitly how to perform a number-up operation and not expose information about the number-up operation. If this attribute is present, it might be for informational purposes, or a server might use it to guide the number-up operation.

9.15.3 Logical-page-origin

The four logical-page attributes defined in this and the following subclauses, if present, specify a group of transformations that shall be applied jointly to consecutive sequences of page-images in order to achieve the imposition effect specified by this object.

If the logical-page attributes are absent, the server knows implicitly how to perform the number-up operation.

The following terms are used in describing the logical-page attributes:

page-image: the electronic description of the image content of a page, including specified margins;

source-document: the document to be printed, in the form originally received by the print-server;

source-page: one page-image from the source-document;

source-medium: the medium specified in the source document;

destination-medium: the medium on which the document is finally printed, whether selected by means of instructions in the source-document, the print-argument, or some other means;

logical-page: a page-image that has been derived from a source-page by application of logical-page attributes;

result-surface: the aggregate result of one application of a specified set of logical-page attributes, i.e., the collection of logical-pages that are to be rendered on one side of an instance of the destination medium;

logical-page-coordinate-system (LPCS): a coordinate-system derived from the Reference Coordinate System (RCS) by rotating and translating the (RCS) relative to the source medium such that the origin is at one

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corner of the medium, and the coordinate axes are aligned with two edges of the medium; one LPCS shall exist for each logical page.

```
logical-page-origin  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-origin
```

An instance of this attribute contains a sequence of values, one for each logical page to be placed on a single result-surface; e.g., for a 4-up imposition, this attribute would contain four values.

Each value indicates: (1) which corner of the source-medium is aligned with the LPCS origin for one logical page, and (2) the orientation of the logical page.

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
lower-left	id-val-logical-page-origin-lower-left	(Default) Server places the logical-page-origin at the lower-left corner of the source-medium, i.e., coincident with the RCS origin; no rotation of the source-page shall take place
lower-right	id-val-logical-page-origin-lower-right	Server places the logical-page-origin at the lower-right corner of the source-medium, i.e., the LPCS y-axis shall coincide with the RCS x-axis, and the LPCS x-axis shall coincide with the medium edge opposite to the RCS y-axis; the source-page shall be rotated +90 degrees, i.e., anti clockwise;
upper-right	id-val-logical-page-origin-upper-right	Server places the logical-page-origin at the upper-right corner of the source-medium, i.e., the LPCS y-axis shall coincide with the medium edge opposite to the RCS y-axis, and the LPCS x-axis shall coincide with the medium edge opposite to the RCS x-axis; the source-page shall be rotated +180 degrees;
upper-left	id-val-logical-page-origin-upper-left	Server places the logical-page-origin at the upper-left corner of the source-medium, i.e., the LPCS y-axis shall coincide with the medium edge opposite to the RCS x-axis, and the LPCS x-axis shall coincide with the RCS y-axis; the source-page shall be rotated +270 degrees;

Figure 9-8 illustrates the relationship between RCS and LPCS.

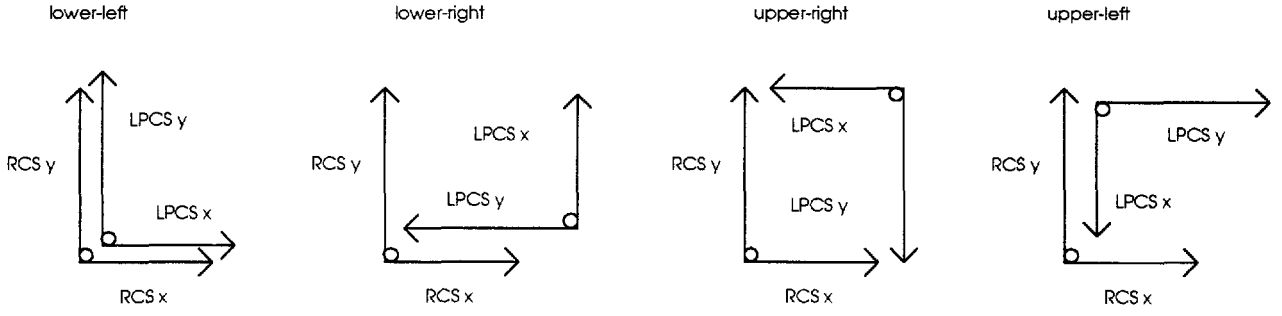

Figure 9-8 - The relationship between the Reference Coordinate System (RCS) and the Logical Page Coordinate System (LPCS)

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Refer also to subsequent subclauses for details of the interaction between this attribute and the other logical-page attributes.

9.15.4 Logical-page-x-offset

An instance of this attribute contains a sequence of offset values, one for each logical page to be placed on a single result-surface. That is, the logical-page-x-offset instance and the corresponding logical-page-origin instance (in the same print-argument) shall contain exactly the same number of values; the sequence of values shall also be the same with respect to the logical-pages to which they refer.

Each value carried in this attribute specifies the distance that one of the logical pages is to be shifted parallel to the x-axis of its respective LPCS. The values shall be non-negative; i.e., the direction of shift is to the right relative to the corresponding logical-page-origin. The values are specified in millimetres.

```
logical-page-x-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-x-offset
```

9.15.5 Logical-page-y-offset

An instance of this attribute contains a sequence of offset values, one for each logical page to be placed on a single result-surface. That is, the logical-page-y-offset instance and the corresponding logical-page-origin instance (in the same print-argument) shall contain exactly the same number of values; the sequence of values shall also be the same with respect to the logical-pages to which they refer.

Each value carried in this attribute specifies the distance that one of the logical pages is to be shifted parallel to the y-axis of its respective LPCS. The values shall be non-negative; i.e., the direction of shift is upward relative to the corresponding logical-page-origin. The values are specified in millimetres.

Available output bins can be associated with these standard values by the server. This mapping is, however, site-specific and outside the scope of ISO/IEC 10175.

```
logical-page-y-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-y-offset
```

9.15.6 Logical-page-scaling

This attribute specifies the scale factors to be applied to transform the respective source-pages to their corresponding logical-page sizes.

An instance of this attribute contains a sequence of values, one for each logical page to be placed on a single result-surface. That is, the logical-page-scaling instance and the corresponding logical-page-origin instance (in the same print-argument) shall contain exactly the same number of values; the sequence of values shall also be the same with respect to the logical-pages to which they refer.

Each value carried in this attribute specifies the amount that one of the source-pages is to be reduced in size (or enlarged) to transform it into the corresponding logical-page size. The values express the ratio of logical-page size to source-page size, and shall be non-negative.

```
logical-page-scaling ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-scaling
```


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9.16 Scheduler object attributes

These attributes provide information about a particular scheduling algorithm.

In addition to the attribute specifically defined for this object class, certain of the generic attributes may also be associated with this class. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.5	message
9.1.6.10	associated-server

9.16.1 Scheduler-identifier

This attribute uniquely identifies the scheduling-algorithm.

```
scheduler-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-scheduler-identifier
```

The following standard values are defined:

Descriptive Name	Object Identifier	Descriptor Text
fifo	id-val-scheduler-fifo	Schedule first in jobs first.
shortest-job-first	id-val-scheduler-shortest-job-first	Schedule the shortest job first.

9.17 Initial-value-job object attributes

The initial-value-job class shall contain those job attributes that may be defaulted by a server. All attributes listed in section 9.2.1 (except **job-identifier** and **initial-value-job**), 9.2.2, 9.2.3, 9.2.4, and 9.2.5 (except **printer-name-requested**), 9.2.7, and 9.2.9 are valid attributes of the initial-value-job class. Attributes listed in section 9.2.6 (Access and Accounting) and 9.2.8 (Job-status) are not valid attributes for an initial-value-job object.

In addition to the attributes specifically defined for this object, certain of the generic attributes may also be associated with this object. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented. In addition, certain printer and server attributes may also be initial-value-job object attributes.

The applicable generic, printer, and server attributes are:

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Clause	Attribute name	Class
9.1.6.1	object-class	generic
9.1.6.2	descriptor	generic
9.1.6.3	descriptive-name	generic
9.1.6.5	message	generic
9.1.6.6	availability	generic
9.1.6.7	list-of-managers	generic
9.1.6.10	associated-server	generic
9.5.9	logical-printers-ready	server
9.5.7	physical-printers-ready	server

The generic attributes listed above apply to the initial-value-job object itself and servers shall not use them as default values for a job object. On the other hand, servers shall use the following generic attributes for default values of job object attributes:

Clause	Attribute name	Class
9.1.6.7	notification-profile	generic
9.1.6.8	logging-profile	generic

The initial-value-job class is a peer to all classes except the job and document classes. That is, behavior concerning the creation and modification of initial-value-job objects is beyond the scope of this International Standard. No abstract-operations defined in ISO/IEC 10175 part 1 except **ListObjectAttributes** may be directed at this object class. Initial-value-job objects have no state.

In place of the **job-identifier** attribute of the job class, the **initial-value-job** class shall have the attribute **initial-value-job-identifier**.

The **initial-value-job** class shall have the **logical-printers-ready** and **physical-printers-ready** attributes with the same definition as that described in the specification for the **logical-printers-ready** and **physical-printers-ready** server attributes. These attributes indicate with which printer objects the initial-value-job object can be used.

9.17.1 Initial-value-job-identifier

This attribute uniquely identifies the initial-value-job object.

```
initial-value-job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-job-identifier
```

9.18 Initial-value-document object attributes

The initial-value-document class shall contain those document attributes that may be defaulted by a server. All attributes listed in 9.3.1, 9.3.2 (except **initial-value-document**), 9.3.3 (except **document-content** and **transfer-method**), and 9.3.4 are valid attributes of the initial-value-document class. Attributes listed in section 9.3.5 (document-status) are not valid attributes for an initial-value-job object.

In addition to the attributes specifically defined for this object, certain of the generic attributes may also be associated with this object. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic, printer and server attributes are:

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Clause	Attribute name	Class
9.1.6.1	object-class	generic
9.1.6.2	descriptor	generic
9.1.6.3	descriptive-name	generic
9.1.6.5	message	generic
9.1.6.6	availability	generic
9.1.6.7	list-of-managers	generic
9.1.6.10	associated-server	generic
9.5.9	logical-printers-ready	server
9.5.7	physical-printers-ready	server

The generic attributes listed here apply to the initial-value-document object itself and are not defaults for a document object.

The **initial-value-document** class is a peer to all classes except the **job** and **document** classes. That is, behavior concerning the creation and modification of **initial-value-document** objects is beyond the scope of this International Standard. No abstract- operations defined in ISO/IEC 10175 part 1 except **ListObjectAttributes** may be directed at this object class. **Initial-value-document** objects have no state.

In place of the **document-sequence-number** attribute of the document class, the initial-value-document class shall have the attribute **initial-value-document-identifier**.

The **initial-value-document** class shall have the **logical-printers-ready** and **physical-printers-ready** attributes with the same definition as that described in the specification for the **logical-printers-ready** and **physical-printers-ready** attributes server attributes. These attributes indicate with which printer objects that the initial-value-document object can be used with.

9.18.1 Initial-value-document-identifier

This attribute uniquely identifies the initial-value-document object.

```
initial-value-document-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-document-identifier
```

9.19 Resource-context object attributes

Resource-context objects contain information specific to a server's environment to enable the server to locate resources without requiring the client to specify such information. Resource-context objects relieve the client from the specifics of a server implementation regarding location of resources; a client need only reference them by a server-independent name.

The server combines the contents of the context-address attribute of the resource-context object with a resource name in a server-dependent manner to locate a specific print resource. For example, if the resource name is a file name and the context-address is a path name, the server would append the file name onto the path name to obtain the fully-qualified file name of the resource.

In addition to the attributes specifically defined for this object, certain of the generic attributes may also be associated with this object. For example, when requesting a list of attribute values for an object of this class, the client may identify one or more of the generic attributes in the following table, for which the server shall return values if the attributes are implemented.

The applicable generic attributes are:

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Clause	Attribute name
9.1.6.1	object-class
9.1.6.2	descriptor
9.1.6.3	descriptive-name
9.1.6.5	message
9.1.6.7	list-of-managers
9.1.6.10	associated-server

9.19.1 Resource-context-identifier

This attribute uniquely identifies the resource-context object.

```
resource-context-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-resource-context-identifier
```

There are no standard values defined.

9.19.2 Context-address

This attribute identifies the location of printer resources in a server-dependent manner (e.g., file system path name).

```
context-address ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-context-address
```

There are no standard values defined.

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Section 4 - DPA realization

10 Overview

Section four describes the procedures for the DPA and the port realization. It contains a description of the supply of the DP-User abstract-service in clause 11, and the supply of the DP-Administrator abstract-service is described in clause 12. The consumption sides of the DP-User and DP-Administration ports are trivial and are not described in this International Standard. The port realization in the form of service elements is described in clause 13.

The performance of the abstract-operations described in clause 11 and 12 shall be subject to the requirements of the security-policy (if one is in force), that applies to the DP abstract-services.

11 Supply of the DP-User abstract-service

This clause specifies how a DP-Server supplies the DP-User abstract-service, covering the supply of the DP-User port.

11.1 Supply of the DP-User port abstract-services

This clause covers the supply of the **Print**, **ModifyJob**, **CancelJob** and **ListObjectAttributes** abstract-operations. The DP-User abstract-service supply of the DP-User port abstract-services assumes that an abstract-association exists between the DP-User port supplier (the DP-Server) and the DP-User port consumer (the DP-User, or DP-Administrator, accessing the DP-User port). The performance of the abstract-operations is in sequential order; no parallel processing takes place. Not all error cases are described.

> NOTE – Exceptions can occur if the client requests or permits the DP-Server to begin printing before the client has submitted all the print-requests for the job , or if the server assigns multiple printers to a job.

11.1.1 Performance of the Print abstract-operation

When the DP-Server receives a **Print** abstract-operation from a DP-User (or from a DP-Administrator via the DP-User port), the DP-server shall perform the following steps, depending on which of the three CHOICE components that the **PrintArgument** contains:

- The **create-job** CHOICE:

  b) Check that the attributes in the supplied argument are valid for the **Print** abstract-operation (see clause 8.2.1 for details and see clause 9 for which attributes can be set by the **Print** abstract-operation);

  c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **Print** abstract-operation to this DP-Server or the **create-job** sub-function on this print-job;

  d) The server shall perform defaulting as follows: initialize the new job object with a copy of all job attributes contained in the initial-value-job object specified by either 1) the incoming job's initial-value-job attribute, or 2) the requested printer's **printer-initial-value-job** attribute. The server shall then apply all job attributes specified in the **job-attributes** component of **PrintArgument** and set the job's **initial-value-job** attribute to the name of the initial-value-job object used to initialize the job.

  If the client supplied a **first-document** component in the **PrintArgument**, the server shall create a new document object and assign the value **1** to the **document-sequence-number** attribute of the document and set the job's **number-of-document** attribute to **1**. The server shall initialize the new document object with a copy of all document attributes contained in the **initial-value-document** object specified by either 1) the incoming document's **initial-value-document** attribute, or 2) the requested printer's **printer-initial-value-document** attribute. The server shall then apply all document attributes specified

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in the **first-document** component of **PrintArgument** and set the document's **initial-value-document** attribute to the name of the initial-value-document object used to initialize the document.

e) Check that the requested compulsory attributes needed to perform the print-job are supported on the requested printer, and that suitable alternatives can be offered for non-compulsory attributes (e.g. printer type, media, fonts) which may include ignoring the attribute if the attribute or the specified value is not supported on the requested printer and adding the ignored attribute's OID to the job's **ignored-attributes** job-status attribute;

f) If a compulsory attribute is unavailable, the server shall either:

1) reject the request and return the **compulsory-resource-not-available** ServiceError, or

2) accept the request,

depending on implementation;

g) Create a new print-job object in the DP-Server and assign a **job-identifier**.

h) Check whether the object (printable document, font, or resource) to be printed was explicitly included in the print-request, or whether some other form of transfer-method is involved; if **ftam-by-client** is to be used, the DP-Server shall obtain a **file-reference** for an associated filestore, for return to the client;

i) Return the **PrintResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **Print** abstract-operation);

j) If the object(s) to be printed is to be retrieved by DP-Server, the DP-Server shall perform this function;

k) Record any problems encountered after the print-job was accepted.

- The **add-document** CHOICE:

a) Check that this is a valid continuation of an already existing job; i.e., the specified job exists, and **Print** abstract-operation invocations have not been completed for the job;

b) Check that the attributes in the supplied argument are valid for the **Print** abstract-operation (see clause 8.2.1 for details and see clause 9 for which attributes can be set by the **Print** abstract-operation);

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **Print** abstract-operation to this DP-Server or the **add-document** sub-function on this print-job;

d) The server shall perform defaulting as follows: initialize the new document object with a copy of all document attributes contained in the initial-value-document object specified by either 1) the incoming document's **initial-value-document** attribute, or 2) the requested printer's **printer-initial-value-document** attribute. The server shall then apply all document attributes specified in the **new-document** component of **PrintArgument** and set the document's **initial-value-document** attribute to the name of the **initial-value-document** object used to initialize the document.

e) Check that the requested compulsory attributes needed to perform the print-job are supported on the requested printer, and that suitable alternatives can be offered for non-compulsory attributes (e.g. printer type, media, fonts) which may include ignoring the attribute if the attribute or the specified value is not supported on the requested printer and adding the ignored attribute's OID to the job's **ignored-attributes** job-status attribute;

f) If a compulsory attribute is unavailable, the server shall either:

1) reject the request and return the **compulsory-resource-not-available** ServiceError, or

2) accept the request,

depending on implementation;

g) Create a new document object and assign a value one greater than the last document's document-sequence-number to the **document-sequence-number** attribute of the document and increment the job's **number-of-documents** attribute.

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h) If the client supplied an **add-document** component in the **PrintArgument**, check whether the object (printable document, font, or resource) to be printed was explicitly included in the print-request, or whether some other form of transfer-method is involved; if **ftam-by-client** is to be used, the DP-Server shall obtain a **file-reference** for an associated filestore, for return to the client;

i) Return the **PrintResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **Print** abstract-operation);

j) If the object(s) to be printed is to be retrieved by DP-Server, the DP-Server shall perform this function;

k) Record any problems encountered after the print-job was accepted.

- The **close-job** CHOICE:

a) Check that this is a valid continuation of an already existing job; i.e., the specified job exists, and **Print** abstract-operation invocations have not been completed for the job;

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **Print** abstract-operation on this DP-Server or the **close-job** sub-function on this print-job;

i) Return the **PrintResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **Print** abstract-operation);

k) Record any problems encountered after the print-job was accepted.

11.1.2 Performance of the ModifyJob abstract-operation

When the DP-Server receives a **ModifyJob** abstract-operation from a DP-User (or from a DP-Administrator via the DP-User port), the DP-Server shall perform the following steps:

a) Check that the attributes in the supplied argument are valid for the **ModifyJob** abstract-operation including the **job-identifier**. This also includes checking that attempts are not made to modify job and document attributes that are not modifiable (see clause 8.2.2 for details and see clause 9 for which attributes are not modifiable);

b) Check that a print-job with the specified **job-identifier** exists and that a document with the specified **document-number** exists, if the **document-number** component was specified by the DP-Administrator

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **ModifyJob** abstract-operation on this DP-Server or the proposed changes to the specified job;

d) Check that the proposed modification does not alter the requested compulsory or non-compulsory resources needed to perform the print-job in such a way that the print-request is invalid; if the resulting job would have been rejected by the DP-Server as a **Print** abstract-operation, the DP-Server shall reject the **ModifyJob** abstract-operation.

e) Check that the print-job has not advanced so far in the processing cycle, that changes cannot be made;

f) Modify the print-job attributes according to the request;

g) Return the **ModifyJobResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **ModifyJob** abstract-operation).

11.1.3 Performance of the CancelJob abstract-operation

When the DP-Server receives a **CancelJob** abstract-operation from a DP-User (or from a DP-Administrator via the DP-User port), the DP-Server shall perform the following steps:

a) Check that the parameters and attributes in the supplied argument are valid for the **CancelJob** abstract-operation (see clause 8.2.3 for details);

b) Check that a print-job with the specified **job-identifier** exists and that a document with the specified **document-number** exists, if the **document-number** component was specified by the DP-Administrator;

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c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **CancelJob** abstract-operation on this DP-Server or the deletion of this job or document;

d) If the **retention-period** parameter is present, set the job's **job-retention-period** attribute with the specified value; else do not change the job's **job-retention-period** attribute.

e) If the **document-number** parameter is present, delete the specified contained document object from the job and its document data immediately. If the job has additional contained documents, go to step h); else delete the job immediately, since it no longer contains document data to be printed.

f) Cancels the print-job. If the print-job is currently being printed, the DP-Server shall either (1) attempt to abort the job or (2) return a **cancellation-not-possible** UpdateError; job-termination and cleanup actions are implementation-specific;

g) If the job's **job-retention-period** attribute has value **0** (or is not implemented), delete the job, its contained document objects, and its document data; otherwise, place the job in the **retained** state and set the job's **job-state-reasons** to **cancelled-by-user** or **cancelled-by-operator** as appropriate (see 9.2.8.2).

h) Returns the **CancelJobResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **CancelJob** abstract-operation).

11.1.4 Performance of the ListObjectAttributes abstract-operation

When the DP-Server receives a **ListObjectAttributes** abstract-operation from a DP-User (or from a DP-Administrator via the DP-User port), the DP-Server shall perform the following steps, depending on which of the CHOICE components that the **ListObjectAttributesArgument** contains:

- The **specification** CHOICE:

  a) Check that the parameters and attributes in the supplied argument are valid for the **ListObjectAttributes** abstract-operation (see clause 8.2.4 for details and see clause 9 for which attributes can be retrieved by the **ListObjectAttributes** abstract-operation);

  b) Check that the specified **object-class** and **object-instances** (if specified) exist and that the object instance is a member (1) of the specified object class or (2) of a class derived from the specified object class;

  c) Check that the **requested-attributes** are appropriate for the specified object class or derived object classes, if any;

  d) Check that the match specified in the **object-filter** component is appropriate, if supplied by the DP-User;

  e) depending on the value of the **list-operator** parameter:

  get-attributes: Retrieve the **requested-attribute** information from one or several objects, subject to the constraints specified by the selector component, if supplied by the DP-User. If no object-instance was specified, retrieve all objects of the specified class and derived classes, if any.

  get-ordered-jobs: Retrieve the jobs that are competing for the physical printer(s) specified by the logical or physical printer in order of expected print initiation followed by retained and completed jobs in any implementation-defined order.

  f) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **ListObjectAttributes** abstract-operation to this DP-Server or on this object;

  g) Return the **ListObjectAttributesResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **ListObjectAttributes** abstract-operation).

- The **continuation** CHOICE and **abort** is **FALSE**:

  Check that the value of the **context** element is of a valid format for this DP-Server;

  b) Check that the specified **continuation-context** exists in the DP-Server;

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e) Retrieve the **requested-attribute** information from one or several objects;

f) If a security-policy is in force, ensure that such a policy is not violated by the performance of the ListObjectAttributes abstract-operation to this DP-Server or on this object;

g) Return the **ListObjectAttributesResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **ListObjectAttributes** abstract-operation).

- The **continuation** CHOICE and **abort** is TRUE:

  Check that the value of the **context** element is of a valid format for this DP-Server;

  Check that the specified continuation-context exists in the DP-Server;

  d) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **ListObjectAttributes** abstract-operation to this DP-Server or on this object;

  e) Abort the **ListObjectAttributes** continuation-context;

  g) Return the **ListObjectAttributesResult** to the requester (i.e., the DP-User or DP-Administrator that invoked the **ListObjectAttributes** abstract-operation).

12 Supply of the DP-administrator abstract-service

This clause specifies how a DP-Server supplies the DP-Administrator abstract-service, covering the supply of the DP-Administration port.

12.1 Supply of the DP-Administration port abstract-services

This clause covers the supply of the PromoteJob, InterruptJob, PauseJob and ResumeJob abstract-operations. The DP-Administrator abstract-service supply of the DP-Administration port abstract-services assumes that an abstract-association exists between the DP-Administration port supplier (the DP-Server) and the DP-Administration port consumer (the DP-Administrator). The performance of the abstract-operations is in sequential order; no parallel processing takes place, except as noted previously, in 11.1. Not all error cases are described.

12.1.1 Performance of the PromoteJob abstract-operation

When the DP-Server receives a **PromoteJob** abstract-operation from the DP-Administrator, the DP-Server shall perform the following steps:

a) Check that the parameters and attributes in the supplied argument are valid for the **PromoteJob** abstract-operation (see clause 8.3.1 for details);

b) Check that the job specified by the **job-identifier** exists;

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **PromoteJob** abstract-operation on this DP-Server or the proposed promotion to the specified job;

d) Schedule the job for printing on the next available matching printer;

e) Return the **PromoteJobResult** to the DP-Administrator.

12.1.2 Performance of the InterruptJob abstract-operation

When the DP-Server receives an **InterruptJob** abstract-operation from the DP-Administrator, the DP-Server shall perform the following steps:

a) Check that the parameters and attributes in the supplied argument are valid for the **InterruptJob** abstract-operation (see clause 8.3.2 for details);

b) Check that the specified print-job or printer exists;

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c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **InterruptJob** abstract-operation on this DP-Server or the proposed interruption of the specified job;

d) Interrupt the specified printer or job, allow the specified interrupting job to print, and allow the interrupted job to resume printing when the interrupting job completes;

e) Return the **InterruptJobResult** to the DP-Administrator.

12.1.3 Performance of the PauseJob abstract-operation

When the DP-Server receives a **PauseJob** abstract-operation from the DP-Administrator, the DP-Server shall perform the following steps:

a) Check that the parameters and attributes in the supplied argument are valid for the **PauseJob** abstract-operation (see clause 8.3.3 for details);

b) Check that the specified object exists;

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **PauseJob** abstract-operation on this DP-Server or the proposed pausing of the specified job;

d) Pause the specified job object;

e) Return the **PauseJobResult** to the DP-Administrator;

12.1.4 Performance of the ResumeJob abstract-operation

When the DP-Server receives a **ResumeJob** abstract-operation from the DP-Administrator, the DP-Server shall perform the following steps:

a) Check that the parameters and attributes in the supplied argument are valid for the **ResumeJob** abstract-operation (see clause 8.3.4 for details);

b) Check if the specified object exists;

c) If a security-policy is in force, ensure that such a policy is not violated by the performance of the **ResumeJob** abstract-operation on this DP-Server or the proposed resumption of the specified job;

d) Resume the specified job object from the paused state;

e) Return the **ResumeJobResult** to the DP-Administrator.

12.2 Scheduling jobs on physical printers

When a physical printer can accept another job, the server shall select a pending job from amongst the jobs submitted to the physical printer and its associated logical printers according to the scheduling algorithm specified for that physical printer and those logical printers by the printer's **scheduler-ready** attribute. At that time, the server shall supply any required attribute values from implementation defined server defaults for any job or document attributes that still contain no values, i.e. contain an empty value (see 9.1.2).

13 Port realization

The Document Printing abstract-service is realized on a one-to-one basis between abstract-operations defined in this part of the Standard and the real operations in the Document Printing Service Element specified in Part 2 of this International Standard.

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Annex A

(normative)

Formal assignment of DPA standard object identifiers

All object identifiers defined in this part of ISO/IEC 10175 are formally assigned in this annex using ASN.1. The specified values are cited in the ASN.1 modules of subsequent annexes.

This annex is definitive for all values except those that identify the ASN.1 modules of this part of ISO/IEC 10175. The definitive assignments for those occur in the modules themselves.

```
--  File: DPA_0A.ASN,  Version 2.5, 3-July-1996
--    Version 1.7, 7-Nov-1994: Apply all remaining agreed Change Requests
--    Version 1.8, 15-Nov-1994: fix ASN.1 compiler-detected errors
--    Version 2.0, 14-Dec-1994: fix errors found during proof-reading
--         Added id-val-document-state-printing to parallel job-state
--         Delete id-syn-page-size-supported.
--    Version 2.1, 13-Feb-1995: add id-val-event-report-printing-started
--         to go with the printing job state added.
--    Version 2.2, 14-May-1995:
--         Make associated-server a generic attribute, changing its OID too.
--         Add id-syn-name-or-oid-syntax
--    Version 2.3, 16-May-1995:
--         Shorten id-vc-auxiliary-sheet to id-vc-aux-sheet and add aux-sheet- to
--         auxiliary sheet OID names.
--    Version 2.4, December-1995:
--         Corrected id-syn-priority: id-syn-job-priority was deleted but the
--           value was retained for id-syn-priority
--         Added id-val-imposition-simple-1-up to Imposition object attribute
--           values to match list in number-up attribute definition
--         Marked id-att-colour-fidelities as DELeted
--    Version 2.5, 3-July-1996:
--         Added values to distinguished-name-syntaxes
--         UnDELeted id-val-availability-none


--  ANNEX A

--  FORMAL ASSIGNMENT OF DPA STANDARD OBJECT IDENTIFIERS

--  This normative annex is an integral part of this part of ISO/IEC
--  10175.

--  All Object Identifiers defined in this part of ISO/IEC 10175 are
--  formally assigned in this annex using ASN.1. The specified values
--  are cited in the ASN.1 modules of subsequent annexes.

--  This annex is definitive for all values except those that identify the
```


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```
-- ASN.1 modules of this Part of this International Standard. The definitive
-- assignments for those occur in the modules themselves.

-- NOTE: Those object identifier values that were assigned previously during
-- the development of this International Standard, but which were subsequently
-- deleted from the IS, have not been re-assigned to other Object
-- Identifiers. Hence there are gaps in the assignments. Gaps have
-- also been left, so that future additions can be made in logical
-- places. However, Object Identifiers have been assigned in
-- sequence and are listed in sequence, in order to minimize the
-- chance of assigning the same value to two different object identifiers
-- by mistake.

-- The entries for those Object Identifiers that have been deleted remain in
-- the following list, but are commented out and prefixed by the notation "DEL:"
-- to indicate that the OID has been deleted and its value shall not be reused.
--   Example:
--    --DEL: id-syn-attribute-value-characteristics  ID ::=  { id-syn  32 }


DPAStandardObjectIdentifiers { iso standard dpa(10175) part-1(1)
                               modules(0) object-identifiers(0)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- PROLOGUE --
-- EXPORTS  everything --
IMPORTS  -- nothing -- ;

ID ::=  OBJECT IDENTIFIER

id-dpa     ID ::= { iso standard dpa(10175) part-1(1) }

-- Categories --
     id-mod          ID ::=  { id-dpa  0 } -- modules --
     id-ot           ID ::=  { id-dpa  1 } -- objects --
     id-pt           ID ::=  { id-dpa  2 } -- ports --
     id-oc           ID ::=  { id-dpa  3 } -- object classes
                                           -- = attribute type classes --
     id-syn          ID ::=  { id-dpa  5 } -- attribute syntaxes --
     id-vc           ID ::=  { id-dpa  6 } -- attribute value classes --
     id-op           ID ::=  { id-dpa  7 } -- operation attributes

-- Modules --
     id-mod-object-identifiers      ID ::=  { id-mod  0 }  -- ANNEX A
     id-mod-abstract-service        ID ::=  { id-mod  1 }  -- ANNEX B
     id-mod-attributes              ID ::=  { id-mod  2 }  -- ANNEX C
     id-mod-bounds                  ID ::=  { id-mod  3 }  -- ANNEX D

-- Objects --
     id-dp-server         ID ::=  { id-ot  0 }
     id-dp-user           ID ::=  { id-ot  1 }
     id-dp-administrator  ID ::=  { id-ot  2 }
```


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```
-- Ports --
     id-pt-dp-user                ID ::=  { id-pt  0 }
     id-pt-dp-administration      ID ::=  { id-pt  1 }

-- Operation Attribute (pseudo) object class --
     id-oc-operation                   ID ::=  { id-op  0 }

-- DPA object Classes --
     id-oc-generic                     ID ::=  { id-oc  0 }
     id-oc-job                         ID ::=  { id-oc  1 }
     id-oc-printer                     ID ::=  { id-oc  2 }
     id-oc-server                      ID ::=  { id-oc  3 }
     id-oc-medium                      ID ::=  { id-oc  4 }
     id-oc-font                        ID ::=  { id-oc  5 }
     id-oc-transfer-method             ID ::=  { id-oc  8 }
     id-oc-delivery-method             ID ::=  { id-oc  9 }
     id-oc-auxiliary-sheet             ID ::=  { id-oc  10 }
     id-oc-finishing                   ID ::=  { id-oc  11 }
     id-oc-output                      ID ::=  { id-oc  12 }
     id-oc-imposition                  ID ::=  { id-oc  13 }
     id-oc-scheduler                   ID ::=  { id-oc  14 }
     id-oc-document                    ID ::=  { id-oc  15 }
     id-oc-resource                    ID ::=  { id-oc  16 }
     id-oc-initial-value-job           ID ::=  { id-oc  17 }
     id-oc-initial-value-document      ID ::=  { id-oc  18 }
     id-oc-resource-context            ID ::=  { id-oc  19 }
     id-oc-auxiliary-sheet-package     ID ::=  { id-oc  20 }


--*****************************************************************************--

-- Attribute Syntaxes --
  -- syntaxes for the generic data types used by the generic attributes
     id-syn-descriptor                      ID ::=  { id-syn  1 }
     id-syn-simple-name                     ID ::=  { id-syn  2 }
     id-syn-distinguished-name              ID ::=  { id-syn  3 }
     id-syn-rdn-sequence                    ID ::=  { id-syn  4 }
     id-syn-message                         ID ::=  { id-syn  5 }
     id-syn-dist-name-string                ID ::=  { id-syn  6 }

  -- syntaxes for generic data types used by many attributes
     id-syn-text                            ID ::=  { id-syn  10 }
     id-syn-delta-time                      ID ::=  { id-syn  11 }
     id-syn-generalized-time                ID ::=  { id-syn  12 }
     id-syn-integer                         ID ::=  { id-syn  13 }
     id-syn-boolean                         ID ::=  { id-syn  14 }
     id-syn-percent                         ID ::=  { id-syn  15 }
     id-syn-object-identifier               ID ::=  { id-syn  16 }
     id-syn-area                            ID ::=  { id-syn  17 }
     id-syn-cardinal                        ID ::=  { id-syn  18 }
     id-syn-positive-integer                ID ::=  { id-syn  19 }
     id-syn-real                            ID ::=  { id-syn  20 }
```


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```
    id-syn-name-or-oid                          ID ::= { id-syn 21 }
    id-syn-realization                          ID ::= { id-syn 22 }
    id-syn-integer-range                        ID ::= { id-syn 25 }
    id-syn-maximum-integer                      ID ::= { id-syn 26 }
    id-syn-minimum-integer                      ID ::= { id-syn 27 }
    id-syn-real-range                           ID ::= { id-syn 28 }
    id-syn-sides                                ID ::= { id-syn 29 }
    id-syn-medium-dimensions                    ID ::= { id-syn 30 }
    id-syn-edge                                 ID ::= { id-syn 31 }
--DEL: id-syn-attribute-value-characteristics  ID ::= { id-syn 32 }
    id-syn-font-reference                       ID ::= { id-syn 33 }
    id-syn-non-negative-real                    ID ::= { id-syn 34 }
    id-syn-dimension                            ID ::= { id-syn 35 }
    id-syn-x-y-dimensions                       ID ::= { id-syn 36 }
    id-syn-locations                            ID ::= { id-syn 37 }
    id-syn-integer-sequence                     ID ::= { id-syn 38 }
    id-syn-real-sequence                        ID ::= { id-syn 39 }
    id-syn-object-identifier-sequence           ID ::= { id-syn 40 }
    id-syn-cardinal-or-oid                      ID ::= { id-syn 41 }
    id-syn-oid-cardinal-map                     ID ::= { id-syn 42 }
    id-syn-positive-integer-or-oid              ID ::= { id-syn 43 }
    id-syn-cardinal-or-name-or-oid              ID ::= { id-syn 44 }
    id-syn-cardinal-range                       ID ::= { id-syn 45 }
    id-syn-non-negative-real-range              ID ::= { id-syn 46 }
    id-syn-dist-name-string-sequence            ID ::= { id-syn 47 }
    id-syn-area-sequence                        ID ::= { id-syn 48 }
    id-syn-cardinal-sequence                    ID ::= { id-syn 49 }
-- more generic syntaxes continues below --


-- Job object syntaxes --
    id-syn-job-identifier                       ID ::= { id-syn 50 }
    id-syn-results-profile                      ID ::= { id-syn 51 }
    id-syn-finishing                            ID ::= { id-syn 52 }
    id-syn-event-handling-profile               ID ::= { id-syn 53 }
    id-syn-criteria                             ID ::= { id-syn 54 }
    id-syn-job-password                         ID ::= { id-syn 55 }
    id-syn-priority                             ID ::= { id-syn 56 }
    id-syn-job-level                            ID ::= { id-syn 57 }
    id-syn-job-categories                       ID ::= { id-syn 58 }
--DEL: id-syn-printer-assigned                  ID ::= { id-syn 59 }
    id-syn-print-checkpoint                     ID ::= { id-syn 60 }
    id-syn-new-job-identifier                   ID ::= { id-syn 61 }
    id-syn-object-identification                ID ::= { id-syn 62 }
    id-syn-ignored-attribute                    ID ::= { id-syn 63 }

-- Printable Document object syntaxes --

    id-syn-font-substitution                    ID ::= { id-syn 80 }
    id-syn-medium-substitution                  ID ::= { id-syn 81 }
--DEL: id-syn-output-bin-sequence               ID ::= { id-syn 82 }
--DEL: id-syn-imposition-sequence               ID ::= { id-syn 83 }
    id-syn-page-select                          ID ::= { id-syn 85 }
```


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```
    id-syn-page-media-select                ID ::=  { id-syn  86 }
    id-syn-document-content                 ID ::=  { id-syn  87 }
    id-syn-page-size                        ID ::=  { id-syn  88 }
    id-syn-presentation-direction           ID ::=  { id-syn  89 }
    id-syn-file-reference                   ID ::=  { id-syn  90 }
    id-syn-resource-context                 ID ::=  { id-syn  91 }
    id-syn-resource                         ID ::=  { id-syn  92 }
    id-syn-page-order-type                  ID ::=  { id-syn  93 }
    id-syn-page-orientation-type            ID ::=  { id-syn  94 }
    id-syn-output-bins-characteristics      ID ::=  { id-syn  95 }

-- Printer object syntaxes --

--DEL: id-syn-output-bin-supported           ID ::=  { id-syn  101 }
--DEL: id-syn-output-bin-ready              ID ::=  { id-syn  102 }
    id-syn-page-id-type                     ID ::=  { id-syn  103 }
--DEL: id-syn-doc-fmt-variant-chars         ID ::=  { id-syn  104 }
    id-syn-doc-format                       ID ::=  { id-syn  104 }
--DEL: id-syn-page-size-supported           ID ::=  { id-syn  105 }
    id-syn-level-range                      ID ::=  { id-syn  106 }
    id-syn-category-set                     ID ::=  { id-syn  107 }
    id-syn-medium-source-size               ID ::=  { id-syn  108 }
    id-syn-input-tray-medium                ID ::=  { id-syn  109 }
    id-syn-numbers-up-supported             ID ::=  { id-syn  110 }

-- Server object syntaxes --

    id-syn-translator-type                  ID ::=  { id-syn  120 }

-- Operation attribute syntaxes --

    id-syn-privileges                       ID ::=  { id-syn  131 }
    id-syn-locale                           ID ::=  { id-syn  132 }
    id-syn-delivery-address-for-method      ID ::=  { id-syn  133 }
    id-syn-error-message                    ID ::=  { id-syn  134 }


-- More generic syntaxes --
    id-syn-integer64                        ID ::=  { id-syn  150 }
    id-syn-integer64-sequence               ID ::=  { id-syn  151 }
    id-syn-cardinal64                       ID ::=  { id-syn  152 }
    id-syn-cardinal64-sequence              ID ::=  { id-syn  153 }
    id-syn-positive-integer64               ID ::=  { id-syn  154 }
    id-syn-integer64-range                  ID ::=  { id-syn  155 }
    id-syn-cardinal64-range                 ID ::=  { id-syn  156 }
    id-syn-maximum-integer64                ID ::=  { id-syn  157 }
    id-syn-minimum-integer64                ID ::=  { id-syn  158 }

    id-syn-descriptive-name                 ID ::=  { id-syn  161 }
    id-syn-name-or-oid-sequence             ID ::=  { id-syn  162 }
```


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```
--*****************************************************************************--

-- Attribute Types --
   ---------------

 -- Operation Attributes
     id-att-priority                          ID ::= { id-oc-operation  0 }
     id-att-privileges                        ID ::= { id-oc-operation  1 }
     id-att-operation-locale                  ID ::= { id-oc-operation  2 }
     id-att-default-delivery-addresses        ID ::= { id-oc-operation  3 }



-- Generic attributes --
     id-att-object-class                       ID ::=  { id-oc-generic  0 }
     id-att-descriptor                         ID ::=  { id-oc-generic  1 }
     id-att-descriptive-name                   ID ::=  { id-oc-generic  2 }
     id-att-state                              ID ::=  { id-oc-generic  4 }
     id-att-message                            ID ::=  { id-oc-generic  5 }
     id-att-availability                       ID ::=  { id-oc-generic  6 }
     id-att-list-of-managers                   ID ::=  { id-oc-generic  7 }
     id-att-job-attributes-supported           ID ::=  { id-oc-generic  8 }
     id-att-document-attributes-supported      ID ::=  { id-oc-generic  9 }
     id-att-notification-profile               ID ::=  { id-oc-generic 10 }
     id-att-logging-profile                    ID ::=  { id-oc-generic 11 }
     id-att-enabled                            ID ::=  { id-oc-generic 12 }
     id-att-associated-server                  ID ::=  { id-oc-generic 13 }


 -- Job object attributes --

   -- job-information --
     id-att-job-identifier                     ID ::=  { id-oc-job  0 }
     id-att-job-name                           ID ::=  { id-oc-job  1 }
     id-att-job-originator                     ID ::=  { id-oc-job  2 }
     id-att-job-owner                          ID ::=  { id-oc-job  3 }
     id-att-job-comment                        ID ::=  { id-oc-job  4 }
     id-att-job-start-message                  ID ::=  { id-oc-job  5 }
     id-att-job-end-message                    ID ::=  { id-oc-job  6 }
     id-att-job-client-id                      ID ::=  { id-oc-job  7 }
     id-att-job-non-compulsory-attributes      ID ::=  { id-oc-job  8 }
     id-att-initial-value-job                  ID ::=  { id-oc-job  9 }

   -- job-results-handling --
     id-att-results-profile                    ID ::=  { id-oc-job  15 }
     id-att-job-finishing                      ID ::=  { id-oc-job  16 }

   -- job-event-handling --
 --DEL: id-att-notification-profile               ID ::=  { id-oc-job  20 }
 --DEL: id-att-logging-profile                   ID ::=  { id-oc-job  21 }
     id-att-job-abort-criteria                 ID ::=  { id-oc-job  22 }
     id-att-job-warning-criteria               ID ::=  { id-oc-job  23 }
     id-att-document-abort-criteria            ID ::=  { id-oc-job  24 }
```


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```
  -- job-scheduling-instructions --
     id-att-job-start-wait                    ID ::=  { id-oc-job  30 }
     id-att-job-end-wait                      ID ::=  { id-oc-job  31 }
     id-att-job-hold                          ID ::=  { id-oc-job  32 }
     id-att-job-password                      ID ::=  { id-oc-job  33 }
     id-att-job-print-after                   ID ::=  { id-oc-job  34 }
     id-att-job-priority                      ID ::=  { id-oc-job  35 }
     id-att-job-deadline-time                 ID ::=  { id-oc-job  36 }
     id-att-job-discard-time                  ID ::=  { id-oc-job  37 }
     id-att-job-retention-period              ID ::=  { id-oc-job  38 }
     id-att-job-message-to-operator           ID ::=  { id-oc-job  39 }
     id-att-job-scheduling                    ID ::=  { id-oc-job  40 }
     id-att-job-validate                      ID ::=  { id-oc-job  41 }

  -- printer-selection-instructions --
     id-att-printer-name-requested              ID ::=  { id-oc-job 43 }
     id-att-printer-locations-requested         ID ::=  { id-oc-job 44 }
     id-att-printer-models-requested            ID ::=  { id-oc-job 45 }
     id-att-printer-types-requested             ID ::=  { id-oc-job 46 }
     id-att-printer-speed-range-requested       ID ::=  { id-oc-job 47 }
--DEL: id-att-printer-resolution-range-requested ID ::=  { id-oc-job 48 }
     id-att-physical-printers-requested         ID ::=  { id-oc-job 49 }


-- Printable Document object attributes
  -- production-instructions --
     id-att-font-substitution                 ID ::=  { id-oc-job  50 }
     id-att-medium-substitution               ID ::=  { id-oc-job  51 }
     id-att-finishing                         ID ::=  { id-oc-job  53 }
     id-att-output                            ID ::=  { id-oc-job  54 }
--DEL: id-att-output-bins                       ID ::=  { id-oc-job  55 }
--DEL: id-att-imposition                        ID ::=  { id-oc-job  56 }
     id-att-print-quality                     ID ::=  { id-oc-job  57 }
     id-att-medium-fidelity                   ID ::=  { id-oc-job  59 }
     id-att-sides                             ID ::=  { id-oc-job  61 }
     id-att-page-select                       ID ::=  { id-oc-job  62 }
     id-att-page-media-select                 ID ::=  { id-oc-job  63 }
     id-att-copy-count                        ID ::=  { id-oc-job  64 }
--DEL: id-att-start-sheet                       ID ::=  { id-oc-job  65 }
--DEL: id-att-separator-sheet                   ID ::=  { id-oc-job  66 }
--DEL: id-att-end-sheet                         ID ::=  { id-oc-job  67 }
     id-att-reset-printer                     ID ::=  { id-oc-job  68 }
     id-att-binding-edge                      ID ::=  { id-oc-job  69 }
     id-att-binding-edge-image-shift          ID ::=  { id-oc-job  70 }
     id-att-number-up                         ID ::=  { id-oc-job  71 }
     id-att-plex                              ID ::=  { id-oc-job  72 }
     id-att-x-image-shift                     ID ::=  { id-oc-job  73 }
     id-att-y-image-shift                     ID ::=  { id-oc-job  74 }
     id-att-input-tray-select                 ID ::=  { id-oc-job  75 }

  -- document-description --
     id-att-transfer-method                   ID ::=  { id-oc-job  80 }
```


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```
    id-att-document-format                    ID ::=  { id-oc-job  81 }
    id-att-document-sequence-number           ID ::=  { id-oc-job  82 }
    id-att-document-content                   ID ::=  { id-oc-job  83 }
    id-att-file-reference                     ID ::=  { id-oc-job  84 }
    id-att-document-type                      ID ::=  { id-oc-job  85 }
    id-att-resource-context                   ID ::=  { id-oc-job  87 }
    id-att-non-compulsory-attributes          ID ::=  { id-oc-job  88 }

  -- document-attributes --
    id-att-document-file-name                 ID ::=  { id-oc-job  89 }
    id-att-document-name                      ID ::=  { id-oc-job  90 }
    id-att-document-authors                   ID ::=  { id-oc-job  91 }
    id-att-document-comment                   ID ::=  { id-oc-job  92 }
    id-att-document-revision-date             ID ::=  { id-oc-job  93 }
--DEL: id-att-document-format-variant            ID ::=  { id-oc-job  94 }
--DEL: id-att-page-order                         ID ::=  { id-oc-job  95 }
    id-att-page-order-received                ID ::=  { id-oc-job  95 }
--DEL: id-att-assured-reproduction-area          ID ::=  { id-oc-job  96 }
    id-att-assured-reproduction-areas-used    ID ::=  { id-oc-job  96 }
    id-att-intended-page-size                 ID ::=  { id-oc-job  97 }
    id-att-content-orientation                ID ::=  { id-oc-job  98 }
--DEL: id-att-page-independent                   ID ::=  { id-oc-job  99 }
    id-att-character-sets-used                ID ::=  { id-oc-job 100 }
    id-att-character-mappings-used            ID ::=  { id-oc-job 101 }
    id-att-fonts-used                         ID ::=  { id-oc-job 102 }
    id-att-character-repertoires-used         ID ::=  { id-oc-job 103 }
    id-att-media-used                         ID ::=  { id-oc-job 104 }
    id-att-octet-count                        ID ::=  { id-oc-job 106 }
    id-att-page-count                         ID ::=  { id-oc-job 107 }
    id-att-glyph-count                        ID ::=  { id-oc-job 108 }
    id-att-font-count                         ID ::=  { id-oc-job 109 }
    id-att-font-change-count                  ID ::=  { id-oc-job 110 }
    id-att-maximum-fonts-per-page             ID ::=  { id-oc-job 111 }
    id-att-percent-graphics                   ID ::=  { id-oc-job 112 }
    id-att-percent-images                     ID ::=  { id-oc-job 113 }
--DEL: id-att-presentation-directions-contained
--DEL:                                          ID ::=  { id-oc-job 115 }
    id-att-presentation-directions-used       ID ::=  { id-oc-job 115 }
--DEL: id-att-document-format-version            ID ::=  { id-oc-job 116 }
    id-att-resources-used                     ID ::=  { id-oc-job 118 }
    id-att-input-trays-used                   ID ::=  { id-oc-job 119 }


-- Job object attributes (continued) --
  -- access-and-accounting --
    id-att-user-name                          ID ::=  { id-oc-job 120 }
    id-att-accounting-information             ID ::=  { id-oc-job 122 }

  -- job-security --
    id-att-job-security-confidentiality-level     ID ::=  { id-oc-job 130 }
    id-att-job-security-confidentiality-category  ID ::=  { id-oc-job 131 }
    id-att-job-security-confidentiality-policy    ID ::=  { id-oc-job 132 }
    id-att-job-security-integrity-level           ID ::=  { id-oc-job 133 }
```


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```
    id-att-job-security-integrity-category        ID ::=  { id-oc-job 134 }
    id-att-job-security-integrity-policy          ID ::=  { id-oc-job 135 }
    id-att-job-security-label                     ID ::=  { id-oc-job 136 }

  -- job-status --
    id-att-current-job-state                ID ::=  { id-oc-job  200 }
    id-att-previous-job-state               ID ::=  { id-oc-job  201 }
    id-att-printers-assigned                ID ::=  { id-oc-job  202 }
    id-att-estimated-completion-time        ID ::=  { id-oc-job  203 }
    id-att-submission-time                  ID ::=  { id-oc-job  204 }
    id-att-modification-time                ID ::=  { id-oc-job  205 }
    id-att-started-printing-time            ID ::=  { id-oc-job  206 }
    id-att-job-copies-completed             ID ::=  { id-oc-job  207 }
    id-att-pages-completed                  ID ::=  { id-oc-job  208 }
    id-att-octets-completed                 ID ::=  { id-oc-job  209 }
    id-att-intervening-jobs                 ID ::=  { id-oc-job  212 }
    id-att-print-checkpoint                 ID ::=  { id-oc-job  213 }
    id-att-new-job-identifier               ID ::=  { id-oc-job  214 }
    id-att-on-request-resources-required    ID ::=  { id-oc-job  215 }
    id-att-job-message-from-administrator   ID ::=  { id-oc-job  216 }
    id-att-last-job-events                  ID ::=  { id-oc-job  217 }
    id-att-name-of-last-accessor            ID ::=  { id-oc-job  218 }
    id-att-error-count                      ID ::=  { id-oc-job  221 }
    id-att-warning-count                    ID ::=  { id-oc-job  222 }
    id-att-processing-time                  ID ::=  { id-oc-job  223 }
    id-att-job-submission-complete          ID ::=  { id-oc-job  224 }
    id-att-completion-time                  ID ::=  { id-oc-job  225 }
    id-att-number-of-documents              ID ::=  { id-oc-job  226 }
    id-att-ignored-attributes               ID ::=  { id-oc-job  227 }
    id-att-job-state-reasons                ID ::=  { id-oc-job  228 }
    id-att-total-job-octets                 ID ::=  { id-oc-job  229 }
    id-att-finishing-includes-job-sheets    ID ::=  { id-oc-job  230 }
    id-att-finishing-includes-document-sheets
                                            ID ::=  { id-oc-job  231 }
    id-att-job-sheets                       ID ::=  { id-oc-job  232 }
    id-att-document-sheets                  ID ::=  { id-oc-job  233 }
    id-att-printer-state-of-printers-assigned
                                            ID ::=  { id-oc-job  234 }
    id-att-impressions-completed            ID ::=  { id-oc-job  235 }
    id-att-media-sheets-completed           ID ::=  { id-oc-job  236 }
    id-att-job-page-count                   ID ::=  { id-oc-job  237 }
    id-att-job-impression-count             ID ::=  { id-oc-job  238 }
    id-att-job-media-sheet-count            ID ::=  { id-oc-job  239 }
    id-att-job-identifier-on-printer        ID ::=  { id-oc-job  240 }
    id-att-job-identifier-on-client         ID ::=  { id-oc-job  241 }
    id-att-presentation-direction           ID ::=  { id-oc-job  242 }
    id-att-content-orientations-used        ID ::=  { id-oc-job  243 }
    id-att-current-page-order               ID ::=  { id-oc-job  244 }


-- Printable Document object attributes (continued) --
  -- [The DIS assigned document attributes to id-oc-job; these are new for IS]
  -- Production instructions --
```


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```
    id-att-default-character-set              ID ::=  { id-oc-document  0 }
    id-att-default-character-mapping          ID ::=  { id-oc-document  1 }
    id-att-default-font                       ID ::=  { id-oc-document  2 }
    id-att-default-character-repertoire       ID ::=  { id-oc-document  3 }
    id-att-default-medium                     ID ::=  { id-oc-document  4 }
    id-att-default-input-tray                 ID ::=  { id-oc-document  5 }
    id-att-default-resources                  ID ::=  { id-oc-document  6 }
    id-att-default-printer-resolution         ID ::=  { id-oc-document  7 }
    id-att-printer-resolutions-used           ID ::=  { id-oc-document  8 }

    id-att-initial-value-document             ID ::=  { id-oc-document 10 }

    id-att-new-line-option                    ID ::=  { id-oc-document 12 }
    id-att-carriage-control-type              ID ::=  { id-oc-document 13 }
    id-att-table-reference-characters         ID ::=  { id-oc-document 14 }
    id-att-shift-out-shift-in                 ID ::=  { id-oc-document 15 }


  -- document-status --

    id-att-document-state                     ID ::=  { id-oc-document 20 }
    id-att-copies-completed                   ID ::=  { id-oc-document 21 }

--*****************************************************************************--

-- Printer object attributes --
    id-att-printer-name                       ID ::=  { id-oc-printer  0 }
    id-att-printer-name-aliases               ID ::=  { id-oc-printer  1 }
    id-att-printer-locations                  ID ::=  { id-oc-printer  2 }
    id-att-printer-model                      ID ::=  { id-oc-printer  3 }
    id-att-printer-types                      ID ::=  { id-oc-printer  4 }
    id-att-printer-realization                ID ::=  { id-oc-printer  5 }
    id-att-maximum-printer-speed              ID ::=  { id-oc-printer  6 }
--DEL: id-att-printer-resolutions                ID ::=  { id-oc-printer  7 }
    id-att-printer-state                      ID ::=  { id-oc-printer  8 }
    id-att-printer-associated-printers        ID ::=  { id-oc-printer 12 }
    id-att-printers-ready                     ID ::=  { id-oc-printer 13 }
    id-att-printer-initial-value-job          ID ::=  { id-oc-printer 14 }
    id-att-fonts-supported                    ID ::=  { id-oc-printer 15 }
    id-att-fonts-ready                        ID ::=  { id-oc-printer 16 }
    id-att-media-supported                    ID ::=  { id-oc-printer 21 }
    id-att-media-ready                        ID ::=  { id-oc-printer 22 }
    id-att-finishings-supported               ID ::=  { id-oc-printer 27 }
    id-att-finishings-ready                   ID ::=  { id-oc-printer 28 }
    id-att-outputs-supported                  ID ::=  { id-oc-printer 30 }
    id-att-outputs-ready                      ID ::=  { id-oc-printer 31 }
    id-att-output-bins-supported              ID ::=  { id-oc-printer 33 }
    id-att-output-bins-ready                  ID ::=  { id-oc-printer 34 }
--DEL: id-att-impositions-supported              ID ::=  { id-oc-printer 36 }
--DEL: id-att-impositions-ready                  ID ::=  { id-oc-printer 37 }
```


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```
     id-att-print-qualities-supported          ID ::=  { id-oc-printer  39 }
     id-att-print-qualities-ready              ID ::=  { id-oc-printer  40 }
--DEL: id-att-start-sheets-supported             ID ::=  { id-oc-printer  42 }
--DEL: id-att-start-sheets-ready                 ID ::=  { id-oc-printer  43 }
--DEL: id-att-separator-sheets-supported         ID ::=  { id-oc-printer  45 }
--DEL: id-att-separator-sheets-ready             ID ::=  { id-oc-printer  46 }
     id-att-character-sets-supported           ID ::=  { id-oc-printer  50 }
     id-att-character-sets-ready               ID ::=  { id-oc-printer  51 }
     id-att-character-mappings-supported       ID ::=  { id-oc-printer  53 }
     id-att-character-mappings-ready           ID ::=  { id-oc-printer  54 }
     id-att-character-repertoires-supported    ID ::=  { id-oc-printer  56 }
     id-att-character-repertoires-ready        ID ::=  { id-oc-printer  57 }
     id-att-start-message-supported            ID ::=  { id-oc-printer  59 }
     id-att-end-message-supported              ID ::=  { id-oc-printer  60 }
     id-att-sides-supported                    ID ::=  { id-oc-printer  61 }
     id-att-sides-ready                        ID ::=  { id-oc-printer  62 }
     id-att-page-select-supported              ID ::=  { id-oc-printer  63 }
     id-att-maximum-copies-supported           ID ::=  { id-oc-printer  65 }
--DEL: id-att-document-format-variants-supported
                                               ID ::=  { id-oc-printer  66 }
--DEL:
     id-att-native-document-formats-ready      ID ::=  { id-oc-printer  67}
     id-att-document-formats-supported         ID ::=  { id-oc-printer  68 }
     id-att-document-formats-ready             ID ::=  { id-oc-printer  69}
--DEL: id-att-aras-supported                     ID ::=  { id-oc-printer  70 }
--DEL: id-att-page-sizes-supported               ID ::=  { id-oc-printer  72 }
--DEL: id-att-orientations-supported             ID ::=  { id-oc-printer  73 }
     id-att-content-orientations-supported     ID ::=  { id-oc-printer  73 }

--DEL: id-att-associated-server                  ID ::=  { id-oc-printer  77 }
     id-att-sheet-count                        ID ::=  { id-oc-printer  78 }
     id-att-printer-needs-attention-time       ID ::=  { id-oc-printer  79 }
     id-att-printer-needs-key-operator-attention-time
                                               ID ::=  { id-oc-printer  80 }
     id-att-presentation-directions-supported
                                               ID ::=  { id-oc-printer  81 }
--DEL: id-att-end-sheets-supported               ID ::=  { id-oc-printer  83 }
--DEL: id-att-end-sheets-ready                   ID ::=  { id-oc-printer  84 }
       id-att-printer-resource-context           ID ::=  { id-oc-printer  86 }

--DEL: id-att-font-fidelities-supported          ID ::=  { id-oc-printer  87 }
     id-att-medium-fidelities-supported        ID ::=  { id-oc-printer  88 }
--DEL: id-att-colour-fidelities-supported        ID ::=  { id-oc-printer  89 }
     id-att-printer-confidentiality-level-range
                                               ID ::=  { id-oc-printer  90 }
     id-att-printer-confidentiality-category-sets
                                               ID ::= { id-oc-printer 91 }
     id-att-printer-confidentiality-policy     ID ::=  { id-oc-printer  92 }
     id-att-printer-integrity-level-range      ID ::=  { id-oc-printer  93 }
     id-att-printer-integrity-category-sets    ID ::=  { id-oc-printer  94 }
     id-att-printer-integrity-policy           ID ::=  { id-oc-printer  95 }
     id-att-printer-security-label-policy      ID ::=  { id-oc-printer  96 }
--DEL: id-att-page-orders-supported              ID ::=  { id-oc-printer  98 }
--DEL: id-att-printer-final-value-job            ID ::=  { id-oc-printer  99 }
```


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```
    id-att-printer-initial-value-document   ID ::=  { id-oc-printer  100 }
    id-att-printer-resolutions-supported    ID ::=  { id-oc-printer  101 }

    id-att-new-line-options-supported        ID ::=  { id-oc-printer 103 }
    id-att-carriage-control-types-supported  ID ::=  { id-oc-printer 104 }
    id-att-table-reference-characters-supported
                                             ID ::=  { id-oc-printer 105 }
    id-att-shift-out-shift-in-supported      ID ::=  { id-oc-printer 106 }
    id-att-input-trays-medium                ID ::=  { id-oc-printer 107 }
    id-att-output-bins-characteristics       ID ::=  { id-oc-printer 109 }

    -- job finishing support --
    id-att-job-finishings-supported          ID ::=  { id-oc-printer  140 }
    id-att-job-finishings-ready              ID ::=  { id-oc-printer  141 }

    -- imposition support --
    id-att-plexes-supported                  ID ::=  { id-oc-printer  200 }
--DEL: id-att-plexes-ready                     ID ::=  { id-oc-printer  201 }
    id-att-numbers-up-supported              ID ::=  { id-oc-printer  202 }
--DEL: id-att-numbers-up-ready                 ID ::=  { id-oc-printer  203 }
    id-att-x-image-shift-range-supported     ID ::=  { id-oc-printer  204 }
--DEL: id-att-x-image-shift-range-ready        ID ::=  { id-oc-printer  205 }
    id-att-y-image-shift-range-supported     ID ::=  { id-oc-printer  206 }
--DEL: id-att-y-image-shift-range-ready        ID ::=  { id-oc-printer  207 }
--DEL: id-att-logical-page-origins-supported   ID ::=  { id-oc-printer  208 }
--DEL: id-att-logical-page-origins-ready       ID ::=  { id-oc-printer  209 }
--DEL: id-att-logical-page-x-offset-ranges-supported
--                                            ID ::=  { id-oc-printer  210 }
--DEL: id-att-logical-page-x-offset-ranges-ready
--                                            ID ::=  { id-oc-printer  211 }
--DEL: id-att-logical-page-y-offset-ranges-supported
--                                            ID ::=  { id-oc-printer  212 }
--DEL: id-att-logical-page-y-offset-ranges-ready
--                                            ID ::=  { id-oc-printer  213 }
--DEL: id-att-logical-page-scaling-range-supported
--                                            ID ::=  { id-oc-printer  214 }
--DEL: id-att-logical-page-scaling-range-ready ID ::=  { id-oc-printer  215 }

-- misc. printer attributes --
    id-att-resources-supported               ID ::=  { id-oc-printer  216 }
    id-att-schedulers-supported              ID ::=  { id-oc-printer  217 }
    id-att-scheduler-ready                   ID ::=  { id-oc-printer  218 }
    id-att-printer-timeout-period            ID ::=  { id-oc-printer  219 }
--DEL: id-att-printer-notification-profile     ID ::=  { id-oc-printer  220 }
    id-att-input-trays-supported             ID ::=  { id-oc-printer  221 }
    id-att-input-trays-ready                 ID ::=  { id-oc-printer  222 }
    id-att-resources-ready                   ID ::=  { id-oc-printer  223 }

    id-att-medium-source-sizes-supported     ID ::=  { id-oc-printer  225 }
    id-att-medium-source-sizes-ready         ID ::=  { id-oc-printer  226 }
    id-att-job-abort-criteria-supported      ID ::=  { id-oc-printer  227 }
    id-att-job-warning-criteria-supported    ID ::=  { id-oc-printer  228 }
    id-att-document-abort-criteria-supported
```


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```
                                        ID ::=  { id-oc-printer  229 }
    id-att-binding-edges-supported      ID ::=  { id-oc-printer  230 }
    id-att-binding-edge-image-shift-max-supported
                                        ID ::=  { id-oc-printer  231 }
    id-att-job-sheets-supported         ID ::=  { id-oc-printer  232 }
    id-att-job-sheets-ready             ID ::=  { id-oc-printer  233 }
    id-att-document-sheets-supported    ID ::=  { id-oc-printer  234 }
    id-att-document-sheets-ready        ID ::=  { id-oc-printer  235 }
    id-att-finishing-includes-doc-sheets-supported
                                        ID ::=  { id-oc-printer  236 }
    id-att-finishing-includes-job-sheets-supported
                                        ID ::=  { id-oc-printer  237 }
    id-att-initial-value-jobs-supported ID ::=  { id-oc-printer  238 }
    id-att-initial-value-documents-supported
                                        ID ::=  { id-oc-printer  239 }
    id-att-job-size-range-supported     ID ::=  { id-oc-printer  240 }
    id-att-job-size-range-ready         ID ::=  { id-oc-printer  241 }
    id-att-checkpoint-formats-supported ID ::=  { id-oc-printer  242 }
    id-att-are-foreign-jobs-visible     ID ::=  { id-oc-printer  243 }


--*****************************************************************************--

-- Server object attributes --
    id-att-server-name                  ID ::=  { id-oc-server  0 }
    id-att-server-name-aliases          ID ::=  { id-oc-server  1 }
    id-att-server-address               ID ::=  { id-oc-server  2 }
    id-att-server-state                 ID ::=  { id-oc-server  3 }
    id-att-object-classes-supported     ID ::=  { id-oc-server  5 }
    id-att-physical-printers-supported  ID ::=  { id-oc-server  7 }
    id-att-physical-printers-ready      ID ::=  { id-oc-server  8 }
    id-att-logical-printers-supported   ID ::=  { id-oc-server  9 }
    id-att-logical-printers-ready       ID ::=  { id-oc-server  10 }
    id-att-translators-supported        ID ::=  { id-oc-server  11 }
    id-att-translators-ready            ID ::=  { id-oc-server  12 }
--DEL: id-att-delivery-methods-supported    ID ::=  { id-oc-server  13 }
    id-att-job-result-set-delivery-methods-supported
                                        ID ::=  { id-oc-server  13 }
--DEL: id-att-delivery-methods-ready        ID ::=  { id-oc-server  14 }
    id-att-job-result-set-delivery-methods-ready
                                        ID ::=  { id-oc-server  14 }
    id-att-job-validates-supported      ID ::=  { id-oc-server  17 }
    id-att-events-supported             ID ::=  { id-oc-server  18 }
    id-att-multiple-documents-supported ID ::=  { id-oc-server  19 }
    id-att-modify-individual-document-supported
                                        ID ::=  { id-oc-server  20 }
    id-att-cancel-individual-document-supported
                                        ID ::=  { id-oc-server  21 }
    id-att-extended-problems-supported  ID ::=  { id-oc-server  23 }
    id-att-server-resource-context      ID ::=  { id-oc-server  24 }
    id-att-transfer-methods-supported   ID ::=  { id-oc-server  25 }
    id-att-conformance-levels-supported ID ::=  { id-oc-server  27 }
```


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```
    id-att-job-states-supported                ID ::=  { id-oc-server  28 }
    id-att-job-state-reasons-supported         ID ::=  { id-oc-server  29 }
    id-att-document-states-supported           ID ::=  { id-oc-server  30 }
    id-att-printer-states-supported            ID ::=  { id-oc-server  31 }
    id-att-default-dist-name-syntax            ID ::=  { id-oc-server  32 }
    id-att-dist-name-syntaxes-supported        ID ::=  { id-oc-server  33 }
    id-att-locale                              ID ::=  { id-oc-server  34 }
    id-att-locales-supported                   ID ::=  { id-oc-server  35 }
    id-att-notification-delivery-methods-supported
                                               ID ::=  { id-oc-server  36 }
    id-att-notification-delivery-methods-ready
                                               ID ::=  { id-oc-server  37 }
    id-att-log-delivery-methods-supported      ID ::=  { id-oc-server  38 }
    id-att-log-delivery-methods-ready          ID ::=  { id-oc-server  39 }


--*****************************************************************************--

-- Medium object attributes --
    id-att-medium-identifier                   ID ::=  { id-oc-medium  0 }
    id-att-medium-type                         ID ::=  { id-oc-medium  3 }
    id-att-medium-size                         ID ::=  { id-oc-medium  4 }
    id-att-medium-dimensions                   ID ::=  { id-oc-medium  5 }
    id-att-medium-colour                       ID ::=  { id-oc-medium  6 }
    id-att-medium-tooth                        ID ::=  { id-oc-medium  7 }
    id-att-medium-grain                        ID ::=  { id-oc-medium  8 }
    id-att-medium-sides                        ID ::=  { id-oc-medium  9 }
    id-att-medium-weight                       ID ::=  { id-oc-medium  10 }
    id-att-medium-assured-reproduction-area    ID ::=  { id-oc-medium  11 }
    id-att-medium-associated-media             ID ::=  { id-oc-medium  12 }
    id-att-medium-realization                  ID ::=  { id-oc-medium  13 }
    id-att-medium-form-parts                   ID ::=  { id-oc-medium  15 }
    id-att-medium-holes-count                  ID ::=  { id-oc-medium  20 }
    id-att-medium-holes-edge                   ID ::=  { id-oc-medium  21 }
    id-att-medium-holes-axis-offset            ID ::=  { id-oc-medium  22 }
    id-att-medium-holes-locations              ID ::=  { id-oc-medium  23 }
    id-att-medium-holes-diameter               ID ::=  { id-oc-medium  24 }


-- Font object attributes --
    id-att-font-identifier                     ID ::=  { id-oc-font  0 }


-- Resource object attributes --
    id-att-resource-name                       ID ::=  { id-oc-resource  0 }
    id-att-resource-type                       ID ::=  { id-oc-resource  1 }


-- Transfer-Method object attributes --
    id-att-transfer-method-identifier      ID ::=  { id-oc-transfer-method  0 }
    id-att-transfer-method-type            ID ::=  { id-oc-transfer-method  1 }
    id-att-document-reference-type         ID ::=  { id-oc-transfer-method  2 }
```


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```
-- Delivery Method object attributes --
     id-att-delivery-method-identifier     ID ::=  { id-oc-delivery-method  0 }


-- Auxiliary-sheet-package object attributes --
     id-att-auxiliary-sheet-package-identifier
                                    ID ::= { id-oc-auxiliary-sheet-package 0 }
     id-att-start-sheet-of-set      ID ::= { id-oc-auxiliary-sheet-package 1 }
     id-att-separator-sheet-of-set  ID ::= { id-oc-auxiliary-sheet-package 2 }
     id-att-end-sheet-of-set        ID ::= { id-oc-auxiliary-sheet-package 3 }
     id-att-start-sheet-of-copy     ID ::= { id-oc-auxiliary-sheet-package 4 }
     id-att-separator-sheet-of-copy ID ::= { id-oc-auxiliary-sheet-package 5 }
     id-att-end-sheet-of-copy       ID ::= { id-oc-auxiliary-sheet-package 6 }


-- Auxiliary Sheet object attributes --
     id-att-auxiliary-sheet-identifier     ID ::=  { id-oc-auxiliary-sheet  0 }
     id-att-auxiliary-sheet-medium         ID ::=  { id-oc-auxiliary-sheet  1 }


--*************************************************************************--

-- Finishing object attributes --
     id-att-finishing-identifier           ID ::=  { id-oc-finishing  0 }
     id-att-finishing-associated-finishings ID ::=  { id-oc-finishing  1 }
     id-att-finishing-realization          ID ::=  { id-oc-finishing  2 }
     id-att-finishing-specification        ID ::=  { id-oc-finishing  3 }


-- Output object attributes --
     id-att-output-identifier              ID ::=  { id-oc-output  0 }


-- Imposition object attributes --
     id-att-imposition-identifier          ID ::=  { id-oc-imposition  0 }
--DEL: id-att-imposition-associated-impositions  ID ::=  { id-oc-imposition  1 }
--DEL: id-att-imposition-realization           ID ::=  { id-oc-imposition  2 }
--DEL: id-att-plex                            ID ::=  { id-oc-imposition  3 }
--DEL: id-att-number-up                       ID ::=  { id-oc-imposition  4 }
--DEL: id-att-x-image-shift                   ID ::=  { id-oc-imposition  5 }
--DEL: id-att-y-image-shift                   ID ::=  { id-oc-imposition  6 }
     id-att-logical-page-origin            ID ::=  { id-oc-imposition  7 }
     id-att-logical-page-x-offset          ID ::=  { id-oc-imposition  8 }
     id-att-logical-page-y-offset          ID ::=  { id-oc-imposition  9 }
     id-att-logical-page-scaling           ID ::=  { id-oc-imposition 10 }
--DEL: id-att-imposition-specification        ID ::=  { id-oc-imposition 11 }
     id-att-imposition-n-up                ID ::=  { id-oc-imposition 12 }


-- Scheduler object attributes --
```


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```
    id-att-scheduler-identifier              ID ::=  { id-oc-scheduler  0 }


-- Initial-value-job object attributes --

    id-att-initial-value-job-identifier   ID ::= { id-oc-initial-value-job 0 }


-- Initial-value-document object attributes --

    id-att-initial-value-document-identifier
                                    ID ::= { id-oc-initial-value-document 0 }


-- Resource-context object attributes --

    id-att-resource-context-identifier     ID ::= { id-oc-resource-context 0 }
    id-att-context-address                 ID ::= { id-oc-resource-context 1 }


--*****************************************************************************--

-- DPA Attribute Value Classes --
   ---------------------------

-- Generic object value classes --
    id-vc-state                            ID ::=  { id-vc  0 }
    id-vc-availability                     ID ::=  { id-vc  1 }
    id-vc-generic                          ID ::=  { id-vc  2 }


-- Job and Document object value classes  --
    id-vc-print-quality                    ID ::=  { id-vc  10 }
    id-vc-font-fidelity                    ID ::=  { id-vc  11 }
    id-vc-medium-fidelity                  ID ::=  { id-vc  12 }
    id-vc-document-format                  ID ::=  { id-vc  14 }
--DEL: id-vc-doc-fmt-variant                 ID ::=  { id-vc  15 }
    id-vc-content-orientation              ID ::=  { id-vc  16 }
--DEL: id-vc-page-order                      ID ::=  { id-vc  17 }
    id-vc-job-state                        ID ::=  { id-vc  18 }
    id-vc-reasons                          ID ::=  { id-vc  19 }
    id-vc-job-scheduling                   ID ::=  { id-vc  20 }
    id-vc-job-validate                     ID ::=  { id-vc  21 }
    id-vc-document-type                    ID ::=  { id-vc  22 }
    id-vc-document-state                   ID ::=  { id-vc  23 }
    id-vc-code-set                         ID ::=  { id-vc  24 }
    id-vc-confidentiality-policy           ID ::=  { id-vc  25 }
    id-vc-integrity-policy                 ID ::=  { id-vc  26 }
    id-vc-security-label                   ID ::=  { id-vc  27 }
    id-vc-security-policy                  ID ::=  { id-vc  28 }
    id-vc-printer-resolution               ID ::=  { id-vc  29 }
```


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```
-- Printer object value classes --
     id-vc-printer-state                    ID ::=  { id-vc  30 }
--DEL: id-vc-printer-type                     ID ::=  { id-vc  31 }
     id-vc-printer-output-bin               ID ::=  { id-vc  33 }
     id-vc-input-tray                       ID ::=  { id-vc  34 }
     id-vc-printer-type                     ID ::=  { id-vc  35 }
      -- Assign new set of printer-type OIDs to align with IETF
      -- Printer MIB MarkingTechnology enum values; don't re-use
      -- the printer-type OIDs already assigned by ISO/IEC 10175.
     id-vc-checkpoint-formats               ID ::=  { id-vc  36 }


--*****************************************************************************--

-- Server object value classes --
  -- server-state (uses only generic object state values) --

  -- Conformance levels value  --
     id-vc-conformance-level                ID ::=  { id-vc  40 }

  -- Distinguished name value  --
     id-vc-dist-name-syntax                 ID ::=  { id-vc  41 }


-- Medium object value classes --
     id-vc-medium                           ID ::=  { id-vc  50 }
     -- medium-state (uses only generic object state values) --
     id-vc-medium-type                      ID ::=  { id-vc  52 }
     id-vc-medium-size                      ID ::=  { id-vc  53 }
     id-vc-medium-colour                    ID ::=  { id-vc  54 }
     id-vc-medium-tooth                     ID ::=  { id-vc  55 }
     id-vc-medium-grain                     ID ::=  { id-vc  56 }


-- Font object value classes --
  -- font-state (uses only generic object state values) --


-- Resource object value classes --
     id-vc-resource                         ID ::=  { id-vc  65 }
     id-vc-resource-type                    ID ::=  { id-vc  66 }


-- Transfer Method object value classes --
     id-vc-transfer-method                  ID ::=  { id-vc  75 }
     id-vc-transfer-method-type             ID ::=  { id-vc  76 }
     id-vc-document-ref-type                ID ::=  { id-vc  77 }


-- Delivery Method object value classes --
     id-vc-delivery-method                  ID ::=  { id-vc  80 }
```


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```
-- Auxiliary-sheet-package object value classes --
     id-vc-aux-pkg                          ID ::=  { id-vc  84 }

-- Auxiliary Sheet object value classes --
     id-vc-aux-sheet                        ID ::=  { id-vc  85 }

--*****************************************************************************--

-- Finishing object value classes --
     id-vc-finishing                        ID ::=  { id-vc  90 }
     id-vc-stitching                        ID ::=  { id-vc  91 }
     id-vc-stitching-type                   ID ::=  { id-vc  93 }
     id-vc-binding                          ID ::=  { id-vc  92 }
     id-vc-binding-type                     ID ::=  { id-vc  94 }
     id-vc-binding-colour                   ID ::=  { id-vc  95 }
     id-vc-perforation                      ID ::=  { id-vc  97 }
     id-vc-perforation-type                 ID ::=  { id-vc  96 }
     id-vc-trimming                         ID ::=  { id-vc  98 }
     id-vc-punching                         ID ::=  { id-vc  99 }
     id-vc-slitting                         ID ::=  { id-vc  110 }
     id-vc-covers                           ID ::=  { id-vc  111 }
     id-vc-cover-name                       ID ::=  { id-vc  112 }
     id-vc-folding                          ID ::=  { id-vc  113 }

-- Output object value classes --
     id-vc-output                           ID ::=  { id-vc  115 }

-- Imposition object value classes --
     id-vc-imposition                       ID ::=  { id-vc  100 }
     id-vc-plex                             ID ::=  { id-vc  101 }
     id-vc-logical-page-origin              ID ::=  { id-vc  102 }

-- Scheduler object value classes --
     id-vc-scheduler                        ID ::=  { id-vc  105 }

-- Initial-value-job object value classes --
     id-vc-initial-value-job                ID ::=  { id-vc  106 }

-- Initial-value-document object value classes --
     id-vc-initial-value-document           ID ::=  { id-vc  107 }

-- Resource Context object value classes --
    id-vc-resource-context                  ID ::=  { id-vc  108 }
```


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```
-- Event value classes --
     id-vc-event-class                    ID ::=  { id-vc  120 }
     id-vc-event-aborted                  ID ::=  { id-vc  121 }
     id-vc-event-error                    ID ::=  { id-vc  122 }
     id-vc-event-warning                  ID ::=  { id-vc  123 }
     id-vc-event-report                   ID ::=  { id-vc  124 }
     id-vc-event-state-changed            ID ::=  { id-vc  125 }


--*****************************************************************************--

-- Some more value-classes for document attributes for which ISO DPA does not
  -- define OIDs for the corresponding attribute values --
--DEL: id-vc-character-sets                 ID ::=  { id-vc 200 }
     id-vc-character-repertoire           ID ::=  { id-vc 201 }
     id-vc-character-mapping              ID ::=  { id-vc 202 }

  -- Some value-classes for document-format specific attributes --
     id-vc-nl-option                      ID ::=  { id-vc 204 }
     id-vc-cc-type                        ID ::=  { id-vc 205 }
     id-vc-shift-out-shift-in             ID ::=  { id-vc 206 }


--*****************************************************************************--

-- DPA Attribute Value identification --
   ---------------------------------

-- Generic object attribute values --

  -- state --
     id-val-state-ready                   ID ::=  { id-vc-state  1 }
     id-val-state-on-request              ID ::=  { id-vc-state  2 }
     id-val-state-unavailable             ID ::=  { id-vc-state  3 }
     id-val-state-unknown                 ID ::=  { id-vc-state  4 }
     id-val-state-busy                    ID ::=  { id-vc-state  5 }
     id-val-state-initializing            ID ::=  { id-vc-state  6 }
     id-val-state-terminating             ID ::=  { id-vc-state  7 }

  -- availability --
     id-val-availability-high             ID ::=  { id-vc-availability  1 }
     id-val-availability-normal           ID ::=  { id-vc-availability  2 }
     id-val-availability-low              ID ::=  { id-vc-availability  3 }
     id-val-availability-none             ID ::=  { id-vc-availability  5 }
     id-val-availability-unknown          ID ::=  { id-vc-availability  6 }

  -- generic (can be used on any objectIdentifierSyntax or nameOrOidSyntax) --
     id-val-generic-none                  ID ::=  { id-vc-generic  0 }
```


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```
-- Job object attribute values --

  -- print-quality --
     id-val-print-quality-draft              ID ::=  { id-vc-print-quality  0 }
     id-val-print-quality-normal             ID ::=  { id-vc-print-quality  1 }
     id-val-print-quality-high               ID ::=  { id-vc-print-quality  2 }

-- printer-resolution --
     id-val-printer-resolution-lowest     ID ::= { id-vc-printer-resolution 0 }
     id-val-printer-resolution-medium     ID ::= { id-vc-printer-resolution 1 }
     id-val-printer-resolution-highest    ID ::= { id-vc-printer-resolution 2 }

  -- medium-fidelity --
     id-val-medium-fidelity-size    ID ::=  { id-vc-medium-fidelity  0 }
     id-val-medium-fidelity-colour  ID ::=  { id-vc-medium-fidelity  1 }
     id-val-medium-fidelity-tooth   ID ::=  { id-vc-medium-fidelity  2 }
     id-val-medium-fidelity-grain   ID ::=  { id-vc-medium-fidelity  3 }
     id-val-medium-fidelity-weight  ID ::=  { id-vc-medium-fidelity  4 }
     id-val-medium-fidelity-ara     ID ::=  { id-vc-medium-fidelity  5 }

  -- document-format --
     -- see Annex F for document format identifiers --

  -- document-type --
     id-val-document-type-printable       ID ::=  { id-vc-document-type  0 }
     id-val-document-type-font            ID ::=  { id-vc-document-type  1 }
     id-val-document-type-resource        ID ::=  { id-vc-document-type  3 }

  -- document-state --
     id-val-document-state-transfer-pending ID ::=  { id-vc-document-state  0 }
     id-val-document-state-pending          ID ::=  { id-vc-document-state  1 }
     id-val-document-state-processing       ID ::=  { id-vc-document-state  2 }
     id-val-document-state-completed        ID ::=  { id-vc-document-state  3 }
     id-val-document-state-printing         ID ::=  { id-vc-document-state  4 }

-- Coded Character Set OIDs
-- Created by using the Internet Printer MIB coded character set
-- enum values as the last arc of the ISO DPA OID.  See the
-- default-character-set attribute and Internet RFC 1759 (Printer MIB).

-- The Internet Authority for Number Assignment (IANA) has assigned
-- numbers to other character sets in addition to those shown here.
-- The OIDs listed here are those character sets that the developers of RFC 1759
-- registered initially for use with printers.  Other character sets will
-- continue to be registered with IANA and assigned numbers.  These numbers can
-- be used as the last arc of the DPA OID without requiring any update to
-- the DPA standard.  The IANA character sets registry is available via
-- anonymous ftp:

--    The ftp server is ftp.isi.edu.
--    The subdirectory is /in-notes/iana/assignments/.
--    The file name is character-sets.
```


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```
-- NOTE: iso-ucs-2-level2 has been assigned the value 0 in this
-- International Standard; this value is NOT defined in the
-- Internet Printer MIB, since SNMP forbids the value 0 in enums.
-- However, the Printer MIB defines Unicode enum (1000) which is equivalent to
-- ISO/IEC 10646 Level 3 and is sufficient for the needs of a printer.
     id-val-code-set-iso-ucs-2-level2            ID ::= { id-vc-code-set  0 }
     id-val-code-set-other                       ID ::= { id-vc-code-set  1 }

-- standard sets in the range 3-999:
     id-val-code-set-ASCII                       ID ::= { id-vc-code-set  3 }
     id-val-code-set-ISO-Latin1                  ID ::= { id-vc-code-set  4 }
     id-val-code-set-ISO-Latin2                  ID ::= { id-vc-code-set  5 }
     id-val-code-set-ISO-Latin3                  ID ::= { id-vc-code-set  6 }
     id-val-code-set-ISO-Latin4                  ID ::= { id-vc-code-set  7 }
     id-val-code-set-ISO-Latin-Cyrillic          ID ::= { id-vc-code-set  8 }
     id-val-code-set-ISO-Latin-Arabic            ID ::= { id-vc-code-set  9 }
     id-val-code-set-ISO-Latin-Greek             ID ::= { id-vc-code-set 10 }
     id-val-code-set-ISO-Latin-Hebrew            ID ::= { id-vc-code-set 11 }
     id-val-code-set-ISO-Latin5                  ID ::= { id-vc-code-set 12 }
     id-val-code-set-ISO-Latin6                  ID ::= { id-vc-code-set 13 }
     id-val-code-set-ISO-Text-Communication      ID ::= { id-vc-code-set 14 }
     id-val-code-set-Half-Width-Katakana         ID ::= { id-vc-code-set 15 }
     id-val-code-set-JIS-Encoding                ID ::= { id-vc-code-set 16 }
     id-val-code-set-Shift-JIS                   ID ::= { id-vc-code-set 17 }
     id-val-code-set-EUC-Packed-Format-Japanese  ID ::= { id-vc-code-set 18 }
     id-val-code-set-EUC-Fixed-Width-Japanese    ID ::= { id-vc-code-set 19 }
     id-val-code-set-ISO-reg4-United-Kingdom     ID ::= { id-vc-code-set 20 }
     id-val-code-set-ISO-reg11-Swedish-for-Names ID ::= { id-vc-code-set 21 }
     id-val-code-set-ISO-reg15-Italian           ID ::= { id-vc-code-set 22 }
     id-val-code-set-ISO-reg17-Spanish           ID ::= { id-vc-code-set 23 }
     id-val-code-set-ISO-reg21-German            ID ::= { id-vc-code-set 24 }
     id-val-code-set-ISO-reg60-Danish-Norwegian  ID ::= { id-vc-code-set 25 }
     id-val-code-set-ISO-reg69-French            ID ::= { id-vc-code-set 26 }

-- Unicode and vendor-supplied combinations of ISO collections
-- in the range 1000-1999):
     id-val-code-set-Unicode                   ID ::= { id-vc-code-set 1000 }
     id-val-code-set-UCS4                      ID ::= { id-vc-code-set 1001 }
     id-val-code-set-Unicode-ASCII             ID ::= { id-vc-code-set 1002 }
     id-val-code-set-Unicode-Latin1            ID ::= { id-vc-code-set 1003 }
     id-val-code-set-Unicode-IBM-2039          ID ::= { id-vc-code-set 1004 }
     id-val-code-set-Unicode-IBM-1261          ID ::= { id-vc-code-set 1005 }
     id-val-code-set-Unicode-IBM-1268          ID ::= { id-vc-code-set 1006 }
     id-val-code-set-Unicode-IBM-1276          ID ::= { id-vc-code-set 1007 }
     id-val-code-set-Unicode-IBM-1264          ID ::= { id-vc-code-set 1008 }
     id-val-code-set-Unicode-IBM-1265          ID ::= { id-vc-code-set 1009 }

-- Vendor developed coded character sets in the range 2000-xxx):
     id-val-code-set-Windows30-Latin1          ID ::= { id-vc-code-set 2000 }
     id-val-code-set-Windows31-Latin1          ID ::= { id-vc-code-set 2001 }
     id-val-code-set-Windows31-Latin2          ID ::= { id-vc-code-set 2002 }
     id-val-code-set-Windows31-Latin5          ID ::= { id-vc-code-set 2003 }
     id-val-code-set-HP-Roman8                 ID ::= { id-vc-code-set 2004 }
```


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```
    id-val-code-set-Adobe-Standard-Encoding   ID ::= { id-vc-code-set 2005 }
    id-val-code-set-Ventura-US                ID ::= { id-vc-code-set 2006 }
    id-val-code-set-Ventura-International     ID ::= { id-vc-code-set 2007 }
    id-val-code-set-DEC-MCS                   ID ::= { id-vc-code-set 2008 }
    id-val-code-set-PC-page-850-Multilingual  ID ::= { id-vc-code-set 2009 }
    id-val-code-set-PC-page-852-Latin2        ID ::= { id-vc-code-set 2010 }
    id-val-code-set-PC8-page-437-US           ID ::= { id-vc-code-set 2011 }
    id-val-code-set-PC8-Danish-Norwegian      ID ::= { id-vc-code-set 2012 }
    id-val-code-set-PC-page-862-Latin-Hebrew  ID ::= { id-vc-code-set 2013 }
    id-val-code-set-PC8-Turkish               ID ::= { id-vc-code-set 2014 }
    id-val-code-set-IBM-Symbols               ID ::= { id-vc-code-set 2015 }
    id-val-code-set-IBM-Thai                  ID ::= { id-vc-code-set 2016 }
    id-val-code-set-HP-Legal                  ID ::= { id-vc-code-set 2017 }
    id-val-code-set-HP-PiFont                 ID ::= { id-vc-code-set 2018 }
    id-val-code-set-HP-Math8                  ID ::= { id-vc-code-set 2019 }
    id-val-code-set-HP-PS-Math                ID ::= { id-vc-code-set 2020 }
    id-val-code-set-HP-Desktop                ID ::= { id-vc-code-set 2021 }
    id-val-code-set-Ventura-Math              ID ::= { id-vc-code-set 2022 }
    id-val-code-set-Microsoft-Publishing      ID ::= { id-vc-code-set 2023 }
    id-val-code-set-Windows31J                ID ::= { id-vc-code-set 2024 }
    id-val-code-set-GB-2312                   ID ::= { id-vc-code-set 2025 }
    id-val-code-set-Big5                      ID ::= { id-vc-code-set 2026 }

  -- content-orientation --
    id-val-content-orientation-portrait  ID ::= { id-vc-content-orientation 0 }
    id-val-content-orientation-landscape ID ::= { id-vc-content-orientation 1 }
--DEL: id-val-content-orientation-mixed ID ::= { id-vc-content-orientation 2 }
    id-val-content-orientation-reverse-portrait
                                         ID ::= { id-vc-content-orientation 3 }
    id-val-content-orientation-reverse-landscape
                                         ID ::= { id-vc-content-orientation 4 }

--DEL: page-order --
--DEL: id-val-page-order-forward          ID ::=  { id-vc-page-order  0 }
--DEL: id-val-page-order-reverse          ID ::=  { id-vc-page-order  1 }
--DEL: id-val-page-order-signature        ID ::=  { id-vc-page-order  2 }

  -- job-state --
    id-val-job-state-unknown              ID ::=  { id-vc-job-state  0 }
    id-val-job-state-pre-processing       ID ::=  { id-vc-job-state  1 }
    id-val-job-state-pending              ID ::=  { id-vc-job-state  4 }
    id-val-job-state-processing           ID ::=  { id-vc-job-state  5 }
    id-val-job-state-interrupted          ID ::=  { id-vc-job-state  6 }
    id-val-job-state-retained             ID ::=  { id-vc-job-state  9 }
    id-val-job-state-held                 ID ::=  { id-vc-job-state  10 }
    id-val-job-state-paused               ID ::=  { id-vc-job-state  11 }
    id-val-job-state-terminating          ID ::=  { id-vc-job-state  12 }
    id-val-job-state-cancelled            ID ::=  { id-vc-job-state  14 }
    id-val-job-state-completed            ID ::=  { id-vc-job-state  15 }
    id-val-job-state-printing             ID ::=  { id-vc-job-state  16 }

  -- job-state-reasons --
    id-val-reasons-documents-needed       ID ::=  { id-vc-reasons  1 }
```


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```
   id-val-reasons-job-hold-set                 ID ::=  { id-vc-reasons  2 }
   id-val-reasons-job-print-after-specified    ID ::=  { id-vc-reasons  3 }
   id-val-reasons-required-resources-not-ready
                                               ID ::=  { id-vc-reasons  4 }
   id-val-reasons-successful-completion        ID ::=  { id-vc-reasons  5 }
   id-val-reasons-completed-with-warnings      ID ::=  { id-vc-reasons  6 }
   id-val-reasons-completed-with-errors        ID ::=  { id-vc-reasons  7 }
   id-val-reasons-cancelled-by-user            ID ::=  { id-vc-reasons  8 }
   id-val-reasons-cancelled-by-operator        ID ::=  { id-vc-reasons  9 }
   id-val-reasons-aborted-by-system            ID ::=  { id-vc-reasons 10 }
   id-val-reasons-logfile-pending              ID ::=  { id-vc-reasons 11 }
   id-val-reasons-logfile-transferring         ID ::=  { id-vc-reasons 12 }

-- job-scheduling --
   id-val-job-scheduling-after-complete   ID ::=  { id-vc-job-scheduling  0 }
   id-val-job-scheduling-before-complete  ID ::=  { id-vc-job-scheduling  1 }
   id-val-job-scheduling-either           ID ::=  { id-vc-job-scheduling  2 }

-- job-validate --
   id-val-job-validate-and-print          ID ::=  { id-vc-job-validate  0 }
   id-val-job-validate-submit-only        ID ::=  { id-vc-job-validate  1 }

-- confidentiality-policy --
   id-val-confidentiality-policy-b-and-l
                                  ID ::= { id-vc-confidentiality-policy 0 }

-- integrity-policy --
   id-val-integrity-policy-biba      ID ::= { id-vc-integrity-policy 0 }

-- security-label --
   id-val-security-label-sheet-top        ID ::=  { id-vc-security-label 0 }
   id-val-security-label-no-sheet-top     ID ::=  { id-vc-security-label 1 }
   id-val-security-label-sheet-bottom     ID ::=  { id-vc-security-label 2 }
   id-val-security-label-no-sheet-bottom  ID ::=  { id-vc-security-label 3 }
   id-val-security-label-job-start-sheet  ID ::=  { id-vc-security-label 4 }
   id-val-security-label-job-end-sheet    ID ::=  { id-vc-security-label 5 }

-- security-policy --
   id-val-security-policy-disclosable     ID ::=  { id-vc-security-policy 0 }

-- new-line-option --
   id-val-nl-option-cr-and-lf                 ID ::= { id-vc-nl-option  1 }
   id-val-nl-option-lf                        ID ::= { id-vc-nl-option  2 }
   id-val-nl-option-cr                        ID ::= { id-vc-nl-option  3 }
   id-val-nl-option-cr-or-lf                  ID ::= { id-vc-nl-option  4 }
   id-val-nl-option-counted-4-octet-aligned   ID ::= { id-vc-nl-option  5 }
   id-val-nl-option-unknown                   ID ::= { id-vc-nl-option  6 }

-- carriage-control-type --
   id-val-cc-type-ansi-ascii                    ID ::= { id-vc-cc-type  1 }
   id-val-cc-type-ansi-ebcdic                   ID ::= { id-vc-cc-type  2 }
   id-val-cc-type-machine                       ID ::= { id-vc-cc-type  3 }
```


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```
  -- shift-out-shift-in --
     id-val-shift-out-shift-in-one    ID ::= { id-vc-shift-out-shift-in  1 }
     id-val-shift-out-shift-in-two    ID ::= { id-vc-shift-out-shift-in  2 }
     id-val-shift-out-shift-in-three  ID ::= { id-vc-shift-out-shift-in  3 }


--*****************************************************************************--

-- Printer object attribute values --

  -- printer-types --

--DEL: id-val-printer-type-black-and-white    ID ::=  { id-vc-printer-type  0 }
--DEL: id-val-printer-type-greyscale          ID ::=  { id-vc-printer-type  1 }
--DEL: id-val-printer-type-highlight          ID ::=  { id-vc-printer-type  2 }
--DEL: id-val-printer-type-colour             ID ::=  { id-vc-printer-type  3 }

     -- mechanism --
--DEL: id-val-printer-type-line               ID ::=  { id-vc-printer-type  10 }
--DEL: id-val-printer-type-laser              ID ::=  { id-vc-printer-type  11 }
--DEL: id-val-printer-type-microfiche-imager  ID ::=  { id-vc-printer-type  12 }
--DEL: id-val-printer-type-plotter            ID ::=  { id-vc-printer-type  13 }
--DEL: id-val-printer-type-ink-jet            ID ::=  { id-vc-printer-type  14 }
--DEL: id-val-printer-type-dot-matrix         ID ::=  { id-vc-printer-type  15 }
--DEL: id-val-printer-type-daisy-wheel        ID ::=  { id-vc-printer-type  16 }
--DEL: id-val-printer-type-typesetter         ID ::=  { id-vc-printer-type  17 }
--DEL: id-val-printer-type-imagesetter        ID ::=  { id-vc-printer-type  18 }
  -- The following values were formed by appending the Internet Printer MIB
  -- prtMarkerMarkTech enum values to the id-vc-printer-type OID:

     id-val-printer-type-other               ID ::=  { id-vc-printer-type  1 }
 --  value 2 is reserved (unknown is not allowed by Internet Printer MIB)
     id-val-printer-type-electrophotographic-LED
                                             ID ::=  { id-vc-printer-type  3 }
     id-val-printer-type-electrophotographic-laser
                                             ID ::=  { id-vc-printer-type  4 }
     id-val-printer-type-electrophotographic-other
                                             ID ::=  { id-vc-printer-type  5 }
     id-val-printer-type-impact-moving-head-dot-matrix-9-pin
                                             ID ::=  { id-vc-printer-type  6 }
     id-val-printer-type-impact-moving-head-dot-matrix-24-pin
                                             ID ::=  { id-vc-printer-type  7 }
     id-val-printer-type-impact-moving-head-dot-matrix-other
                                             ID ::=  { id-vc-printer-type  8 }
     id-val-printer-type-impact-moving-head-fully-formed
                                             ID ::=  { id-vc-printer-type  9 }
     id-val-printer-type-impact-band         ID ::=  { id-vc-printer-type 10 }
     id-val-printer-type-impact-other        ID ::=  { id-vc-printer-type 11 }
     id-val-printer-type-inkjet-aqueous      ID ::=  { id-vc-printer-type 12 }
     id-val-printer-type-inkjet-solid        ID ::=  { id-vc-printer-type 13 }
     id-val-printer-type-inkjet-other        ID ::=  { id-vc-printer-type 14 }
     id-val-printer-type-pen                 ID ::=  { id-vc-printer-type 15 }
```


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```
   id-val-printer-type-thermal-transfer    ID ::=  { id-vc-printer-type 16 }
   id-val-printer-type-thermal-sensitive   ID ::=  { id-vc-printer-type 17 }
   id-val-printer-type-thermal-diffusion   ID ::=  { id-vc-printer-type 18 }
   id-val-printer-type-thermal-other       ID ::=  { id-vc-printer-type 19 }
   id-val-printer-type-electro-erosion     ID ::=  { id-vc-printer-type 20 }
   id-val-printer-type-electro-static      ID ::=  { id-vc-printer-type 21 }
   id-val-printer-type-photographic-microfiche
                                           ID ::=  { id-vc-printer-type 22 }
   id-val-printer-type-photographic-imagesetter
                                           ID ::=  { id-vc-printer-type 23 }
   id-val-printer-type-photographic-other  ID ::=  { id-vc-printer-type 24 }
   id-val-printer-type-ion-deposition      ID ::=  { id-vc-printer-type 25 }
   id-val-printer-type-E-beam              ID ::=  { id-vc-printer-type 26 }
   id-val-printer-type-typesetter          ID ::=  { id-vc-printer-type 27 }

-- printer-state --
   id-val-printer-state-unknown            ID ::=  { id-vc-printer-state  0 }
   id-val-printer-state-idle               ID ::=  { id-vc-printer-state  1 }
   id-val-printer-state-printing           ID ::=  { id-vc-printer-state  2 }
   id-val-printer-state-needs-attention    ID ::=  { id-vc-printer-state  3 }
   id-val-printer-state-paused             ID ::=  { id-vc-printer-state  4 }
   id-val-printer-state-shutdown           ID ::=  { id-vc-printer-state  5 }
   id-val-printer-state-job-start-wait     ID ::=  { id-vc-printer-state  6 }
   id-val-printer-state-job-end-wait       ID ::=  { id-vc-printer-state  7 }
   id-val-printer-state-needs-key-operator ID ::= { id-vc-printer-state  8 }
   id-val-printer-state-job-password-wait
                                           ID ::=  { id-vc-printer-state  9 }
   id-val-printer-state-timed-out          ID ::=  { id-vc-printer-state 10 }
   id-val-printer-state-connecting-to-printer
                                           ID ::=  { id-vc-printer-state 11 }

-- printer-output-bin --
   id-val-output-bin-top                ID ::=  { id-vc-printer-output-bin  0 }
   id-val-output-bin-middle             ID ::=  { id-vc-printer-output-bin  1 }
   id-val-output-bin-bottom             ID ::=  { id-vc-printer-output-bin  2 }
   id-val-output-bin-side               ID ::=  { id-vc-printer-output-bin  3 }
   id-val-output-bin-face-up            ID ::=  { id-vc-printer-output-bin  4 }
   id-val-output-bin-left               ID ::=  { id-vc-printer-output-bin  5 }
   id-val-output-bin-right              ID ::=  { id-vc-printer-output-bin  6 }
   id-val-output-bin-large              ID ::=  { id-vc-printer-output-bin  7 }
   id-val-output-bin-private            ID ::=  { id-vc-printer-output-bin  8 }
   id-val-output-bin-face-down          ID ::=  { id-vc-printer-output-bin  9 }
   id-val-output-bin-collator           ID ::=  { id-vc-printer-output-bin 10 }

-- printer-input-tray --
   id-val-input-tray-top                   ID ::=  { id-vc-input-tray  0 }
   id-val-input-tray-middle                ID ::=  { id-vc-input-tray  1 }
   id-val-input-tray-bottom                ID ::=  { id-vc-input-tray  2 }
   id-val-input-tray-envelope              ID ::=  { id-vc-input-tray  3 }
   id-val-input-tray-manual                ID ::=  { id-vc-input-tray  4 }
   id-val-input-tray-large-capacity        ID ::=  { id-vc-input-tray  5 }
   id-val-input-tray-main                  ID ::=  { id-vc-input-tray  6 }
   id-val-input-tray-side                  ID ::=  { id-vc-input-tray  7 }
```


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```
   -- print-checkpoint-formats-supported
      id-val-checkpoint-format-no-context-info
                                    ID ::=  { id-vc-checkpoint-formats  0 }


--*****************************************************************************--

-- Server object attribute values --

   -- server-state (uses only generic object values) --

   -- conformance-level --
     id-val-conformance-level-1    ID ::=  { id-vc-conformance-level  1 }
     id-val-conformance-level-2    ID ::=  { id-vc-conformance-level  2 }
     id-val-conformance-level-1m   ID ::=  { id-vc-conformance-level  3 }
     id-val-conformance-level-2m   ID ::=  { id-vc-conformance-level  4 }

   -- distinguished-name-syntaxes --
     id-val-dn-syntax-automatic      ID ::=  { id-vc-dist-name-syntax  0 }
     id-val-dn-syntax-x-500          ID ::=  { id-vc-dist-name-syntax  1 }
     id-val-dn-syntax-xfn            ID ::=  { id-vc-dist-name-syntax  2 }
     id-val-dn-syntax-dce            ID ::=  { id-vc-dist-name-syntax  3 }
     id-val-dn-syntax-cds            ID ::=  { id-vc-dist-name-syntax  4 }
     id-val-dn-syntax-nis            ID ::=  { id-vc-dist-name-syntax  5 }
     id-val-dn-syntax-dns            ID ::=  { id-vc-dist-name-syntax  6 }
     id-val-dn-syntax-dec-ns         ID ::=  { id-vc-dist-name-syntax  7 }
     id-val-dn-syntax-internet-mail  ID ::=  { id-vc-dist-name-syntax  8 }
     id-val-dn-syntax-xns            ID ::=  { id-vc-dist-name-syntax  9 }
     id-val-dn-syntax-bindery        ID ::=  { id-vc-dist-name-syntax 10 }
     id-val-dn-syntax-nds            ID ::=  { id-vc-dist-name-syntax 11 }
     id-val-dn-syntax-url            ID ::=  { id-vc-dist-name-syntax 12 }

     id-val-dn-syntax-posix          ID ::=  { id-vc-dist-name-syntax 20 }
     id-val-dn-syntax-unix           ID ::=  { id-vc-dist-name-syntax 21 }
     id-val-dn-syntax-os2            ID ::=  { id-vc-dist-name-syntax 22 }
     id-val-dn-syntax-pc-dos         ID ::=  { id-vc-dist-name-syntax 23 }
     id-val-dn-syntax-nt             ID ::=  { id-vc-dist-name-syntax 24 }
     id-val-dn-syntax-mvs            ID ::=  { id-vc-dist-name-syntax 25 }
     id-val-dn-syntax-vm             ID ::=  { id-vc-dist-name-syntax 26 }
     id-val-dn-syntax-os400          ID ::=  { id-vc-dist-name-syntax 27 }
     id-val-dn-syntax-vms            ID ::=  { id-vc-dist-name-syntax 28 }
     id-val-dn-syntax-unc            ID ::=  { id-vc-dist-name-syntax 29 }
     id-val-dn-syntax-netware        ID ::=  { id-vc-dist-name-syntax 30 }

--*****************************************************************************--

-- Medium object attribute values --

   -- medium --
      id-val-medium-default                    ID ::=  { id-vc-medium  1000 }
      id-val-medium-iso-a4-white                 ID ::=  { id-vc-medium   0 }
```


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```
id-val-medium-iso-a4-coloured                    ID ::= { id-vc-medium   1 }
id-val-medium-iso-a4-transparent                 ID ::= { id-vc-medium   2 }

id-val-medium-iso-a3-white                       ID ::= { id-vc-medium  10 }
id-val-medium-iso-a3-coloured                    ID ::= { id-vc-medium  11 }

id-val-medium-iso-a5-white                       ID ::= { id-vc-medium  20 }
id-val-medium-iso-a5-coloured                    ID ::= { id-vc-medium  21 }

id-val-medium-iso-b4-white                       ID ::= { id-vc-medium  30 }
id-val-medium-iso-b4-coloured                    ID ::= { id-vc-medium  31 }

id-val-medium-iso-b5-white                       ID ::= { id-vc-medium  40 }
id-val-medium-iso-b5-coloured                    ID ::= { id-vc-medium  41 }

id-val-medium-na-letter-white                    ID ::= { id-vc-medium  50 }
id-val-medium-na-letter-coloured                 ID ::= { id-vc-medium  51 }
id-val-medium-na-letter-transparent              ID ::= { id-vc-medium  52 }

id-val-medium-na-legal-white                     ID ::= { id-vc-medium  60 }
id-val-medium-na-legal-coloured                  ID ::= { id-vc-medium  61 }

id-val-medium-iso-b5-envelope                    ID ::= { id-vc-medium  73 }
id-val-medium-iso-b4-envelope                    ID ::= { id-vc-medium  83 }
id-val-medium-iso-c3-envelope                    ID ::= { id-vc-medium  88 }
id-val-medium-iso-c4-envelope                    ID ::= { id-vc-medium  93 }
id-val-medium-iso-c5-envelope                    ID ::= { id-vc-medium 103 }
id-val-medium-iso-c6-envelope                    ID ::= { id-vc-medium 108 }
id-val-medium-iso-designated-long-envelope       ID ::= { id-vc-medium 113 }

id-val-medium-na-10x13-envelope                  ID ::= { id-vc-medium 123 }
id-val-medium-na-9x12-envelope                   ID ::= { id-vc-medium 133 }
id-val-medium-monarch-envelope                   ID ::= { id-vc-medium 134 }
id-val-medium-na-number-10-envelope              ID ::= { id-vc-medium 143 }
id-val-medium-na-7x9-envelope                    ID ::= { id-vc-medium 144 }
id-val-medium-na-9x11-envelope                   ID ::= { id-vc-medium 145 }
id-val-medium-na-10x14-envelope                  ID ::= { id-vc-medium 146 }
id-val-medium-na-number-9-envelope               ID ::= { id-vc-medium 147 }
id-val-medium-na-6x9-envelope                    ID ::= { id-vc-medium 148 }
id-val-medium-na-10x15-envelope                  ID ::= { id-vc-medium 149 }

id-val-medium-jis-b4-white                       ID ::= { id-vc-medium 150 }
id-val-medium-jis-b4-coloured                    ID ::= { id-vc-medium 151 }

id-val-medium-jis-b5-white                       ID ::= { id-vc-medium 160 }
id-val-medium-jis-b5-coloured                    ID ::= { id-vc-medium 161 }

-- less commonly used media (white-only) --
id-val-medium-executive                          ID ::= { id-vc-medium 170 }
id-val-medium-folio                              ID ::= { id-vc-medium 171 }
id-val-medium-invoice                            ID ::= { id-vc-medium 172 }
id-val-medium-ledger                             ID ::= { id-vc-medium 173 }
id-val-medium-quarto                             ID ::= { id-vc-medium 174 }
```


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```
    id-val-medium-iso-a0-white                  ID ::=  { id-vc-medium 200 }
    id-val-medium-iso-a1-white                  ID ::=  { id-vc-medium 201 }
    id-val-medium-iso-a2-white                  ID ::=  { id-vc-medium 202 }

    id-val-medium-iso-a6-white                  ID ::=  { id-vc-medium 206 }
    id-val-medium-iso-a7-white                  ID ::=  { id-vc-medium 207 }
    id-val-medium-iso-a8-white                  ID ::=  { id-vc-medium 208 }
    id-val-medium-iso-a9-white                  ID ::=  { id-vc-medium 209 }
    id-val-medium-iso-a10-white                 ID ::=  { id-vc-medium 210 }

    id-val-medium-iso-b0-white                  ID ::=  { id-vc-medium 220 }
    id-val-medium-iso-b1-white                  ID ::=  { id-vc-medium 221 }
    id-val-medium-iso-b2-white                  ID ::=  { id-vc-medium 222 }
    id-val-medium-iso-b3-white                  ID ::=  { id-vc-medium 223 }

    id-val-medium-iso-b6-white                  ID ::=  { id-vc-medium 226 }
    id-val-medium-iso-b7-white                  ID ::=  { id-vc-medium 227 }
    id-val-medium-iso-b8-white                  ID ::=  { id-vc-medium 228 }
    id-val-medium-iso-b9-white                  ID ::=  { id-vc-medium 229 }
    id-val-medium-iso-b10-white                 ID ::=  { id-vc-medium 230 }

    id-val-medium-jis-b0-white                  ID ::=  { id-vc-medium 240 }
    id-val-medium-jis-b1-white                  ID ::=  { id-vc-medium 241 }
    id-val-medium-jis-b2-white                  ID ::=  { id-vc-medium 242 }
    id-val-medium-jis-b3-white                  ID ::=  { id-vc-medium 243 }

    id-val-medium-jis-b6-white                  ID ::=  { id-vc-medium 246 }
    id-val-medium-jis-b7-white                  ID ::=  { id-vc-medium 247 }
    id-val-medium-jis-b8-white                  ID ::=  { id-vc-medium 248 }
    id-val-medium-jis-b9-white                  ID ::=  { id-vc-medium 249 }
    id-val-medium-jis-b10-white                 ID ::=  { id-vc-medium 250 }

    -- engineering media --
    id-val-medium-a                             ID ::=  { id-vc-medium 260 }
    id-val-medium-b                             ID ::=  { id-vc-medium 261 }
    id-val-medium-c                             ID ::=  { id-vc-medium 262 }
    id-val-medium-d                             ID ::=  { id-vc-medium 263 }
    id-val-medium-e                             ID ::=  { id-vc-medium 264 }

-- medium-type --
    id-val-medium-type-stationery               ID ::=  { id-vc-medium-type  0 }
    id-val-medium-type-transparency             ID ::=  { id-vc-medium-type  1 }
    id-val-medium-type-envelope                 ID ::=  { id-vc-medium-type  2 }
    id-val-medium-type-envelope-plain           ID ::=  { id-vc-medium-type  3 }
    id-val-medium-type-envelope-window          ID ::=  { id-vc-medium-type  9 }
    id-val-medium-type-continuous-long          ID ::=  { id-vc-medium-type  4 }
    id-val-medium-type-continuous-short         ID ::=  { id-vc-medium-type  5 }
    id-val-medium-type-tab-stock                ID ::=  { id-vc-medium-type  6 }
    id-val-medium-type-multi-part-form          ID ::=  { id-vc-medium-type  7 }
    id-val-medium-type-labels                   ID ::=  { id-vc-medium-type  8 }
    id-val-medium-type-multi-layer              ID ::=  { id-vc-medium-type  10 }
```


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```
-- medium-size --
  -- North American media and envelope sizes --
   id-val-medium-size-na-letter              ID ::=  { id-vc-medium-size  0 }
   id-val-medium-size-na-legal               ID ::=  { id-vc-medium-size  1 }
   id-val-medium-size-na-10x13-envelope      ID ::=  { id-vc-medium-size  2 }
   id-val-medium-size-na-9x12-envelope       ID ::=  { id-vc-medium-size  3 }
   id-val-medium-size-na-number-10-envelope  ID ::=  { id-vc-medium-size  4 }
   id-val-medium-size-na-7x9-envelope        ID ::=  { id-vc-medium-size  5 }
   id-val-medium-size-na-9x11-envelope       ID ::=  { id-vc-medium-size  6 }
   id-val-medium-size-na-10x14-envelope      ID ::=  { id-vc-medium-size  7 }
   id-val-medium-size-na-number-9-envelope   ID ::=  { id-vc-medium-size  8 }
   id-val-medium-size-na-6x9-envelope        ID ::=  { id-vc-medium-size  9 }
   id-val-medium-size-na-10x15-envelope      ID ::=  { id-vc-medium-size  10 }

  -- engineering drawing sizes
   id-val-medium-size-a                      ID ::=  { id-vc-medium-size  11 }
   id-val-medium-size-b                      ID ::=  { id-vc-medium-size  12 }
   id-val-medium-size-c                      ID ::=  { id-vc-medium-size  13 }
   id-val-medium-size-d                      ID ::=  { id-vc-medium-size  14 }
   id-val-medium-size-e                      ID ::=  { id-vc-medium-size  15 }
   id-val-medium-size-monarch-envelope       ID ::=  { id-vc-medium-size  16 }

  -- ISO A series media per ISO 216 --
   id-val-medium-size-iso-a0                 ID ::=  { id-vc-medium-size  20 }
   id-val-medium-size-iso-a1                 ID ::=  { id-vc-medium-size  21 }
   id-val-medium-size-iso-a2                 ID ::=  { id-vc-medium-size  22 }
   id-val-medium-size-iso-a3                 ID ::=  { id-vc-medium-size  23 }
   id-val-medium-size-iso-a4                 ID ::=  { id-vc-medium-size  24 }
   id-val-medium-size-iso-a5                 ID ::=  { id-vc-medium-size  25 }
   id-val-medium-size-iso-a6                 ID ::=  { id-vc-medium-size  26 }
   id-val-medium-size-iso-a7                 ID ::=  { id-vc-medium-size  27 }
   id-val-medium-size-iso-a8                 ID ::=  { id-vc-medium-size  28 }
   id-val-medium-size-iso-a9                 ID ::=  { id-vc-medium-size  29 }
   id-val-medium-size-iso-a10                ID ::=  { id-vc-medium-size  30 }

  -- ISO B series media per ISO 216
   id-val-medium-size-iso-b0                 ID ::=  { id-vc-medium-size  40 }
   id-val-medium-size-iso-b1                 ID ::=  { id-vc-medium-size  41 }
   id-val-medium-size-iso-b2                 ID ::=  { id-vc-medium-size  42 }
   id-val-medium-size-iso-b3                 ID ::=  { id-vc-medium-size  43 }
   id-val-medium-size-iso-b4                 ID ::=  { id-vc-medium-size  44 }
   id-val-medium-size-iso-b5                 ID ::=  { id-vc-medium-size  45 }
   id-val-medium-size-iso-b6                 ID ::=  { id-vc-medium-size  46 }
   id-val-medium-size-iso-b7                 ID ::=  { id-vc-medium-size  47 }
   id-val-medium-size-iso-b8                 ID ::=  { id-vc-medium-size  48 }
   id-val-medium-size-iso-b9                 ID ::=  { id-vc-medium-size  49 }
   id-val-medium-size-iso-b10                ID ::=  { id-vc-medium-size  50 }

  -- ISO envelope sizes per ISO 269
   id-val-medium-size-iso-c3                 ID ::=  { id-vc-medium-size  63 }
   id-val-medium-size-iso-c4                 ID ::=  { id-vc-medium-size  64 }
   id-val-medium-size-iso-c5                 ID ::=  { id-vc-medium-size  65 }
   id-val-medium-size-iso-c6                 ID ::=  { id-vc-medium-size  66 }
```


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```
    id-val-medium-size-iso-designated-long   ID ::=  { id-vc-medium-size  67 }

   -- JIS B sizes
    id-val-medium-size-jis-b0                ID ::=  { id-vc-medium-size  80 }
    id-val-medium-size-jis-b1                ID ::=  { id-vc-medium-size  81 }
    id-val-medium-size-jis-b2                ID ::=  { id-vc-medium-size  82 }
    id-val-medium-size-jis-b3                ID ::=  { id-vc-medium-size  83 }
    id-val-medium-size-jis-b4                ID ::=  { id-vc-medium-size  84 }
    id-val-medium-size-jis-b5                ID ::=  { id-vc-medium-size  85 }
    id-val-medium-size-jis-b6                ID ::=  { id-vc-medium-size  86 }
    id-val-medium-size-jis-b7                ID ::=  { id-vc-medium-size  87 }
    id-val-medium-size-jis-b8                ID ::=  { id-vc-medium-size  88 }
    id-val-medium-size-jis-b9                ID ::=  { id-vc-medium-size  89 }
    id-val-medium-size-jis-b10               ID ::=  { id-vc-medium-size  90 }

-- additional miscellaneous media sizes:
    id-val-medium-size-executive              ID ::= { id-vc-medium-size 100 }
    id-val-medium-size-folio                  ID ::= { id-vc-medium-size 101 }
    id-val-medium-size-invoice                ID ::= { id-vc-medium-size 102 }
    id-val-medium-size-ledger                 ID ::= { id-vc-medium-size 103 }
    id-val-medium-size-quarto                 ID ::= { id-vc-medium-size 104 }


  -- medium-colour --
    id-val-medium-colour-white               ID ::=  { id-vc-medium-colour 0 }
    id-val-medium-colour-pink                ID ::=  { id-vc-medium-colour 1 }
    id-val-medium-colour-yellow              ID ::=  { id-vc-medium-colour 2 }
    id-val-medium-colour-buff                ID ::=  { id-vc-medium-colour 3 }
    id-val-medium-colour-goldenrod           ID ::=  { id-vc-medium-colour 4 }
    id-val-medium-colour-blue                ID ::=  { id-vc-medium-colour 5 }
    id-val-medium-colour-green               ID ::=  { id-vc-medium-colour 6 }
    id-val-medium-colour-transparent-untinted
                                             ID ::=  { id-vc-medium-colour 7 }

  -- medium-tooth --
    id-val-medium-tooth-fine                 ID ::=  { id-vc-medium-tooth 1 }
    id-val-medium-tooth-coarse               ID ::=  { id-vc-medium-tooth 2 }

  -- medium-grain --
    id-val-medium-grain-long                 ID ::=  { id-vc-medium-grain 1 }
    id-val-medium-grain-short                ID ::=  { id-vc-medium-grain 2 }


--*****************************************************************************--

-- Font object attribute values --

  -- font-identifier --
  -- NOTE: This part of ISO/IEC 10175 does not define any standard
  -- values for the font-identifier attribute.
```


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```
-- Resource object attribute values --

  -- resource-name --
  -- NOTE: This part of ISO/IEC 10175 does not define any standard
  -- values for the resource-name attribute.

  -- resource-type --
     id-val-resource-type-overlay                    ID ::=  { id-vc-resource  0 }


-- Transfer Method object attribute values --

  -- transfer-method --
     id-val-transfer-method-with-request    ID ::=  { id-vc-transfer-method  0 }
     id-val-transfer-method-referenced-data-transfer
                                            ID ::=  { id-vc-transfer-method  1 }
     id-val-transfer-method-ftam-by-client  ID ::=  { id-vc-transfer-method  2 }
     id-val-transfer-method-ftam-by-server  ID ::=  { id-vc-transfer-method  3 }

  -- transfer-method type --
     id-val-transfer-method-type-push   ID ::= { id-vc-transfer-method-type  0 }
     id-val-transfer-method-type-pull   ID ::= { id-vc-transfer-method-type  1 }
     id-val-transfer-method-type-immediate
                                        ID ::= { id-vc-transfer-method-type  2 }

  -- document-reference-type --
     id-val-document-ref-type-immediate  ID ::= { id-vc-document-ref-type  0 }
     id-val-document-ref-type-dor        ID ::= { id-vc-document-ref-type  1 }


-- Delivery Method object attribute values --

  -- delivery-method --
     id-val-delivery-method-pick-up          ID ::= { id-vc-delivery-method  0 }
     id-val-delivery-method-secure-pickup    ID ::= { id-vc-delivery-method  1 }
     id-val-delivery-method-interoffice-mail ID ::= { id-vc-delivery-method  2 }
     id-val-delivery-method-postal-mail      ID ::= { id-vc-delivery-method  3 }
     id-val-delivery-method-notification-service
                                             ID ::= { id-vc-delivery-method  4 }
     id-val-delivery-method-electronic-mail  ID ::= { id-vc-delivery-method  5 }
     id-val-delivery-method-file             ID ::= { id-vc-delivery-method  6 }
--DEL: id-val-delivery-method-none          ID ::= { id-vc-delivery-method  7 }
     id-val-delivery-method-with-job-result-set
                                             ID ::= { id-vc-delivery-method  8 }
     id-val-delivery-method-printed-matter-mail
                                             ID ::= { id-vc-delivery-method  9}
     id-val-delivery-method-bulk-mail        ID ::= { id-vc-delivery-method 10}
     id-val-delivery-method-express-mail     ID ::= { id-vc-delivery-method 11}
     id-val-delivery-method-budget-express-mail
                                             ID ::= { id-vc-delivery-method 12}
     id-val-delivery-method-doc-file         ID ::= { id-vc-delivery-method 13}
```


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```
     id-val-delivery-method-file-add-to      ID ::= { id-vc-delivery-method 14}


--*************************************************************************--

-- Auxiliary-sheet-package object attribute values --

     id-val-aux-pkg-job-separators                    ID ::=  { id-vc-aux-pkg  0}
     id-val-aux-pkg-job-set-start                     ID ::=  { id-vc-aux-pkg  1}
     id-val-aux-pkg-job-set-end                       ID ::=  { id-vc-aux-pkg  2}
     id-val-aux-pkg-job-set-wrap                      ID ::=  { id-vc-aux-pkg  3}
     id-val-aux-pkg-job-set-start-copies-separate     ID ::=  { id-vc-aux-pkg  4}
     id-val-aux-pkg-job-set-end-copies-separate       ID ::=  { id-vc-aux-pkg  5}
     id-val-aux-pkg-job-set-wrap-copies-separate      ID ::=  { id-vc-aux-pkg  6}
     id-val-aux-pkg-job-copy-start                    ID ::=  { id-vc-aux-pkg  7}
     id-val-aux-pkg-job-copy-end                      ID ::=  { id-vc-aux-pkg  8}
     id-val-aux-pkg-job-copy-wrap                     ID ::=  { id-vc-aux-pkg  9}
     id-val-aux-pkg-doc-separators                    ID ::=  { id-vc-aux-pkg 20}
     id-val-aux-pkg-doc-set-start                     ID ::=  { id-vc-aux-pkg 21}
     id-val-aux-pkg-doc-set-end                       ID ::=  { id-vc-aux-pkg 22}
     id-val-aux-pkg-doc-set-wrap                      ID ::=  { id-vc-aux-pkg 23}
     id-val-aux-pkg-doc-set-start-copies-separate     ID ::=  { id-vc-aux-pkg 24}
     id-val-aux-pkg-doc-set-end-copies-separate       ID ::=  { id-vc-aux-pkg 25}
     id-val-aux-pkg-doc-set-wrap-copies-separate      ID ::=  { id-vc-aux-pkg 26}
     id-val-aux-pkg-doc-copy-start                    ID ::=  { id-vc-aux-pkg 27}
     id-val-aux-pkg-doc-copy-end                      ID ::=  { id-vc-aux-pkg 28}
     id-val-aux-pkg-doc-copy-wrap                     ID ::=  { id-vc-aux-pkg 29}


-- Auxiliary Sheet object attribute values --

  -- auxiliary-sheet --
--DEL: id-val-auxiliary-sheet-brief          ID ::=  { id-vc-auxiliary-sheet 1 }
--DEL: id-val-auxiliary-sheet-full           ID ::=  { id-vc-auxiliary-sheet 2 }
--DEL: id-val-auxiliary-sheet-blank          ID ::=  { id-vc-auxiliary-sheet 3 }
     id-val-aux-sheet-job-set-start-sheet          ID ::=  {id-vc-aux-sheet 10 }
     id-val-aux-sheet-job-set-separator-sheet      ID ::=  {id-vc-aux-sheet 11 }
     id-val-aux-sheet-job-set-end-sheet            ID ::=  {id-vc-aux-sheet 12 }
     id-val-aux-sheet-job-copy-start-sheet         ID ::=  {id-vc-aux-sheet 13 }
     id-val-aux-sheet-job-copy-separator-sheet     ID ::=  {id-vc-aux-sheet 14 }
     id-val-aux-sheet-job-copy-end-sheet           ID ::=  {id-vc-aux-sheet 15 }
     id-val-aux-sheet-doc-set-start-sheet          ID ::=  {id-vc-aux-sheet 30 }
     id-val-aux-sheet-doc-set-separator-sheet      ID ::=  {id-vc-aux-sheet 31 }
     id-val-aux-sheet-doc-set-end-sheet            ID ::=  {id-vc-aux-sheet 32 }
     id-val-aux-sheet-doc-copy-start-sheet         ID ::=  {id-vc-aux-sheet 33 }
     id-val-aux-sheet-doc-copy-separator-sheet     ID ::=  {id-vc-aux-sheet 34 }
     id-val-aux-sheet-doc-copy-end-sheet           ID ::=  {id-vc-aux-sheet 35 }


--*************************************************************************--

-- Finishing object attribute values --
```


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```
-- finishing --
   id-val-finishing-staple                ID ::=  { id-vc-finishing  0 }
   id-val-finishing-staple-top-left       ID ::=  { id-vc-finishing  1 }
   id-val-finishing-staple-bottom-left    ID ::=  { id-vc-finishing  2 }
   id-val-finishing-staple-top-right      ID ::=  { id-vc-finishing  3 }
   id-val-finishing-staple-bottom-right   ID ::=  { id-vc-finishing  4 }
   id-val-finishing-saddle-stitch         ID ::=  { id-vc-finishing  5 }
   id-val-finishing-edge-stitch           ID ::=  { id-vc-finishing  6 }
   id-val-finishing-punch                 ID ::=  { id-vc-finishing  7 }
   id-val-finishing-cover                 ID ::=  { id-vc-finishing  8 }
   id-val-finishing-bind                  ID ::=  { id-vc-finishing  9 }

-- stitching --
   id-val-stitching-default                ID ::=  { id-vc-stitching  0 }
   id-val-stitching-staple                ID ::=  { id-vc-stitching  1 }
   id-val-stitching-staple-top-left       ID ::=  { id-vc-stitching  2 }
   id-val-stitching-staple-bottom-left    ID ::=  { id-vc-stitching  3 }
   id-val-stitching-staple-top-right      ID ::=  { id-vc-stitching  4 }
   id-val-stitching-staple-bottom-right   ID ::=  { id-vc-stitching  5 }
   id-val-stitching-saddle-stitch         ID ::=  { id-vc-stitching  6 }
   id-val-stitching-edge-stitch           ID ::=  { id-vc-stitching  7 }
   id-val-stitching-edge-stitch-right     ID ::=  { id-vc-stitching  8 }
   id-val-stitching-edge-stitch-top       ID ::=  { id-vc-stitching  9 }

-- stitching-type --
   id-val-stitching-type-default       ID ::=  { id-vc-stitching-type  0 }
   id-val-stitching-type-staple        ID ::=  { id-vc-stitching-type  3 }
   id-val-stitching-type-edge-stitch   ID ::=  { id-vc-stitching-type  4 }
   id-val-stitching-type-saddle-stitch ID ::=  { id-vc-stitching-type  5 }


-- binding --
   id-val-binding-default                 ID ::=  { id-vc-binding 0 }

-- binding-type --
   id-val-binding-type-default            ID ::=  { id-vc-binding-type  0 }
   id-val-binding-type-tape               ID ::=  { id-vc-binding-type  1 }
   id-val-binding-type-plastic            ID ::=  { id-vc-binding-type  2 }
   id-val-binding-type-velo               ID ::=  { id-vc-binding-type  3 }
   id-val-binding-type-perfect            ID ::=  { id-vc-binding-type  4 }
   id-val-binding-type-spiral             ID ::=  { id-vc-binding-type  5 }

-- binding-colour --
   id-val-binding-colour-default       ID ::=  { id-vc-binding-colour  0 }
   id-val-binding-colour-black         ID ::=  { id-vc-binding-colour  1 }
   id-val-binding-colour-blue          ID ::=  { id-vc-binding-colour  2 }
   id-val-binding-colour-gray          ID ::=  { id-vc-binding-colour  3 }
   id-val-binding-colour-brown         ID ::=  { id-vc-binding-colour  4 }

-- perforation --
   id-val-perforation-default             ID ::= { id-vc-perforation 0 }
```


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```
  -- perforation-type --
     id-val-perforation-type-default     ID ::=  { id-vc-perforation-type  0 }

  -- trimming --
     id-val-trimming-default                     ID ::=  { id-vc-trimming 0 }

  -- punching --
     id-val-punching-default                     ID ::=  { id-vc-punching 0 }

  -- slitting --
     id-val-slitting-default                     ID ::=  { id-vc-slitting 0 }

  -- covers --
     id-val-covers-default                         ID ::=  { id-vc-covers 0 }

  -- cover-name --
     id-val-cover-name-default                   ID ::=  { id-vc-cover-name 0 }

  -- folding --
     id-val-folding-default                      ID ::=  { id-vc-folding 0 }


-- Output object attribute values --

  -- output-method --
     id-val-output-page-collate                    ID ::=  { id-vc-output  0 }
     id-val-output-no-page-collate                 ID ::=  { id-vc-output  1 }
     id-val-output-decollate                       ID ::=  { id-vc-output  4 }
     id-val-output-no-decollate                    ID ::=  { id-vc-output  5 }
     id-val-output-burst                           ID ::=  { id-vc-output  6 }
     id-val-output-no-burst                        ID ::=  { id-vc-output  7 }
     id-val-output-stacking-default                ID ::=  { id-vc-output  10 }


--*****************************************************************************--

-- Imposition object attribute values --
  -- imposition --
     id-val-imposition-simple-1-up               ID ::=  { id-vc-imposition  1 }
     id-val-imposition-simple-2-up               ID ::=  { id-vc-imposition  3 }
     id-val-imposition-simple-4-up               ID ::=  { id-vc-imposition  4 }

  -- plex --
     id-val-plex-simplex                            ID ::=  { id-vc-plex  0 }
     id-val-plex-duplex                             ID ::=  { id-vc-plex  1 }
     id-val-plex-tumble                             ID ::=  { id-vc-plex  2 }

  -- logical-page-origin --
     id-val-logical-page-origin-lower-left
                                    ID ::=  { id-vc-logical-page-origin  0 }
     id-val-logical-page-origin-lower-right
                                    ID ::=  { id-vc-logical-page-origin  1 }
```


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```
    id-val-logical-page-origin-upper-right
                                    ID ::=  { id-vc-logical-page-origin  2 }
    id-val-logical-page-origin-upper-left
                                    ID ::=  { id-vc-logical-page-origin  3 }

  -- Scheduler object attribute values --
    id-val-scheduler-fifo                     ID ::= { id-vc-scheduler  0 }
    id-val-scheduler-shortest-job-first       ID ::= { id-vc-scheduler  1 }


--*****************************************************************************--

-- EVENTS --

-- Event class identifiers --
    id-val-event-class-aborted                ID ::= { id-vc-event-class  0 }
    id-val-event-class-error                  ID ::= { id-vc-event-class  1 }
    id-val-event-class-warning                ID ::= { id-vc-event-class  2 }
    id-val-event-class-report                 ID ::= { id-vc-event-class  3 }
    id-val-event-class-state-changed          ID ::= { id-vc-event-class  4 }

-- Abort event identifiers --
    id-val-event-job-aborted-by-server       ID ::= { id-vc-event-aborted  0 }
    id-val-event-job-cancelled-by-operator   ID ::= { id-vc-event-aborted  1 }
    id-val-event-job-cancelled-by-user       ID ::= { id-vc-event-aborted  2 }
    id-val-event-document-aborted-by-server  ID ::= { id-vc-event-aborted  3 }
    id-val-event-document-cancelled-by-operator
                                             ID ::= { id-vc-event-aborted  4 }
    id-val-event-document-cancelled-by-user  ID ::= { id-vc-event-aborted  5 }

-- Error event identifiers:
    id-val-event-error-past-deadline          ID ::= { id-vc-event-error  3 }
    id-val-event-error-past-discard-time      ID ::= { id-vc-event-error  4 }
    id-val-event-error-printer-shutdown       ID ::= { id-vc-event-error  5 }
    id-val-event-error-no-resource            ID ::= { id-vc-event-error  6 }
    id-val-event-error-unrecognized-resource  ID ::= { id-vc-event-error  7 }
    id-val-event-error-no-document            ID ::= { id-vc-event-error  8 }
    id-val-event-error-job-submission-not-complete
                                              ID ::= { id-vc-event-error  9 }
    id-val-event-error-page-select            ID ::= { id-vc-event-error 10 }
    id-val-event-error-document-content       ID ::= { id-vc-event-error 11 }
--DEL: id-val-event-error-document-aborted       ID ::= { id-vc-event-error 12 }

    id-val-event-error-other                  ID ::= { id-vc-event-error 99 }

-- Warning event identifiers --
    id-val-event-warning-resource-needs-attention
                                              ID ::= { id-vc-event-warning  0 }
    id-val-event-warning-resource-needs-operator
                                              ID ::= { id-vc-event-warning  1 }
    id-val-event-warning-printer-shutdown     ID ::= { id-vc-event-warning  2 }
    id-val-event-warning-job-modified         ID ::= { id-vc-event-warning  3 }
```


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```
    id-val-event-warning-close-to-deadline     ID ::= { id-vc-event-warning  4 }
    id-val-event-warning-close-to-discard-time
                                               ID ::= { id-vc-event-warning  5 }
    id-val-event-warning-criterion-exceeded    ID ::= { id-vc-event-warning  6 }
    id-val-event-warning-duplicate-attribute-ignored
                                               ID ::= { id-vc-event-warning  7 }
    id-val-event-warning-job-paused            ID ::= { id-vc-event-warning  8 }
    id-val-event-warning-job-interrupted       ID ::= { id-vc-event-warning  9 }
    id-val-event-warning-attribute-ignored     ID ::= { id-vc-event-warning 10 }
    id-val-event-warning-other                 ID ::= { id-vc-event-warning 99 }


--****************************************************************************--

-- Report event identifiers --
    id-val-event-report-job-completed          ID ::= { id-vc-event-report  0 }
    id-val-event-report-checkpoint-taken       ID ::= { id-vc-event-report  1 }
    id-val-event-report-resource-message       ID ::= { id-vc-event-report  2 }
    id-val-event-report-job-discarded          ID ::= { id-vc-event-report  3 }
    id-val-event-report-file-transferred       ID ::= { id-vc-event-report  4 }
    id-val-event-report-job-promoted           ID ::= { id-vc-event-report  5 }
    id-val-event-report-job-resumed            ID ::= { id-vc-event-report  6 }
    id-val-event-report-processing-started     ID ::= { id-vc-event-report  7 }
    id-val-event-report-printing-started       ID ::= { id-vc-event-report  8 }

  -- State-change event identifiers --
    id-val-event-state-changed-job      ID ::= { id-vc-event-state-changed  0 }
    id-val-event-state-changed-printer  ID ::= { id-vc-event-state-changed  1 }
    id-val-event-state-changed-server   ID ::= { id-vc-event-state-changed  2 }

END -- of DPA-ObjectIdentifiers --
```


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Annex B

(normative)

Formal definition of the DPA abstract service

This Annex is a supplement to section two, formally defining the Document Printing abstract service. It employs ASN.1 and the OBJECT, PORT, ABSTRACT-BIND, ABSTRACT-UNBIND, ABSTRACT-OPERATION, and ABSTRACT-ERROR macros of ISO/IEC 10021-3.

The order of the ASN.1 productions in this Annex follows the order of the operation definitions in clause 8.

This Annex has been compiled with Annexes A, B, and D by a recognized ASN.1 compiler. In case of discrepancies between this Annex and clause 8, this Annex shall take precedence.

```
-- File:  DPA_0B.ASN,  Version 1.3, 30-March-1995
-- Version 1.1, 19-Nov-1994: fix errors found during proof-reading
-- Version 1.2, 20-Jan-1995: change requested-oids back to requested-attributes
--     as in the DIS, since get-oid-characteristics is being deleted and to
--     keep alignment with the POSIX Printing standard.
--     Removed id-vc-xxx, id-vc, and id-syn from LOA class comment.
--     Added some comments to the ASN.1 to agree with clause 8.
--     Changed illegal-qualifier-modification (11) AttributeError to
--     invalid-non-compulsory-attribute-modification, to agree with the text
--     that removed the concept of qualifier.
-- Version 1.3, 30-Mar-1995:
--     Added simple-name element to ObjectIdentification type, for use with
--     objects that are identified by simple-names, such as printer and server
--     objects.


-- ANNEX B

-- FORMAL DEFINITION OF THE DPA ABSTRACT SERVICE

-- This normative annex is an integral part of this part of ISO/IEC
-- 10175.

-- This Annex is a supplement to section two and formally defines the
-- Document Printing abstract service.  It employs ASN.1 and the OBJECT,
-- PORT, ABSTRACT-BIND, ABSTRACT-UNBIND, ABSTRACT-OPERATION, and
-- ABSTRACT-ERROR macros of ISO/IEC 10021-3.
```


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```
41
42
43      DPAAbstractService {iso  standard dpa(10175) part-1(1) modules(0)
44                          abstract-service(1) }
45      DEFINITIONS IMPLICIT TAGS ::=
46      BEGIN
47
48      IMPORTS
49
50      -- Abstract service macros --
51      ABSTRACT-BIND, ABSTRACT-ERROR, ABSTRACT-OPERATION, ABSTRACT-UNBIND, PORT
52          -- OBJECT not imported but defined herein as DPA-OBJECT --
53          FROM AbstractServiceNotation
54              { joint-iso-ccitt mhs-motis(6) asdc(2) modules(0) notation(1) }
55
56      BIND, UNBIND
57          FROM Remote-Operation-Notation
58                              {joint-iso-ccitt remote-operations(4) notation(0)}
59
60
61      -- DPA object identifiers --
62      id-val-document-type-printable, id-val-transfer-method-with-request,
63      id-dp-administrator, id-dp-user, id-dp-server, id-pt-dp-administration,
64      id-pt-dp-user
65          FROM DPAStandardObjectIdentifiers
66              {iso standard dpa(10175) part-1(1) modules(0) object-identifiers(0) }
67
68      -- DPA data types --
69      Cardinal, PrintCheckpoint, Descriptor, NameOrOid, FontReference, DeltaTime,
70      PositiveInteger, Message, ErrorMessage, SimpleName, DocumentContent,
71      JobIdentifier, DistinguishedNameString
72          FROM DPAStandardAttributes
73              {iso standard dpa(10175) part-1(1) modules(0) attributes(2) }
74
75      -- DPA bounds --
76      ub-integer
77          FROM DPABounds
78              { iso standard dpa(10175) part-1(1) modules(0) bounds(3) }  ;
79
80      -- end of IMPORTS
81
82
83      -- Copied from ISO/IEC 9594 (Directory):
84      -- DistinguishedName, RelativeDistinguishedName, and RDNSequence
85      -- with the following changes:
86      --  (1) changed the names of the type that RelativeDistinguishedName uses
87      --      from AttributeValueAssertion to NameComponent, in order to avoid
88      --      confusion with ISO DPA AttributeValueAssertion used in a Filter
89      --      and because its really not an assertion in an RDN.
90      -- NOTE - Most attributes have been changed to use the simpler ISO DPA type:
91      -- DistinguishedNameString (CR 12).  DistinguishedName is retained for
92      -- interoperability with systems that implement this more complex type.
```


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```
93      AttributeType              ::= OBJECT IDENTIFIER
94      AttributeValue             ::= ANY
95      NameComponent              ::= SEQUENCE { AttributeType, AttributeValue }
96
97      -- naming data types --
98
99      RelativeDistinguishedName ::= SET OF NameComponent
100     RDNSequence                ::= SEQUENCE OF RelativeDistinguishedName
101     DistinguishedName          ::= RDNSequence
102
103
104
105     -- Copied from ISO/IEC 9596-1: 1990, 1991 (CMIP):
106     -- AttributeId, Attribute, Filter, and FilterItem with the following changes:
107     --  (1) defined AttributeId to be only an OBJECT IDENTIFIER; no localForm
108     --      INTEGER
109     --  (2) used all-lower-case hyphenated tag symbols (attribute-id and
110     --      attribute-values, instead of attributeId and attributeValue)
111     --  (3) defined attribute-values to be a SET OF:
112     --          attribute-values   SET OF ANY == DEFINED BY attribute-id
113     --      CMIP is:
114     --          attributeValue     ANY DEFINED BY attributeId
115     --  (4) removed IMPLICIT from each element (since DPA ASN.1 specifies
116     --      IMPLICIT TAGS globally up front as the default)
117     --  (5) changed Attribute to AttributeValueAssertion for clarity
118     --  (6) defined AttributeValueAssertion to be:
119     --          attribute-values   SET OF ANY == DEFINED BY attribute-id
120     --      CMIP is:
121     --          attributeValue     ANY DEFINED BY attributeId
122     --  (7) added context tags [0] and [1] to Attribute and AttributeValueAssertion
123
124     AttributeId ::= OBJECT IDENTIFIER
125
126     Attribute ::= SEQUENCE {
127         attribute-id      [0] AttributeId,
128         attribute-values  [1] SET OF ANY -- DEFINED BY attribute-id -- }
129
130     AttributeValueAssertion ::= SEQUENCE {
131         attribute-id      [0] AttributeId,
132         attribute-values  [1] SET OF ANY -- DEFINED BY attribute-id -- }
133
134
```


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```
135     -- DPA-OBJECT macro defined here --
136
137     DPA-OBJECT MACRO ::=
138     BEGIN
139
140     TYPE NOTATION      ::= "PORTS" "{"PortList"}" | empty
141     VALUE NOTATION     ::= value (VALUE OBJECT IDENTIFIER)
142
143     PortList           ::= Port "," PortList | Port
144     Port               ::= value (PORT) PortType
145
146     PortType           ::= Symmetric | Asymmetric
147
148     Symmetric          ::= empty
149     Asymmetric         ::= Consumer | Supplier
150
151     Consumer           ::= "[C]"
152     Supplier           ::= "[S]"
153
154     END  -- End DPA-OBJECT macro
155
156     Filter ::= CHOICE {
157         item      [0] FilterItem,
158         and       [1] SET OF Filter,
159         or        [2] SET OF Filter,
160         not       [3] Filter }
161
162     SubstringMatchCriteria ::= ENUMERATED {
163         exact             (0),
164         case-insensitive  (1),
165         same-letter       (2), -- ignoring accents, case, etc.
166         approximate       (3)  -- implementation-defined -- }
167
168     FilterItem ::= CHOICE {
169         equality           [0] AttributeValueAssertion,
170         substrings         [1] SEQUENCE {
171             attribute-id       [0] AttributeId,
172             match-criteria     [1] SubstringMatchCriteria,
173             initial-string     [2] ANY OPTIONAL,      -- DEFINED BY attribute-id
174             any-string         [3] SEQUENCE OF ANY OPTIONAL,
175                                                       -- DEFINED BY attribute-id
176             final-string       [4] ANY OPTIONAL },    -- DEFINED BY attribute-id
177         greater-or-equal   [2] AttributeValueAssertion,
178                                -- asserted value is greater than or equal to
179                                -- the attribute value
180         less-or-equal      [3] AttributeValueAssertion,
181                                -- asserted value is less than or equal to
182                                -- the attribute value
183         present            [4] AttributeId,
184                                -- asserted attribute is present (with any value)
185         subset-of          [5] AttributeValueAssertion,
186                                -- asserted value is a subset of attribute value
187         superset-of        [6] AttributeValueAssertion,
```


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```
                                -- asserted value is a superset of attribute value
        non-null-set-intersection [7] Attribute
                                -- at least one of the members of the asserted --
                                -- value is present in the attribute value  -- }


--*****************************************************************************--

--      DPA ABSTRACT OBJECTS --

dp-server       DPA-OBJECT
                PORTS { dp-user-port [S],
                        dp-administration-port [S] }
                ::= id-dp-server

dp-user         DPA-OBJECT
                PORTS { dp-user-port [C] }
                ::= id-dp-user

dp-administrator        DPA-OBJECT
                PORTS { dp-user-port [C],
                        dp-administration-port [C] }
                ::= id-dp-administrator


--      DPA ABSTRACT PORTS --

dp-user-port    PORT
            CONSUMER INVOKES {
                    print,                      -- Print
                    modify-job,                 -- ModifyJob
                    cancel-job,                 -- CancelJob
                    list-object-attributes }    -- ListObjectAttributes
            ::= id-pt-dp-user

dp-administration-port    PORT
            CONSUMER INVOKES {
                    promote-job,                -- PromoteJob
                    interrupt-job,              -- InterruptJob
                    pause-job,                  -- PauseJob
                    resume-job }                -- ResumeJob
            ::= id-pt-dp-administration


--      DPA common data types --

DpAccessListElement ::= SEQUENCE {
        access-id       AccessId,
        access-rights   DpAccessRights }

AccessId ::= DistinguishedNameString
```


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```
239     DpAccessRights ::= ENUMERATED {
240             dp-user                 (0),
241             dp-administrator        (1) }
242
243     --*****************************************************************************--
244
245     --      ABSTRACT BIND UNBIND --
246
247     DpBind ::= ABSTRACT-BIND
248              TO              { dp-user-port[S], dp-administration-port[S] }
249              BIND
250              ARGUMENT        DpBindArgument
251              RESULT          DpBindResult
252              BIND-ERROR      DpBindError
253
254
255     DpBindArgument ::= SEQUENCE {
256             credentials             [0] Credentials,
257             retrieve-restrictions   [1] Restrictions OPTIONAL, -- default is none
258             bind-security           [2] BindSecurity OPTIONAL }
259
260     Credentials ::= CHOICE {
261             simple     [0] Creds,
262                            -- used for initial authentication
263             certified  [1] PrivilegeAttributeCertificate
264                            -- used when initial authentication has already --
265                            -- taken place external to the DP-Server -- }
266
267     Creds ::= SEQUENCE {
268             name             [0] DistinguishedNameString,
269             password         [2] OCTET STRING }
270
271     PrivilegeAttributeCertificate ::= EXTERNAL
272
273     Restrictions ::= SET {
274             maximum-result-length   [1] ResultLength OPTIONAL }
275                                             -- default is no restriction
276
277     ResultLength ::= INTEGER (1..ub-integer)
278
279     BindSecurity ::= EXTERNAL
280
281     DpBindResult ::= SET {
282             authentication-attributes       [0] SET OF AuthenticationAttribute }
283
284     AuthenticationAttribute ::= EXTERNAL
285
286     DpBindError ::= CHOICE {
287             service-error   [0] ServiceProblem,
288             security-error  [1] SecurityProblem }
289
```


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```
290     DpUnbind ::= ABSTRACT-UNBIND
291             FROM { dp-user-port[S], dp-administration-port[S] }
292              UNBIND
293                 ARGUMENT        DpBindArgument
294                 RESULT          DpBindResult
295                 UNBIND-ERROR    DpBindError
296
297     --------------------------------------------------------------------------------
298
299     -- Common arguments --
300
301     CommonArguments ::= SET OF Attribute
302
303     --------------------------------------------------------------------------------
304
305     -- ABSTRACT OPERATIONS --
306
307     -- Print --
308
309     Print ::= ABSTRACT-OPERATION
310         ARGUMENT        PrintArgument
311         RESULT          PrintResult
312         ERRORS          {       AttributeError, -- see clause 8.4
313                                 DocumentAccessError,
314                                 PrinterError,
315                                 SecurityError,
316                                 SelectionError,
317                                 ServiceError }
318
319     PrintArgument ::= CHOICE {
320         create-job   [0] SEQUENCE {
321             printer-name              [0] SimpleName,
322             job-submission-complete   [1] BOOLEAN DEFAULT TRUE,
323             job-attributes            [2] SET OF Attribute OPTIONAL,
324                                     -- may include any job attribute, except
325                                     -- id-att-job-identifier,
326                                     -- id-att-printer-name-requested, and
327                                     -- any job-status attribute
328             first-document            [3] DocumentDescription OPTIONAL,
329             common-arguments          [4] CommonArguments OPTIONAL },
330
331         add-document [1] SEQUENCE {
332             existing-job              [0] JobIdentifier,
333             job-submission-complete   [1] BOOLEAN DEFAULT TRUE,
334             new-document              [3] DocumentDescription,
335             common-arguments          [4] CommonArguments OPTIONAL },
336
337         close-job    [2] SEQUENCE {
338             existing-job              [0] JobIdentifier,
339             common-arguments          [4] CommonArguments OPTIONAL } }
```


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```
340
341         DocumentDescription ::= SEQUENCE {
342             transfer-method          [0] OBJECT IDENTIFIER
343                                          DEFAULT id-val-transfer-method-with-request,
344             document-content         [1] DocumentContent OPTIONAL,
345             document-type            [2] OBJECT IDENTIFIER
346                                          DEFAULT id-val-document-type-printable,
347             document-attributes      [3] SET OF Attribute OPTIONAL
348                     -- Contains any document attributes valid for the document,
349                     -- except any document-status attributes.
350                     -- document-type = printable, font, or resource.
351                     -- If document-type is font, a font-identifier attribute is required
352                     -- in the document-attributes element.
353                     -- If document type is resource, a resource-name attribute
354                     -- is required in the document-attributes element.
355             }
356
357         PrintResult ::= SEQUENCE {
358             job-identification       [0] JobIdentifier,
359                                          -- value of id-att-job-identifier
360             server-state             [1] OBJECT IDENTIFIER OPTIONAL,
361                                          -- value of id-att-server-state
362             server-message           [2] Message OPTIONAL,
363                                          -- value of server's id-att-message
364             document-status          [3] SET OF Attribute OPTIONAL,
365                                          -- may include id-att-document-state,
366                                          -- id-att-document-sequence-number,
367                                          -- id-att-file-reference, and
368                                          -- id-att-copies-completed.
369                                          -- See document-status attributes subclause.
370             job-status               [4] SET OF Attribute
371                                          -- may include any job-status attributes
372                                          -- See job-status attributes subclause.
373             }
374

375         --****************************************************************************--
376
377         -- Modify-job --
378
379         ModifyJob ::= ABSTRACT-OPERATION
380             ARGUMENT        ModifyJobArgument
381             RESULT          ModifyJobResult
382             ERRORS          {       AccessError,
383                                     AttributeError,
384                                     DocumentAccessError,
385                                     PrinterError,
386                                     SecurityError,
387                                     SelectionError,
388                                     ServiceError,
389                                     UpdateError }
390
```


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```
ModifyJobArgument ::= SEQUENCE {
    job-identification       [0] JobIdentifier,
    document-number          [1] PositiveInteger OPTIONAL,
                             -- required for addressing individual
                             -- documents in a multiple document print job
    job-attr-modification    [2] SEQUENCE OF JobAttrModification,
    modify-message           [3] Message OPTIONAL,
                          -- sets value of id-att-job-message-from-administrator
    common-arguments         [4] CommonArguments OPTIONAL }

JobAttrModification ::= SEQUENCE {
    attribute-id     [0] AttributeId,
                         -- Any job attributes, except:
                         --   id-att-job-identifier,
                         --   id-att-job-owner, id-att-job-originator,
                         --   id-att-printer-name-requested,
                         --   id-att-initial-value-job,
                         --   any access-and-accounting attributes,
                         --   any job-security attributes, and
                         --   any job-status attributes.
                         -- Any document attributes, except:
                         --   id-att-transfer-method, id-att-document-content,
                         --   id-att-initial-value-document, and
                         --   any document-status attributes
    attribute-values [1] SET OF ANY -- DEFINED BY attribute-id -- OPTIONAL,
                         -- omitted for set-to-default
    modify-operator  [2] ModifyOperator DEFAULT replace }

ModifyOperator ::= ENUMERATED {
    replace         (0),
    add-values      (1),
    remove-values   (2),
    set-to-default  (3) }

ModifyJobResult ::= SEQUENCE {
    status          [0] SET OF Attribute OPTIONAL
                        -- any job-status or document-status attributes -- }


--****************************************************************************--

-- Cancel-job --

CancelJob ::= ABSTRACT-OPERATION
    ARGUMENT        CancelJobArgument
    RESULT          CancelJobResult
    ERRORS          {       AccessError,
                            AttributeError,
                            SecurityError,
                            SelectionError,
                            ServiceError,
                            UpdateError }
```


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```
442
443     CancelJobArgument ::= SEQUENCE {
444         job-identification  [0] JobIdentifier,
445         document-number     [1] PositiveInteger OPTIONAL,
446                             -- required for addressing individual
447                             -- documents in a multiple document print job
448         cancel-message      [2] Message OPTIONAL,
449                             -- sets value of id-att-job-message-from-administrator
450         retention-period    [3] DeltaTime OPTIONAL,
451         common-arguments    [4] CommonArguments OPTIONAL }
452
453     CancelJobResult ::= SEQUENCE {
454         status          [0] SET OF Attribute OPTIONAL
455                             -- any job-status or document-status attributes -- }
456

457     --****************************************************************************--
458
459     -- List-object-attributes --
460
461     ListObjectAttributes ::= ABSTRACT-OPERATION
462         ARGUMENT        ListObjectAttributesArgument
463         RESULT          ListObjectAttributesResult
464         ERRORS          {       AccessError,
465                                 AttributeError,
466                                 SecurityError,
467                                 SelectionError,
468                                 ServiceError }
469
470     ListObjectAttributesArgument ::= SEQUENCE {
471         CHOICE {
472             continuation    [0] SEQUENCE {
473                 context             [0] ContinuationContext,
474                 abort               [1] BOOLEAN DEFAULT FALSE,
475                 common-arguments    [2] CommonArguments OPTIONAL },
476             specification   [1] SEQUENCE {
477                 class               [0] OBJECT IDENTIFIER, -- id-oc-xxx
478                 scope               [1] Cardinal DEFAULT 0,
479                                   -- scope is contained objects in levels 0 through n
480                                   -- where 0 means the base object specified
481                                   -- by the object-identification
482                 selector            [2] Selector OPTIONAL,
483                 -- should not be omitted if class is id-oc-document
484                 requested-attributes [3] SET OF AttributeId OPTIONAL,
485                 list-operator       [4] ListOperator DEFAULT get-attributes,
486                 common-arguments    [5] CommonArguments OPTIONAL } } }
487
488     ContinuationContext     ::= OCTET STRING
489                             -- implementation-specific information
490
491     Selector ::= SET {
492         object-identification   [0] SEQUENCE OF ObjectIdentification OPTIONAL,
```


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```
                                -- should not be omitted if class is id-oc-document
        object-filter           [1] Filter OPTIONAL,  -- see 6.4.5
        time-limit              [2] DeltaTime OPTIONAL,
        count-limit             [3] PositiveInteger OPTIONAL }

    ObjectIdentification ::= CHOICE {
        job-identifier          [0] JobIdentifier,
        document-identifier     [1] DocumentIdentifier,
        object-identifier       [2] OBJECT IDENTIFIER,
        object-name             [3] DistinguishedNameString,
        font-reference          [4] FontReference,
        name-or-oid             [6] NameOrOid,
        simple-name             [7] SimpleName }

    DocumentIdentifier ::= SEQUENCE {
        job-identifier          [0] JobIdentifier,
        document-number         [1] PositiveInteger OPTIONAL }
                                    -- document sequence number

    ListOperator ::= ENUMERATED {
        get-attributes           (0),
        get-ordered-jobs         (2) }

    ListObjectAttributesResult ::= SEQUENCE {
        answer-time             [1] GeneralizedTime,
        context                 [2] ContinuationContext OPTIONAL,
        limit-encountered       [3] LimitEncountered OPTIONAL,
        result-set              [4] SEQUENCE OF ObjectResult }

    LimitEncountered ::= ENUMERATED {
        time-limit      (0),
        count-limit     (1),
        error-limit     (2) }

    ObjectResult ::= SEQUENCE {
            object-identification       [0] ObjectIdentification,
            attributes                  [1] SET OF Attribute,
            object-class                [2] OBJECT IDENTIFIER } -- id-oc-xxx


    -- Promote-job --

    PromoteJob ::= ABSTRACT-OPERATION
        ARGUMENT        PromoteJobArgument
        RESULT          PromoteJobResult
        ERRORS          {       AccessError,
                                AttributeError,
                                SecurityError,
                                SelectionError,
                                ServiceError }

    PromoteJobArgument ::= SEQUENCE {
        job-identification      [0] JobIdentifier,
```


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```
546             promote-message          [1] Message OPTIONAL,
547                                   -- sets value of id-att-job-message-from-administrator
548             common-arguments         [2] CommonArguments OPTIONAL }
549
550         PromoteJobResult ::= SEQUENCE {
551             job-status               [0] SET OF Attribute OPTIONAL
552                                          -- may include any job-status attributes -- }
553
554
555         -- InterruptJob --
556
557         InterruptJob ::= ABSTRACT-OPERATION
558             ARGUMENT         InterruptJobArgument
559             RESULT           InterruptJobResult
560             ERRORS           {       AccessError,
561                                      AttributeError,
562                                      SecurityError,
563                                      SelectionError,
564                                      ServiceError }
565
566         InterruptJobArgument ::= SEQUENCE {
567             interrupted-job    [0] CHOICE {
568                  job-identifier    [0] JobIdentifier,
569                  printer-name      [1] SimpleName },
570             interrupt-message  [1] Message OPTIONAL,
571                                -- sets value of id-att-job-message-from-administrator
572             interrupting-job   [2] JobIdentifier,
573             common-arguments   [3] CommonArguments OPTIONAL }
574
575         InterruptJobResult ::= SEQUENCE {
576             interrupted-job-identifier  [0] JobIdentifier,
577             job-status                  [1] SET OF Attribute OPTIONAL
578                                             -- may include any job-status attributes -- }
579


580         --*****************************************************************************--
581
582         -- PauseJob --
583
584         PauseJob ::= ABSTRACT-OPERATION
585             ARGUMENT         PauseJobArgument
586             RESULT           PauseJobResult
587             ERRORS           {       AccessError,
588                                      AttributeError,
589                                      SecurityError,
590                                      SelectionError,
591                                      ServiceError }
592
593         PauseJobArgument ::= SEQUENCE {
594             paused-job         [0] CHOICE {
595                 job-identifier    [0] JobIdentifier,
596                 printer-name      [1] SimpleName },
```


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```
        pause-message      [1] Message OPTIONAL,
                            -- sets value of id-att-job-message-from-administrator
        common-arguments   [2] CommonArguments OPTIONAL }

    PauseJobResult ::= SEQUENCE {
        paused-job-identifier   [0] JobIdentifier,
        checkpoint              [1] SET OF PrintCheckpoint,
        job-status              [2] SET OF Attribute OPTIONAL
                                    -- may include any job-status attributes -- }


    --****************************************************************************--

    -- ResumeJob --

    ResumeJob ::= ABSTRACT-OPERATION
        ARGUMENT        ResumeJobArgument
        RESULT          ResumeJobResult
        ERRORS          {       AccessError,
                                AttributeError,
                                SecurityError,
                                SelectionError,
                                ServiceError }

    ResumeJobArgument ::= SEQUENCE {
        resumed-job        [0] JobIdentifier,
        resume-message     [1] Message OPTIONAL,
                           -- sets value of id-att-job-message-from-administrator
        checkpoint         [2] SET OF PrintCheckpoint OPTIONAL,
        common-arguments   [3] CommonArguments OPTIONAL }

    ResumeJobResult ::= SEQUENCE {
        job-status      [0] SET OF Attribute OPTIONAL
                            -- may include any job-status attributes -- }


    --****************************************************************************--

    -- ABSTRACT ERRORS --

    -- Access-error --

    AccessError ::= ABSTRACT-ERROR
        PARAMETER AccessErrorSequence

    AccessErrorSequence ::= SEQUENCE OF SEQUENCE {
            object-identification [0] ObjectIdentification, -- see 8.2.4.1
            problem               [1] AccessProblem,
            error-message         [2] ErrorMessage }

    AccessProblem ::= CHOICE {
        standard-problem        ENUMERATED {
```


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```
647             inappropriate-object-class      (1),
648             insufficient-access-rights      (2),
649             cannot-interrupt-job            (3),
650             inappropriate-object-state      (4) },
651         extended-problem        OBJECT IDENTIFIER }
652
653     -- Attribute-error --
654
655     AttributeError ::= ABSTRACT-ERROR
656         PARAMETER AttributeErrorSequence
657
658     AttributeErrorSequence ::= SEQUENCE {
659             object-identification [0] ObjectIdentification OPTIONAL,  -- see 8.2.4.1
660             problems              [1] SEQUENCE OF SEQUENCE {
661                 problem               [0] AttributeProblem,
662                 attribute             [1] Attribute,
663                 error-message         [2] ErrorMessage } }
664
665     AttributeProblem ::= CHOICE {
666         standard-problem        ENUMERATED {
667             invalid-attribute-syntax                (2),
668             undefined-attribute-type                (3),
669             inappropriate-matching                  (4),
670             constraint-violation                    (5),
671             unsupported-attribute-type              (6),
672             illegal-modification                    (7),
673             inconsistent-with-other-attributes      (8),
674             undefined-attribute-value               (9),
675             unsupported-attribute-value             (10),
676             invalid-non-compulsory-attribute-modification (11),
677             per-job-attribute-inadmissible          (12),
678             not-multi-valued                        (13),
679             mandatory-attribute-omitted             (14),
680             attribute-illegal-for-object-class      (15) },
681      extended-problem OBJECT IDENTIFIER }
682
683     --*****************************************************************************--
684
685     -- Document-access-error --
686
687     DocumentAccessError ::= ABSTRACT-ERROR
688         PARAMETER DocumentAccessErrorSequence
689
690     DocumentAccessErrorSequence ::= SEQUENCE {
691             problem                 [0] DocumentAccessProblem,
692             object-identification   [1] ObjectIdentification,  -- see 8.2.4.1
693             error-message           [2] ErrorMessage }
694
695     DocumentAccessProblem ::= CHOICE {
696         standard-problem        ENUMERATED {
697             document-not-available  (1),
```


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```
698             referent-modified       (2),
699             access-denied           (3),
700             unknown-document        (4),
701             no-documents-in-job     (5) },
702         extended-problem        OBJECT IDENTIFIER  }
703
704     -- Printer-error --
705
706     PrinterError ::= ABSTRACT-ERROR
707         PARAMETER PrinterErrorSequence
708
709     PrinterErrorSequence ::= SEQUENCE {
710             problem                 [0] PrinterProblem,
711             object-identification   [1] ObjectIdentification,  -- see 8.2.4.1
712             error-message           [2] ErrorMessage }
713
714     PrinterProblem ::= CHOICE {
715         standard-problem        ENUMERATED {
716             printer-error                   (1),
717             printer-needs-attention         (2),
718             printer-needs-key-operator      (3) },
719         extended-problem        OBJECT IDENTIFIER  }
720
721     -- Security-error --
722
723     SecurityError ::= ABSTRACT-ERROR
724         PARAMETER SecurityErrorSequence
725
726     SecurityErrorSequence ::= SEQUENCE {
727             problem           [0] SecurityProblem,
728             error-message     [1] ErrorMessage }
729
730     SecurityProblem ::= CHOICE {
731         standard-problem        ENUMERATED {
732             inappropriate-authentication    (1),
733             invalid-credentials             (2),
734             insufficient-operation-rights   (3),
735             invalid-pac                     (4) },
736         extended-problem        OBJECT IDENTIFIER  }
737


738     --*****************************************************************************--
739
740     -- Selection-error --
741
742     SelectionError ::= ABSTRACT-ERROR
743         PARAMETER SelectionErrorSequence
744
745     SelectionErrorSequence ::= SEQUENCE OF
746             SEQUENCE {
747                 problem               [0] SelectionProblem,
748                 attribute             [1] Attribute OPTIONAL,
```


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```
749                 object-identification  [2] ObjectIdentification, -- see 8.2.4.1
750                 error-message          [3] ErrorMessage }
751
752         SelectionProblem ::= CHOICE {
753             standard-problem        ENUMERATED {
754                 invalid-identification (1),
755                 unknown-identification (2),
756                 object-already-exists  (3) },
757             extended-problem        OBJECT IDENTIFIER }
758
759         -- Service-error --
760
761         ServiceError ::= ABSTRACT-ERROR
762             PARAMETER ServiceErrorSequence
763
764         ServiceErrorSequence ::= SEQUENCE OF
765                 SEQUENCE {
766                     problem                [0] ServiceProblem,
767                     attribute              [1] Attribute OPTIONAL,
768                     object-identification  [2] ObjectIdentification,  -- see 8.2.4.1
769                     error-message          [3] ErrorMessage }
770
771         ServiceProblem ::= CHOICE {
772             standard-problem        ENUMERATED {
773                 server-busy                              (1),
774                 server-unavailable                       (2),
775                 operation-too-complex                    (3),
776                 resource-limit-exceeded                  (4),
777                 unclassified-server-error                (5),
778                 too-many-items-in-list                   (6),
779                 compulsory-resource-not-available        (7),
780                 cancel-document-unsupported              (8),
781                 modify-document-unsupported              (9),
782                 print-multiple-documents-unsupported     (10),
783                 unsupported-parameter-value              (11),
784                 invalid-checkpoint                       (12),
785                 invalid-continuation-context             (13),
786                 pause-limit-exceeded                     (14),
787                 unsupported-operation                    (15) },
788             extended-problem        OBJECT IDENTIFIER  }
789
790         --*****************************************************************************--
791
792         -- Update-error --
793
794         UpdateError ::= ABSTRACT-ERROR
795             PARAMETER UpdateErrorSequence
796
```


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```
797     UpdateErrorSequence ::= SEQUENCE {
798             problem                 [0] UpdateProblem,
799             object-identification   [1] ObjectIdentification,  -- see 8.2.4.1
800             error-message           [2] ErrorMessage }
801
802     UpdateProblem ::= CHOICE {
803         standard-problem        ENUMERATED {
804             no-modifications-allowed        (1),
805             insufficient-update-rights      (2),
806             previous-operation-incomplete   (4),
807             cancellation-not-possible       (5) },
808         extended-problem                OBJECT IDENTIFIER  }
809
810
811
812     -- ABSTRACT OPERATIONS --
813
814     -- NOTE - The following was copied from ISO/IEC 10175-2 DPA Access Protocol
815     -- Specification, in order to be able to compile the ASN.1 from Part 1
816     -- by itself.
817
818     print                       Print                   ::= localValue 1
819     modify-job                  ModifyJob               ::= localValue 2
820     cancel-job                  CancelJob               ::= localValue 3
821     list-object-attributes      ListObjectAttributes    ::= localValue 4
822     promote-job                 PromoteJob              ::= localValue 5
823     interrupt-job               InterruptJob            ::= localValue 6
824     resume-job                  ResumeJob               ::= localValue 7
825     pause-job                   PauseJob                ::= localValue 8
826
827
828     END -- of DPA-AbstractService --
829
```


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Annex C

(normative)

Formal definition of DPA standard attributes

This Annex is a supplement to section three, and formally defines the standard attribute-types applicable to DPA. It employs ASN.1 with the ATTRIBUTE and ATTRIBUTE-SYNTAX macros.

The order of the ASN.1 production in this Annex follows the order of the attribute definitions in clause 9.

This Annex has been compiled with Annexes A, B, and D by a recognized ASN.1 compiler. In case of discrepancies between this Annex and clause 9, this Annex shall take precedence.

```
--  File:  DPA_0C.ASN,  Version 2.5, June-1996
--  Version 2.1, 4-Dec-1994: fixed comments about allowed generic attributes.
--    Allowed attributes in Print, ModifyJob, and ListObjectAttributes.
--    Name is intended-page-size, not page-size.
--    Move MaximumInteger and MinimumInteger ahead of 64-bit data types.
--    Change syntax of medium-tooth and medium-grain to nameOrOidSyntax
--  Version 2.2, 25-Jan-1995:  Update to agree with updated Finishing.
--  Version 2.3, 7-May-1995:
--    Fixed comments making associated-server a generic attribute
--    Fix comments to indicate each attribute and remove change request numbers.
--    Added NameOrOidSequence type and syntax.
--    Changed the context tag for message in the SecurityErrorArgument type
--    from [2] to [1], to be consistent.
--    Moved initial-value-jobs-supported and initial-value-documents-supported
--    out of the printer/server attributes section, so only a printer attribute,
--    but no change in OIDs.
--    Enhanced RPCAddress for DCE and ONC.
--  Version 2.4, February-1996:
--    Added PageSelectSyntax type and revise pageSelectSyntax ASN.1 to compile
--  Version 2.5, June-1996:
--    Changed Syntax of maximum-printer-speed to positiveIntegerSyntax.
--    Changed Syntax of maximum-copies-supported to cardinalSyntax.
--    Added clarification to IgnoredAttibute type definition.

--  ANNEX C

--  FORMAL DEFINITION OF DPA STANDARD ATTRIBUTES

--  This normative annex is an integral part of this part of ISO/IEC
--  10175.

--  This Annex is a supplement to section three and formally defines the
--  standard attribute-types applicable to DPA.  It employs ASN.1 and
--  the ATTRIBUTE and ATTRIBUTE-SYNTAX macros.
```


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```
--  At the start of each object class is an ASN.1 comment indicating
--  which additional attributes are applicable to the object class.

--  At the start of section of the Job, Printable Document, Font, and
--  Resource objects is an ASN.1 comment indicating which of their
--  attributes can be specified in the Print, ModifyJob, and
--  ListObjectAttributes operations.


DPAStandardAttributes { iso  standard dpa(10175) part-1(1) modules(0)
                        attributes(2) }
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- PROLOGUE --
-- EXPORTS everything --

IMPORTS

-- ISO/IEC Message Handling Server (MTS/MOTIS) --
ORAddressAndOrDirectoryName
    FROM MTSAbstractService
      { joint-iso-ccitt mhs-motis(6) mts(3) modules(0) mts-abstract-service(1) }

-- ISO/IEC 10031-2, Distributed Office Application Model (DOAM) --
--                  Part 2: Distinguished Object Reference
DOR
    FROM DOR-definition
        { iso standard 10031 part-2(2) reference-definition(0) }

-- ISO/IEC 9541 Font standard --
Global-Name
    FROM ISO-STANDARD-9541-FONT-RESOURCE
        { iso(1) standard(0) 9541 2 1 }

-- Data types from ISO/IEC DPA abstract service (see ANNEX B) --
DistinguishedName, RDNSequence, ObjectIdentification, Attribute,
AttributeId, PrivilegeAttributeCertificate
    FROM DPAAbstractService
        { iso standard dpa(10175) part-1(1) modules(0) abstract-service(1) }

-- ISO/IEC DPA Upper and Lower bounds (see ANNEX D) --
ub-descriptor-string, ub-integer, ub-message-string,
ub-name-string, ub-text-string, ub-octet-string,
lb-integer, ub-integer64, lb-integer64
    FROM DPABounds
        { iso standard dpa(10175) part-1(1) modules(0) bounds(3) }

-- ISO/IEC DPA Object Identifiers (see ANNEX A) --
-- in alphabetic order, first the attribute-type OIDs
-- then the syntax OIDs and
-- finally a few attribute-value OIDs

id-att-accounting-information,
```


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```
id-att-are-foreign-jobs-visible,
id-att-associated-server,
id-att-assured-reproduction-areas-used,
id-att-auxiliary-sheet-identifier,
id-att-auxiliary-sheet-medium,
id-att-auxiliary-sheet-package-identifier,
id-att-availability,
id-att-binding-edge,
id-att-binding-edge-image-shift,
id-att-binding-edge-image-shift-max-supported,
id-att-binding-edges-supported,
id-att-cancel-individual-document-supported,
id-att-character-mappings-ready,
id-att-character-mappings-supported,
id-att-character-mappings-used,
id-att-character-repertoires-ready,
id-att-character-repertoires-supported,
id-att-character-repertoires-used,
id-att-character-sets-ready,
id-att-character-sets-supported,
id-att-character-sets-used,
id-att-checkpoint-formats-supported,
id-att-completion-time,
id-att-conformance-levels-supported,
id-att-content-orientation,
id-att-content-orientations-supported,
id-att-content-orientations-used,
id-att-context-address,
id-att-copies-completed,
id-att-copy-count,
id-att-current-job-state,
id-att-current-page-order,
id-att-default-character-mapping,
id-att-default-character-repertoire,
id-att-default-character-set,
id-att-default-delivery-addresses,
id-att-default-dist-name-syntax,
id-att-default-font,
id-att-default-input-tray,
id-att-default-medium,
id-att-default-printer-resolution,
id-att-default-resources,
id-att-delivery-method-identifier,
id-att-descriptive-name,
id-att-descriptor,
id-att-dist-name-syntaxes-supported,
id-att-document-abort-criteria,
id-att-document-abort-criteria-supported,
id-att-document-attributes-supported,
id-att-document-authors,
id-att-document-comment,
id-att-document-content,
id-att-document-file-name,
```


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```
id-att-document-format,
id-att-document-formats-ready,
id-att-document-formats-supported,
id-att-document-name,
id-att-document-reference-type,
id-att-document-revision-date,
id-att-document-sequence-number,
id-att-document-sheets,
id-att-document-sheets-ready,
id-att-document-sheets-supported,
id-att-document-state,
id-att-document-states-supported,
id-att-document-type,
id-att-enabled,
id-att-end-message-supported,
id-att-end-sheet-of-copy,
id-att-end-sheet-of-set,
id-att-error-count,
id-att-estimated-completion-time,
id-att-events-supported,
id-att-extended-problems-supported,
id-att-file-reference,
id-att-finishing,
id-att-finishing-associated-finishings,
id-att-finishing-identifier,
id-att-finishing-includes-document-sheets,
id-att-finishing-includes-doc-sheets-supported,
id-att-finishing-includes-job-sheets,
id-att-finishing-includes-job-sheets-supported,
id-att-finishing-realization,
id-att-finishing-specification,
id-att-finishings-ready,
id-att-finishings-supported,
id-att-font-change-count,
id-att-font-count,
id-att-font-identifier,
id-att-font-substitution,
id-att-fonts-ready,
id-att-fonts-supported,
id-att-fonts-used,
id-att-glyph-count,
id-att-ignored-attributes,
id-att-imposition-identifier,
id-att-imposition-n-up,
id-att-impressions-completed,
id-att-initial-value-document,
id-att-initial-value-document-identifier,
id-att-initial-value-documents-supported,
id-att-initial-value-job,
id-att-initial-value-job-identifier,
id-att-initial-value-jobs-supported,
id-att-input-tray-select,
id-att-input-trays-medium,
```


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10175-1 96 ■ 4851903 0679730 474 ■


```
id-att-input-trays-ready,
id-att-input-trays-supported,
id-att-input-trays-used,
id-att-intended-page-size,
id-att-intervening-jobs,
id-att-job-abort-criteria,
id-att-job-abort-criteria-supported,
id-att-job-attributes-supported,
id-att-job-client-id,
id-att-job-comment,
id-att-job-copies-completed,
id-att-job-deadline-time,
id-att-job-discard-time,
id-att-job-end-message,
id-att-job-end-wait,
id-att-job-finishing,
id-att-job-finishings-ready,
id-att-job-finishings-supported,
id-att-job-hold,
id-att-job-identifier,
id-att-job-identifier-on-client,
id-att-job-identifier-on-printer,
id-att-job-impression-count,
id-att-job-media-sheet-count,
id-att-job-message-from-administrator,
id-att-job-message-to-operator,
id-att-job-name,
id-att-job-non-compulsory-attributes,
id-att-job-originator,
id-att-job-owner,
id-att-job-page-count,
id-att-job-password,
id-att-job-print-after,
id-att-job-priority,
id-att-job-result-set-delivery-methods-supported,
id-att-job-result-set-delivery-methods-ready,
id-att-job-retention-period,
id-att-job-scheduling,
id-att-job-security-confidentiality-category,
id-att-job-security-confidentiality-level,
id-att-job-security-confidentiality-policy,
id-att-job-security-integrity-category,
id-att-job-security-integrity-level,
id-att-job-security-integrity-policy,
id-att-job-security-label,
id-att-job-sheets,
id-att-job-sheets-ready,
id-att-job-sheets-supported,
id-att-job-size-range-ready,
id-att-job-size-range-supported,
id-att-job-start-message,
id-att-job-start-wait,
id-att-job-state-reasons,
```


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```
id-att-job-state-reasons-supported,
id-att-job-states-supported,
id-att-job-submission-complete,
id-att-job-validate,
id-att-job-validates-supported,
id-att-job-warning-criteria,
id-att-job-warning-criteria-supported,
id-att-last-job-events,
id-att-list-of-managers,
id-att-locale,
id-att-locales-supported,
id-att-log-delivery-methods-supported,
id-att-log-delivery-methods-ready,
id-att-logging-profile,
id-att-logical-page-origin,
id-att-logical-page-scaling,
id-att-logical-page-x-offset,
id-att-logical-page-y-offset,
id-att-logical-printers-ready,
id-att-logical-printers-supported,
id-att-maximum-copies-supported,
id-att-maximum-fonts-per-page,
id-att-maximum-printer-speed,
id-att-media-ready,
id-att-media-sheets-completed,
id-att-media-supported,
id-att-media-used,
id-att-medium-associated-media,
id-att-medium-assured-reproduction-area,
id-att-medium-colour,
id-att-medium-dimensions,
id-att-medium-fidelities-supported,
id-att-medium-fidelity,
id-att-medium-form-parts,
id-att-medium-grain,
id-att-medium-holes-axis-offset,
id-att-medium-holes-count,
id-att-medium-holes-diameter,
id-att-medium-holes-edge,
id-att-medium-holes-locations,
id-att-medium-identifier,
id-att-medium-realization,
id-att-medium-sides,
id-att-medium-size,
id-att-medium-source-sizes-ready,
id-att-medium-source-sizes-supported,
id-att-medium-substitution,
id-att-medium-tooth,
id-att-medium-type,
id-att-medium-weight,
id-att-message,
id-att-modification-time,
id-att-modify-individual-document-supported,
```


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```
id-att-multiple-documents-supported,
id-att-name-of-last-accessor,
id-att-native-document-formats-ready,
id-att-new-job-identifier,
id-att-non-compulsory-attributes,
id-att-notification-delivery-methods-supported,
id-att-notification-delivery-methods-ready,
id-att-notification-profile,
id-att-number-of-documents,
id-att-number-up,
id-att-numbers-up-supported,
id-att-object-class,
id-att-object-classes-supported,
id-att-octet-count,
id-att-octets-completed,
id-att-on-request-resources-required,
id-att-operation-locale,
id-att-output,
id-att-output-bins-characteristics,
id-att-output-bins-ready,
id-att-output-bins-supported,
id-att-output-identifier,
id-att-outputs-ready,
id-att-outputs-supported,
id-att-page-count,
id-att-page-media-select,
id-att-page-order-received,
id-att-page-select,
id-att-page-select-supported,
id-att-pages-completed,
id-att-percent-graphics,
id-att-percent-images,
id-att-physical-printers-ready,
id-att-physical-printers-requested,
id-att-physical-printers-supported,
id-att-plex,
id-att-plexes-supported,
id-att-presentation-direction,
id-att-presentation-directions-supported,
id-att-presentation-directions-used,
id-att-previous-job-state,
id-att-print-checkpoint,
id-att-print-qualities-ready,
id-att-print-qualities-supported,
id-att-print-quality,
id-att-printer-associated-printers,
id-att-printer-confidentiality-category-sets,
id-att-printer-confidentiality-level-range,
id-att-printer-confidentiality-policy,
id-att-printer-initial-value-document,
id-att-printer-initial-value-job,
id-att-printer-integrity-category-sets,
id-att-printer-integrity-level-range,
```


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```
id-att-printer-integrity-policy,
id-att-printer-locations,
id-att-printer-locations-requested,
id-att-printer-model,
id-att-printer-models-requested,
id-att-printer-name,
id-att-printer-name-aliases,
id-att-printer-name-requested,
id-att-printer-needs-attention-time,
id-att-printer-needs-key-operator-attention-time,
id-att-printer-realization,
id-att-printer-resolutions-supported,
id-att-printer-resolutions-used,
id-att-printer-resource-context,
id-att-printer-security-label-policy,
id-att-printer-speed-range-requested,
id-att-printer-state,
id-att-printer-state-of-printers-assigned,
id-att-printer-states-supported,
id-att-printer-timeout-period,
id-att-printer-types,
id-att-printer-types-requested,
id-att-printers-assigned,
id-att-printers-ready,
id-att-priority,
id-att-privileges,
id-att-processing-time,
id-att-reset-printer,
id-att-resource-context,
id-att-resource-context-identifier,
id-att-resource-name,
id-att-resource-type,
id-att-resources-ready,
id-att-resources-supported,
id-att-resources-used,
id-att-results-profile,
id-att-scheduler-identifier,
id-att-scheduler-ready,
id-att-schedulers-supported,
id-att-separator-sheet-of-copy,
id-att-separator-sheet-of-set,
id-att-server-address,
id-att-server-name,
id-att-server-name-aliases,
id-att-server-resource-context,
id-att-server-state,
id-att-sheet-count,
id-att-sides,
id-att-sides-ready,
id-att-sides-supported,
id-att-start-message-supported,
id-att-start-sheet-of-copy,
id-att-start-sheet-of-set,
```


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```
    id-att-started-printing-time,
    id-att-state,
    id-att-submission-time,
    id-att-total-job-octets,
    id-att-transfer-method,
    id-att-transfer-method-identifier,
    id-att-transfer-method-type,
    id-att-transfer-methods-supported,
    id-att-translators-ready,
    id-att-translators-supported,
    id-att-user-name,
    id-att-warning-count,
    id-att-x-image-shift,
    id-att-x-image-shift-range-supported,
    id-att-y-image-shift,
    id-att-y-image-shift-range-supported,

    -- OIDs for syntaxes --

    id-syn-area,
    id-syn-area-sequence,
    id-syn-boolean,
    id-syn-cardinal,
    id-syn-cardinal-or-name-or-oid,
    id-syn-cardinal-or-oid,
    id-syn-cardinal-range,
    id-syn-cardinal-sequence,
    id-syn-cardinal64,
    id-syn-cardinal64-range,
    id-syn-cardinal64-sequence,
    id-syn-category-set,
    id-syn-criteria,
    id-syn-delivery-address-for-method,
    id-syn-delta-time,
    id-syn-descriptor,
    id-syn-descriptive-name,
    id-syn-dimension,
    id-syn-dist-name-string,
    id-syn-dist-name-string-sequence,
    id-syn-distinguished-name,
    id-syn-doc-format,
    id-syn-document-content,
    id-syn-edge,
    id-syn-error-message,
    id-syn-event-handling-profile,
    id-syn-file-reference,
    id-syn-finishing,
    id-syn-font-reference,
    id-syn-font-substitution,
    id-syn-generalized-time,
    id-syn-ignored-attribute,
    id-syn-input-tray-medium,
    id-syn-integer,
```


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```
id-syn-integer-range,
id-syn-integer-sequence,
id-syn-integer64,
id-syn-integer64-range,
id-syn-integer64-sequence,
id-syn-job-categories,
id-syn-job-identifier,
id-syn-job-level,
id-syn-job-password,
id-syn-level-range,
id-syn-locale,
id-syn-locations,
id-syn-maximum-integer,
id-syn-maximum-integer64,
id-syn-medium-dimensions,
id-syn-medium-source-size,
id-syn-medium-substitution,
id-syn-message,
id-syn-minimum-integer,
id-syn-minimum-integer64,
id-syn-name-or-oid,
id-syn-name-or-oid-sequence,
id-syn-new-job-identifier,
id-syn-non-negative-real,
id-syn-non-negative-real-range,
id-syn-numbers-up-supported,
id-syn-object-identification,
id-syn-object-identifier,
id-syn-object-identifier-sequence,
id-syn-oid-cardinal-map,
id-syn-output-bins-characteristics,
id-syn-page-id-type,
id-syn-page-media-select,
id-syn-page-order-type,
id-syn-page-orientation-type,
id-syn-page-select,
id-syn-page-size,
id-syn-percent,
id-syn-positive-integer,
id-syn-positive-integer64,
id-syn-positive-integer-or-oid,
id-syn-presentation-direction,
id-syn-print-checkpoint,
id-syn-priority,
id-syn-privileges,
id-syn-rdn-sequence,
id-syn-real,
id-syn-real-range,
id-syn-real-sequence,
id-syn-realization,
id-syn-resource,
id-syn-resource-context,
id-syn-results-profile,
```


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```
    id-syn-sides,
    id-syn-simple-name,
    id-syn-text,
    id-syn-translator-type,
    id-syn-x-y-dimensions,

    -- A few attribute-value OIDs --
    id-val-binding-type-default,
    id-val-binding-colour-default,
    id-val-perforation-type-default,
    id-val-stitching-type-default

        FROM DPAStandardObjectIdentifiers
            { iso standard dpa(10175) part-1(1) modules(0) object-identifiers(0) }
        ;
    -- end of IMPORTS --

    -- Copied from ISO/IEC 9594 (Directory):
    -- ATTRIBUTE and ATTRIBUTE-SYNTAX macros, with the following changes:
    --  (1) added SET-COMPARISON and SET-INTERSECTION to the ATTRIBUTE and
    --      ATTRIBUTE-SYNTAX macros

    ATTRIBUTE MACRO ::=
    BEGIN
            TYPE NOTATION          ::= AttributeSyntax Multivalued | empty
            VALUE NOTATION         ::= value (VALUE OBJECT IDENTIFIER)

            AttributeSyntax        ::= "WITH ATTRIBUTE-SYNTAX" SyntaxChoice
            Multivalued            ::= "SINGLE VALUE" | "MULTI VALUE" | empty
            SyntaxChoice           ::= value (ATTRIBUTE-SYNTAX) Constraint
                                     | type MatchTypes

            Constraint             ::= "(" ConstraintAlternative ")" | empty
            ConstraintAlternative  ::= StringConstraint | IntegerConstraint
            StringConstraint       ::= "SIZE" "("SizeConstraint")"
            SizeConstraint         ::= SingleValue | Range

            SingleValue            ::= value (INTEGER)
            Range                  ::= value (INTEGER )".." value (INTEGER)
            IntegerConstraint      ::= Range

            MatchTypes             ::= "MATCHES FOR" Matches | empty
            Matches                ::= Match Matches | Match
            Match                  ::= "EQUALITY" | "SUBSTRINGS" | "ORDERING"
                                     | "SET-COMPARISON" | "SET-INTERSECTION"
    END
```


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```
ATTRIBUTE-SYNTAX MACRO ::=
BEGIN
        TYPE NOTATION       ::= Syntax MatchTypes | empty
        VALUE NOTATION      ::= value (VALUE OBJECT IDENTIFIER)

        Syntax              ::= type
        MatchTypes          ::= "MATCHES FOR" Matches | empty
        Matches             ::= Match Matches | Match
        Match               ::= "EQUALITY" | "SUBSTRINGS" | "ORDERING"
                              | "SET-COMPARISON" | "SET-INTERSECTION"
END


--*****************************************************************************--

-- 9.1.1 Common attribute syntaxes and data types --

--*** 9.1.5.1. Text and textSyntax
Latin1String ::= OCTET STRING
    --  ISO 8859-1 8-bit Latin Alphabet Nr 1
    --  (consists of octets 20 to 7E and 80 to FF)

UCS2Level2String ::= OCTET STRING

    -- UCS2Level2String shall contain coded characters that conform to
    -- ISO/IEC 10646-1, two-octet form (UCS-2), implementation level 2
    -- conformance (i.e., no CombiningCharactersB-2) and no control
    -- characters (no C0 and no C1 control characters, i.e., no CR, LF,
    -- etc.).

    -- ISO/IEC 8824 : 1994 contains a more precise method of specifying the
    -- subset of ISO/IEC 10164-1, using sub-typing.  However,
    -- ISO/IEC 8824 : 1994also forbids (1) mixing this new syntax with older
    -- ASN.1 that containsmacros in the same ASN.1 module and (2) importing
    -- types defined by thenew syntax into modules containing the older syntax.
    -- Since theattributes in ISO DPA are defined using ASN.1 macros, ISO DPA
    -- cannotuse the new syntax for defining UCS2Level2String.   Thus ISO DPA
    -- mustuse the old syntax for defining UCS2Level2String.

    -- If ISO DPA could have used the new sub-typing syntax of ISO/IEC
    -- 8824 : 1994, UCS2Level2String would have been defined as follows:
    --
    --    IMPORTS CombiningCharactersB-2
    --        ASN1-CHARACTER-MODULE {joint-iso-ccitt asn1(1) specification(0)
    --                               modules(0) characters(0)} ;

    --    UCS2Level2String ::= BMPString (FROM
    --                                    (ALL EXCEPT (CombiningCharactersB-2
    --                                            {0,0,0,0}..{0,0,0,31}
    --                                            {0,0,0,128}..{0,0,0,159})))

    --  The resulting binary encoding when using the Binary Encoding Rules
```


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```
    --  (BER) defined in ISO/IEC 8825 interchanged in the ISO DPA protocol
    --  would have been the same were this new syntax definition of the
    --  UCS2Level2String to be used, since ISO DPA ASN.1 uses IMPLICIT TAGS.

    --  NOTE: However, the old syntax does NOT yield the same binary encoding
    --  as this new syntax would when other binary encoding rules are used,
    --  such as PER (a new, more efficient encoding).

Text ::= CHOICE {
        iso-646-irv   [0] VisibleString(SIZE(0..ub-text-string)),
        ccitt-t-61    [1] T61String(SIZE(0..ub-text-string)),
        iso-latin1    [2] Latin1String(SIZE(0..ub-text-string)),
        iso-ucs-2     [3] UCS2Level2String(SIZE(0..ub-text-string)) }

textSyntax ATTRIBUTE-SYNTAX
        Text
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-text

--*** 9.1.5.2 9.1.5.2. DescriptiveName and descriptiveNameSyntax
DescriptiveName  ::= CHOICE {
        iso-646-irv     [0] VisibleString(SIZE(0..ub-name-string)),
        ccitt-t-61      [1] T61String(SIZE(0..ub-name-string)),
        iso-latin-1     [2] Latin1String(SIZE(0..ub-name-string)),
        iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-name-string)) }

descriptiveNameSyntax  ATTRIBUTE-SYNTAX
        DescriptiveName
        MATCHES FOR EQUALITY
        ::= id-syn-descriptive-name

--*** 9.1.5.3. Descriptor and descriptorSyntax
Descriptor ::= CHOICE {
        iso-646-irv   [0] VisibleString(SIZE(0..ub-descriptor-string)),
        ccitt-t-61    [1] T61String(SIZE(0..ub-descriptor-string)),
        iso-latin1    [2] Latin1String(SIZE(0..ub-descriptor-string)),
        iso-ucs-2     [3] UCS2Level2String(SIZE(0..ub-descriptor-string)) }

descriptorSyntax ATTRIBUTE-SYNTAX
        Descriptor
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-descriptor

--*** 9.1.5.4. Message and messageSyntax
Message ::= CHOICE {
        iso-646-irv   [0] VisibleString(SIZE(0..ub-message-string)),
        ccitt-t-61    [1] T61String(SIZE(0..ub-message-string)),
        iso-latin1    [2] Latin1String(SIZE(0..ub-message-string)),
        iso-ucs-2     [3] UCS2Level2String(SIZE(0..ub-message-string)) }

messageSyntax ATTRIBUTE-SYNTAX
        Message
        MATCHES FOR SUBSTRINGS EQUALITY
```


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```
        ::= id-syn-message

--*** 9.1.5.5. ErrorMessage and errorMessageSyntax
ErrorMessage ::= SEQUENCE {
        data            [0] CHOICE {
            iso-646-irv     [0] VisibleString(SIZE(0..ub-message-string)),
            ccitt-t-61      [1] T61String(SIZE(0..ub-message-string)),
            iso-latin-1     [2] Latin1String(SIZE(0..ub-message-string)),
            iso-ucs-2       [3] UCS2Level2String(SIZE(0..ub-message-string)),
            other-code-set  [4] OCTET STRING(SIZE(0..ub-message-string)) },
        locale          [1] Locale OPTIONAL }

errorMessageSyntax  ATTRIBUTE-SYNTAX
        ErrorMessage
        MATCHES FOR EQUALITY
        ::= id-syn-error-message

--*** 9.1.5.6. SimpleName and simpleNameSyntax
SimpleName ::= CHOICE {
        iso-646-irv   [0] VisibleString(SIZE(0..ub-name-string)),
        ccitt-t-61    [1] T61String(SIZE(0..ub-name-string)),
        iso-latin1    [2] Latin1String(SIZE(0..ub-name-string)),
        iso-ucs-2     [3] UCS2Level2String(SIZE(0..ub-name-string)) }

simpleNameSyntax ATTRIBUTE-SYNTAX
        SimpleName
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-simple-name

--*** 9.1.5.7. DistinguishedNameString and distinguishedNameStringSyntax
DistinguishedNameString ::= SEQUENCE {
    name          [0] Text,
    name-syntax   [1] NameOrOid OPTIONAL }

distinguishedNameStringSyntax ATTRIBUTE-SYNTAX
        DistinguishedNameString
        MATCHES FOR SUBSTRINGS EQUALITY
        ::= id-syn-dist-name-string

--*** 9.1.5.8. DistinguishedNameStringSequence and
--              distinguishedNameStringSequenceSyntax
DistinguishedNameStringSequence ::= SEQUENCE OF DistinguishedNameString

distinguishedNameStringSequenceSyntax ATTRIBUTE-SYNTAX
        DistinguishedNameStringSequence
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-dist-name-string-sequence

--*** 9.1.5.9. Delta time and deltaSyntax
DeltaTime ::= INTEGER (0..ub-integer)

deltaTimeSyntax ATTRIBUTE-SYNTAX
        DeltaTime
```


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```
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-delta-time

--*** .1.5.10. Generalized time and generalizedTimeSyntax
generalizedTimeSyntax ATTRIBUTE-SYNTAX
        GeneralizedTime
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-generalized-time

--*** 9.1.5.11. Integer and integerSyntax
Integer ::= INTEGER (lb-integer..ub-integer)

integerSyntax ATTRIBUTE-SYNTAX
        Integer
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-integer

--*** 9.1.5.12. IntegerSequence and integerSequenceSyntax
IntegerSequence ::= SEQUENCE OF Integer

integerSequenceSyntax ATTRIBUTE-SYNTAX
        IntegerSequence
        MATCHES FOR EQUALITY
        ::= id-syn-integer-sequence

--*** 9.1.5.13. Cardinal and cardinalSyntax
Cardinal ::= INTEGER (0..ub-integer)

cardinalSyntax ATTRIBUTE-SYNTAX
        Cardinal
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-cardinal

--*** 9.1.5.14. CardinalSequence and cardinalSequenceSyntax
CardinalSequence ::= SEQUENCE OF Cardinal

cardinalSequenceSyntax ATTRIBUTE-SYNTAX
        CardinalSequence
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-sequence

--*** 9.1.5.15. PositiveInteger and positiveIntegerSyntax
PositiveInteger ::= INTEGER (1..ub-integer)

positiveIntegerSyntax ATTRIBUTE-SYNTAX
        PositiveInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-positive-integer

--*** 9.1.5.16. IntegerRange and integerRangeSyntax
IntegerRange ::= SEQUENCE {
        lower-bound  Integer,
        upper-bound  Integer }
```


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```
integerRangeSyntax ATTRIBUTE-SYNTAX
        IntegerRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-integer-range

--*** 9.1.5.17. CardinalRange and cardinalRangeSyntax
CardinalRange ::= SEQUENCE {
        lower-bound  Cardinal,
        upper-bound  Cardinal }

cardinalRangeSyntax ATTRIBUTE-SYNTAX
        CardinalRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-cardinal-range

--*** 9.1.5.18. MaximumInteger and maximumIntegerSyntax
MaximumInteger ::= Integer

maximumIntegerSyntax ATTRIBUTE-SYNTAX
        MaximumInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-maximum-integer

--*** 9.1.5.19. MinimumInteger and minimumIntegerSyntax
MinimumInteger ::= Integer

minimumIntegerSyntax ATTRIBUTE-SYNTAX
        MinimumInteger
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-minimum-integer

-- 64-bit integer data types:
--*** 9.1.5.20. Integer64 and integer64Syntax
Integer64 ::= INTEGER (lb-integer64..ub-integer64)

integer64Syntax ATTRIBUTE-SYNTAX
        Integer64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-integer64

--*** 9.1.5.21. Integer64Sequence and integer64SequenceSyntax
Integer64Sequence ::= SEQUENCE OF Integer64

integer64SequenceSyntax ATTRIBUTE-SYNTAX
        Integer64Sequence
        MATCHES FOR EQUALITY
        ::= id-syn-integer64-sequence

--*** 9.1.5.22. Cardinal64 and cardinal64Syntax
Cardinal64 ::= INTEGER (0..ub-integer64)

cardinal64Syntax ATTRIBUTE-SYNTAX
```


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```
        Cardinal64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-cardinal64

--*** 9.1.5.23. Cardinal64Sequence and cardinal64SequenceSyntax
Cardinal64Sequence ::= SEQUENCE OF Cardinal64

cardinal64SequenceSyntax ATTRIBUTE-SYNTAX
        Cardinal64Sequence
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal64-sequence

--*** 9.1.5.24. PositiveInteger64 and positiveInteger64Syntax
PositiveInteger64 ::= INTEGER (1..ub-integer64)

positiveInteger64Syntax ATTRIBUTE-SYNTAX
        PositiveInteger64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-positive-integer64

--*** 9.1.5.25. Integer64Range and integer64RangeSyntax
Integer64Range ::= SEQUENCE {
        lower-bound  Integer64,
        upper-bound  Integer64 }

integer64RangeSyntax ATTRIBUTE-SYNTAX
        Integer64Range
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-integer64-range

--*** 9.1.5.26. Cardinal64Range and cardinal64RangeSyntax
Cardinal64Range ::= SEQUENCE {
        lower-bound  Cardinal64,
        upper-bound  Cardinal64 }

cardinal64RangeSyntax ATTRIBUTE-SYNTAX
        Cardinal64Range
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-cardinal64-range

--*** 9.1.5.27. MaximumInteger64 and maximumInteger64Syntax
MaximumInteger64 ::= Integer64

maximumInteger64Syntax ATTRIBUTE-SYNTAX
        MaximumInteger64
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-maximum-integer64

--*** 9.1.5.28. MinimumInteger64 and minimumInteger64Syntax
MinimumInteger64 ::= Integer64

minimumInteger64Syntax ATTRIBUTE-SYNTAX
        MinimumInteger64
```


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```
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-minimum-integer64

--*** 9.1.5.29. Real and realSyntax
Real ::= REAL

realSyntax ATTRIBUTE-SYNTAX
        Real
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-real

--*** 9.1.5.30. RealSequence and realSequenceSyntax
RealSequence ::= SEQUENCE OF Real

realSequenceSyntax ATTRIBUTE-SYNTAX
        RealSequence
        MATCHES FOR EQUALITY
        ::= id-syn-real-sequence

--*** 9.1.5.31. NonNegativeReal and nonNegativeRealSyntax
NonNegativeReal ::= REAL(0..PLUS-INFINITY)

nonNegativeRealSyntax ATTRIBUTE-SYNTAX
        NonNegativeReal
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-non-negative-real

--*** 9.1.5.32. RealRange and realRangeSyntax
RealRange ::= SEQUENCE {
        lower-bound  Real,
        upper-bound  Real }

realRangeSyntax ATTRIBUTE-SYNTAX
        RealRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-real-range

--*** 9.1.5.33. NonNegativeRealRange and nonNegativeRealRangeSyntax
NonNegativeRealRange ::= SEQUENCE {
        lower-bound  NonNegativeReal,
        upper-bound  NonNegativeReal }

nonNegativeRealRangeSyntax ATTRIBUTE-SYNTAX
        NonNegativeRealRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-non-negative-real-range

--*** 9.1.5.34. Boolean and booleanSyntax
Boolean ::= BOOLEAN

booleanSyntax ATTRIBUTE-SYNTAX
        Boolean
        MATCHES FOR EQUALITY
```


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```
        ::= id-syn-boolean

--*** 9.1.5.35. Percent and percentSyntax
Percent ::= INTEGER (0..100)

percentSyntax ATTRIBUTE-SYNTAX
        Percent
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-percent

--*** 9.1.5.36. ObjectIdentifier and objectIdentifierSyntax
ObjectIdentifier ::= OBJECT IDENTIFIER

objectIdentifierSyntax ATTRIBUTE-SYNTAX
        ObjectIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-object-identifier

--*** 9.1.5.37. ObjectIdentifierSequence and objectIdentifierSequenceSyntax
ObjectIdentifierSequence ::= SEQUENCE OF ObjectIdentifier

objectIdentifierSequenceSyntax ATTRIBUTE-SYNTAX
        ObjectIdentifierSequence
        MATCHES FOR EQUALITY
        ::= id-syn-object-identifier-sequence

--*** 9.1.5.38. NameOrOid and nameOrOidSyntax
NameOrOid ::= CHOICE {
        global-form  [0] OBJECT IDENTIFIER,
        local-form   [1] SimpleName }

nameOrOidSyntax ATTRIBUTE-SYNTAX
        NameOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-name-or-oid

--*** 9.1.5.39. NameOrOidSequence and nameOrOidSequenceSyntax
NameOrOidSequence ::= SEQUENCE OF NameOrOid

nameOrOidSequenceSyntax ATTRIBUTE-SYNTAX
        NameOrOidSequence
        MATCHES FOR EQUALITY
        ::= id-syn-name-or-oid-sequence

--*** 9.1.5.40. DistinguishedName and distinguishedNameSyntax
distinguishedNameSyntax ATTRIBUTE-SYNTAX
        DistinguishedName
        MATCHES FOR EQUALITY
        ::= id-syn-distinguished-name

--*** 9.1.5.41. RDNSequence and rdnSequenceSyntax
rdnSequenceSyntax ATTRIBUTE-SYNTAX
        RDNSequence
```


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```
        MATCHES FOR EQUALITY
        ::= id-syn-rdn-sequence

--*** 9.1.5.42. Realization and realizationSyntax
Realization ::= ENUMERATED {
        logical                 (0),
        physical                (1),
        logical-and-physical    (2) }

realizationSyntax ATTRIBUTE-SYNTAX
        Realization
        MATCHES FOR EQUALITY
        ::= id-syn-realization

--*** 9.1.5.43. MediumDimensions and mediumDimensionsSyntax
MediumDimensions ::= SEQUENCE {
        x-size      NonNegativeReal,
        y-size      NonNegativeReal }

mediumDimensionsSyntax ATTRIBUTE-SYNTAX
        MediumDimensions
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-medium-dimensions

--*** 9.1.5.44. Dimension and dimensionSyntax
Dimension ::= SEQUENCE {
        value       CHOICE {
            numeric-valued [0] NonNegativeReal,
            named-value    [1] NameOrOid },
        tolerance      [2] NonNegativeReal OPTIONAL }

dimensionSyntax ATTRIBUTE-SYNTAX
        Dimension
        MATCHES FOR EQUALITY
        ::= id-syn-dimension

--*** 9.1.5.45. XYDimensions and xyDimensionsSyntax
XYDimensions ::= SEQUENCE {
        value       CHOICE {
            numeric-valued [0] SEQUENCE {
                x-dimension    [0] NonNegativeReal,
                y-dimension    [1] NonNegativeReal },
            named-valued   [1] NameOrOid },
        tolerance    [2] NonNegativeReal OPTIONAL }

xyDimensionsSyntax ATTRIBUTE-SYNTAX
        XYDimensions
        MATCHES FOR EQUALITY
        ::= id-syn-x-y-dimensions

--*** 9.1.5.46. Locations and locationsSyntax
Locations ::= SEQUENCE {
        value       CHOICE {
```


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```
            numeric-valued [0] SEQUENCE OF NonNegativeReal,
            named-value    [1] NameOrOid },
        tolerance      [2] NonNegativeReal OPTIONAL }

locationsSyntax ATTRIBUTE-SYNTAX
        Locations
        MATCHES FOR EQUALITY
        ::= id-syn-locations

--*** 9.1.5.47. Area and areaSyntax
Area ::= SEQUENCE {
        minimum-x       NonNegativeReal,
        maximum-x       NonNegativeReal,
        minimum-y       NonNegativeReal,
        maximum-y       NonNegativeReal }

areaSyntax ATTRIBUTE-SYNTAX
        Area
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-area

--*** 9.1.5.48. AreaSequence and areaSequenceSyntax
AreaSequence ::= SEQUENCE OF Area

areaSequenceSyntax ATTRIBUTE-SYNTAX
        AreaSequence
        MATCHES FOR EQUALITY
        ::= id-syn-area-sequence

--*** 9.1.5.49. Edge and edgeSyntax
Edge ::= ENUMERATED {
        bottom-edge  (0),
        right-edge   (1),
        top-edge     (2),
        left-edge    (3) }

edgeSyntax ATTRIBUTE-SYNTAX
        Edge
        MATCHES FOR EQUALITY
        ::= id-syn-edge

--*** 9.1.5.50. FontReference and fontReferenceSyntax
FontReference ::= CHOICE {
        simple-font-name    [0] SimpleName,
        iso-9541-font-name  [1] Global-Name }

fontReferenceSyntax ATTRIBUTE-SYNTAX
        FontReference
        MATCHES FOR EQUALITY
        ::= id-syn-font-reference

--*** 9.1.5.51. CardinalOrOid and cardinalOrOidSyntax
CardinalOrOid ::= CHOICE {
```


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```
        cardinal-value      [0] Cardinal,
        oid-value           [1] OBJECT IDENTIFIER }

cardinalOrOidSyntax ATTRIBUTE-SYNTAX
        CardinalOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-or-oid

--*** 9.1.5.52. OidCardinalMap and oidCardinalMapSyntax
OidCardinalMap ::= SEQUENCE {
        oid-name            [0] OBJECT IDENTIFIER OPTIONAL,
        cardinal-value      [1] Cardinal }

oidCardinalMapSyntax ATTRIBUTE-SYNTAX
        OidCardinalMap
        MATCHES FOR EQUALITY
        ::= id-syn-oid-cardinal-map

--*** 9.1.5.53. CardinalOrNameOrOid and cardinalOrNameOrOidSyntax
CardinalOrNameOrOid ::= CHOICE {
        cardinal-value              [0] Cardinal,
        name-or-oid-value           [1] NameOrOid }

cardinalOrNameOrOidSyntax ATTRIBUTE-SYNTAX
        CardinalOrNameOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-cardinal-or-name-or-oid

--*** 9.1.5.54. PositiveIntegerOrOid and positiveIntegerOrOidSyntax
PositiveIntegerOrOid  ::= CHOICE {
        object-identifier       [0] OBJECT IDENTIFIER,
        positive-integer        [1] PositiveInteger }

positiveIntegerOrOidSyntax ATTRIBUTE-SYNTAX
        PositiveIntegerOrOid
        MATCHES FOR EQUALITY
        ::= id-syn-positive-integer-or-oid

--*** 9.1.5.55. EventHandlingProfile and eventHandlingProfileSyntax

RPCAddress ::= CHOICE {
        name-binding [0] Text,  --for an implementation that uses the name
                                -- service, e.g., DCE;  ONC should use
                                -- onc-binding, but may use name-binding
        onc-binding  [1] SEQUENCE {  -- for ONC only
            host-name               [0] Text,
            program-number          [1] Cardinal,
            version-number          [2] Cardinal,
            procedure-number        [3] Cardinal,
            authentication-name     [4] Text } }

DeliveryAddress ::= CHOICE {
        mhs-address         [0] ORAddressAndOrDirectoryName, -- ISO/IEC 10021-4
```


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```
        distinguished-name [1] DistinguishedName,          -- ISO/IEC 9594-2
        text               [2] Text,
        dor                [3] DOR,                        -- ISO/IEC 10031-2
        octet-string       [4] OCTET STRING(SIZE(0..ub-octet-string)),
        dist-name-string   [5] DistinguishedNameString,
        rpc-address        [6] RPCAddress }        -- for notification service

EventHandlingProfile ::= SEQUENCE {
        event-identifiers       [0] SET OF OBJECT IDENTIFIER OPTIONAL,
        delivery-method         [1] OBJECT IDENTIFIER OPTIONAL,
        event-comment           [2] Message OPTIONAL,
        delivery-address        [3] DeliveryAddress OPTIONAL,
        locale                  [4] Locale OPTIONAL }

eventHandlingProfileSyntax ATTRIBUTE-SYNTAX
        EventHandlingProfile
        MATCHES FOR EQUALITY
        ::= id-syn-event-handling-profile


 -- 8.1.2 Operation Attributes

 --*** 8.1.2.1 Priority

Priority ::= INTEGER (1..100)

prioritySyntax ATTRIBUTE-SYNTAX
        Priority
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-priority

priority ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX prioritySyntax
        SINGLE VALUE
        ::= id-att-priority

 --*** 8.1.2.2 Privileges
Privileges ::= SEQUENCE {
        operation-pac [0] PrivilegeAttributeCertificate OPTIONAL,
                          -- see clause 6.6.2
        proxy-pac     [1] PrivilegeAttributeCertificate OPTIONAL }

privilegesSyntax ATTRIBUTE-SYNTAX
        Privileges
        MATCHES FOR EQUALITY ORDERING
        ::= id-syn-privileges

privileges ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX privilegesSyntax
        SINGLE VALUE
        ::= id-att-privileges

--***  8.1.2.3  Locale
```


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```
Locale ::= SEQUENCE {
        language        [0] OCTET STRING ( SIZE (2) ),
        country         [1] OCTET STRING ( SIZE (2) ),
        character-set   [2] OBJECT IDENTIFIER,
        modifier        [3] OCTET STRING ( SIZE (64) ) OPTIONAL }

localeSyntax  ATTRIBUTE-SYNTAX
        Locale
        MATCHES FOR EQUALITY
        ::= id-syn-locale

operation-locale  ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        SINGLE VALUE
        ::= id-att-operation-locale

--***  8.1.2.4
DeliveryAddressForMethod ::= SEQUENCE {
        delivery-method         [0] OBJECT IDENTIFIER,
        delivery-address        [1] DeliveryAddress }

deliveryAddressForMethodSyntax ATTRIBUTE-SYNTAX
        DeliveryAddressForMethod
        MATCHES FOR EQUALITY
        ::= id-syn-delivery-address-for-method

default-delivery-addresses ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deliveryAddressForMethodSyntax
        MULTI VALUE
        ::= id-att-default-delivery-addresses


--*****************************************************************************--

-- 9.1.6 Generic attributes --
   -- Specifiable in Print: id-att-notification-profile,
   --     id-att-logging-profile
   -- Specifiable in ModifyJob: id-att-notification-profile,
   --     id-att-logging-profile
   -- Specifiable in ListObjectAttributes: all

--*** 9.1.6.1. Object-class
object-class ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-object-class  -- see ISO/IEC 9594-2 clause 9.5.4

--*** 9.1.6.2. Descriptor
descriptor ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX descriptorSyntax
        SINGLE VALUE
        ::= id-att-descriptor
```


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```
--*** 9.1.6.3. Descriptive-name
descriptive-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX descriptiveNameSyntax
        SINGLE VALUE
        ::= id-att-descriptive-name

--*** 9.1.6.4. State
state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-state

--*** 9.1.6.5. Message
message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-message

--*** 9.1.6.6. Availability
availability ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-availability

--*** 9.1.6.7. List-of-managers
list-of-managers ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-list-of-managers

--*** 9.1.6.8. Notification-profile
notification-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX eventHandlingProfileSyntax
        MULTI VALUE
        ::= id-att-notification-profile

--*** 9.1.6.9. Logging-profile
logging-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX eventHandlingProfileSyntax
        MULTI VALUE
        ::= id-att-logging-profile

--*** 9.1.6.10. Associated-server
associated-server ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-associated-server


--*****************************************************************************--
```


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```
-- 9.2 Job object attributes --
   -- Applicable Generic attributes are:
   --    id-att-object-class
   --    id-att-notification-profile
   --    id-att-logging-profile

-- 9.2.1 Job information attributes --
   -- Specifiable in Print: all, except id-att-job-identifier and
   --     id-att-job-identifier-on-printer
   -- Specifiable in ModifyJob: all, except id-att-job-identifier,
   --     id-att-job-on-printer, id-att-job-on-client,
   --     id-att-job-originator, id-att-job-owner, and
   --     id-att-initial-value-job
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.1.1. Job-identifier
JobIdentifier ::= PrintableString (SIZE (1..255))

jobIdentifierSyntax ATTRIBUTE-SYNTAX
        JobIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-job-identifier

job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier

--*** 9.2.1.2. Job-identifier-on-printer
job-identifier-on-printer ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier-on-printer

--*** 9.2.1.3. Job-identifier-on-client
job-identifier-on-client ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX JobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-identifier-on-client

--*** 9.2.1.4. Job-client-id
job-client-id ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-job-client-id

--*** 9.2.1.5. Job-name
job-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-job-name

--*** 9.2.1.6. Job-originator
```


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```
job-originator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-job-originator

--*** 9.2.1.7. Job-owner
job-owner ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-job-owner

--*** 9.2.1.8. Job-comment
job-comment ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-comment

--*** 9.2.1.9. Start-message
job-start-message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-start-message

--*** 9.2.1.10. Job-end-message
job-end-message ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-end-message

--*** 9.2.1.11. Job-non-compulsory-attributes
job-non-compulsory-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-non-compulsory-attributes

--*** 9.2.1.12. Initial-value-job
initial-value-job ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-job


--*****************************************************************************--

-- 9.2.2 Job-result-handling attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.2.1. Results-profile
ResultsProfile ::= SEQUENCE {
        delivery-method     [0] OBJECT IDENTIFIER OPTIONAL,
```


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```
        results-set-comment [1] Message OPTIONAL,
        delivery-address    [2] DeliveryAddress OPTIONAL,
        job-copies          [3] PositiveInteger DEFAULT 1,
        output-bin          [5] NameOrOid OPTIONAL }

resultsProfileSyntax ATTRIBUTE-SYNTAX
        ResultsProfile
        MATCHES FOR EQUALITY
        ::= id-syn-results-profile

results-profile ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resultsProfileSyntax
        MULTI VALUE
        ::= id-att-results-profile

--*** 9.2.2.2. Job-finishing
finishingSyntax ATTRIBUTE-SYNTAX
        Finishing
        MATCHES FOR EQUALITY
        ::= id-syn-finishing

job-finishing ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-job-finishing

--*** 9.2.2.3. Finishing-includes-job-sheets
finishing-includes-job-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-finishing-includes-job-sheets

--*** 9.2.2.4. Job-sheets
job-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        SINGLE VALUE
        ::= id-att-job-sheets

--*** 9.2.2.5. Document-sheets
document-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                              -- identifies an auxiliary-sheet-package
        SINGLE VALUE
        ::= id-att-document-sheets


--*****************************************************************************--
-- 9.2.3 Job-event-handling attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all
```


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```
--*** 9.2.3.1. Job-abort-criteria
Criteria ::= SEQUENCE {
        criterion-type          CriterionType,
        criterion-threshold     ANY DEFINED BY criterion-type }

CriterionType ::= AttributeId

criteriaSyntax ATTRIBUTE-SYNTAX
        Criteria
        MATCHES FOR EQUALITY
        ::= id-syn-criteria

job-abort-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-job-abort-criteria

--*** 9.2.3.2. Job-warning-criteria
job-warning-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-job-warning-criteria

--*** 9.2.3.3. Document-abort-criteria
document-abort-criteria ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX criteriaSyntax
        MULTI VALUE
        ::= id-att-document-abort-criteria


--*****************************************************************************--
-- 9.2.4 Job-scheduling-instruction attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.4.1. Job-start-wait
job-start-wait ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-start-wait

--*** 9.2.4.2. Job-end-wait
job-end-wait ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-end-wait

--*** 9.2.4.3. Job-hold
job-hold ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
```


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```
        SINGLE VALUE
        ::= id-att-job-hold

--*** 9.2.4.4. Job-password
JobPassword ::= OCTET STRING (SIZE(0..ub-octet-string))

jobPasswordSyntax ATTRIBUTE-SYNTAX
        JobPassword
        MATCHES FOR EQUALITY
        ::= id-syn-job-password

job-password ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobPasswordSyntax
        SINGLE VALUE
        ::= id-att-job-password

--*** 9.2.4.5. Job-print-after
job-print-after ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-print-after

--*** 9.2.4.6. Job-priority
job-priority ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX prioritySyntax
        SINGLE VALUE
        ::= id-att-job-priority

--*** 9.2.4.7. Job-deadline-time
job-deadline-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-deadline-time

--*** 9.2.4.8. Job-discard-time
job-discard-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-job-discard-time

--*** 9.2.4.9. Job-retention-period
job-retention-period ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-job-retention-period

--*** 9.2.4.10. Job-message-to-operator
job-message-to-operator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-message-to-operator

--*** 9.2.4.11. Job-scheduling
```


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```
job-scheduling ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-scheduling

--*** 9.2.4.12. Job-validate
job-validate ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-validate


--*****************************************************************************--

-- 9.2.5 Printer selection attributes --
   -- Specifiable in Print: all, except the value of printer-name-requested
   --   shall be passed as an explicit parameter of the first PrintArgument,
   --   rather than as an attribute
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.5.1. Printer-name-requested
printer-name-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-printer-name-requested

--*** 9.2.5.2. Physical-printers-requested
physical-printers-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-physical-printers-requested

--*** 9.2.5.3. Printer-locations-requested
printer-locations-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-locations-requested

--*** 9.2.5.4. Printer-models-requested
printer-models-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-models-requested

--*** 9.2.5.5. Printer-types-requested
printer-types-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-types-requested

--*** 9.2.5.6. Printer-speed-range-requested
```


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```
printer-speed-range-requested ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX integerRangeSyntax
        SINGLE VALUE
        ::= id-att-printer-speed-range-requested


--*****************************************************************************--
-- 9.2.6 Access and accounting attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: none
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.6.1. User-name
user-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-user-name

--*** 9.2.6.2. Accounting-information
accounting-information ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX OCTET STRING (SIZE(0..ub-octet-string))
        SINGLE VALUE
        ::= id-att-accounting-information


--*****************************************************************************--

-- 9.2.7 Job security handling attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: none
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.7.1. Job-security-confidentiality-level
JobLevel ::= SEQUENCE {
        organization-identifier  OBJECT IDENTIFIER,
        level                    Cardinal }

jobLevelSyntax ATTRIBUTE-SYNTAX
        JobLevel
        MATCHES FOR EQUALITY
        ::= id-syn-job-level

job-security-confidentiality-level ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobLevelSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-level

--*** 9.2.7.2. Job-security-confidentiality-category
JobCategories ::= SEQUENCE {
        organization-identifier  OBJECT IDENTIFIER,
        categories               SET OF Cardinal }
```


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```
jobCategoriesSyntax ATTRIBUTE-SYNTAX
        JobCategories
        MATCHES FOR EQUALITY
        ::= id-syn-job-categories

job-security-confidentiality-category ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobCategoriesSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-category

--*** 9.2.7.3. Job-security-confidentiality-policy
job-security-confidentiality-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-security-confidentiality-policy

--*** 9.2.7.4. Job-security-integrity-level
job-security-integrity-level ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobLevelSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-level

--*** 9.2.7.5. Job-security-integrity-category
job-security-integrity-category ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobCategoriesSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-category

--*** 9.2.7.6. Job-security-integrity-policy
job-security-integrity-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-job-security-integrity-policy

--*** 9.2.7.7. Job-security-label
job-security-label ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-security-label


--*****************************************************************************--

-- 9.2.8 Job status attributes --
   -- Specifiable in Print: none
   -- Specifiable in ModifyJob: none
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.8.1. Current-job-state
current-job-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
```


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```
        ::= id-att-current-job-state

--*** 9.2.8.2. Job-state-reasons
job-state-reasons ATTRIBUTE
    WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
    MULTI VALUE
    ::= id-att-job-state-reasons

--*** 9.2.8.3. Previous-job-state
previous-job-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-previous-job-state

--*** 9.2.8.4. Printers-assigned
printers-assigned ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSequenceSyntax
        SINGLE VALUE
        ::= id-att-printers-assigned

--*** 9.2.8.5. Printer-state-of-printers-assigned
printer-state-of-printers-assigned ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-printer-state-of-printers-assigned

--*** 9.2.8.6. Estimated-completion-time
estimated-completion-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-estimated-completion-time

--*** 9.2.8.7. Submission-time
submission-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-submission-time

--*** 9.2.8.8. Modification-time
modification-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-modification-time

--*** 9.2.8.9. Started-printing-time
started-printing-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-started-printing-time

--*** 9.2.8.10. Job-copies-completed
job-copies-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
```


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```
        SINGLE VALUE
        ::= id-att-job-copies-completed

--*** 9.2.8.11. Pages-completed
pages-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-pages-completed

--*** 9.2.8.12. Impressions-completed
impressions-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-impressions-completed

--*** 9.2.8.13. Media-sheets-completed
media-sheets-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-media-sheets-completed

--*** 9.2.8.14. Octets-completed
octets-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64Syntax
        SINGLE VALUE
        ::= id-att-octets-completed

--*** 9.2.8.15. Total-job-octets
total-job-octets ATTRIBUTE
          WITH ATTRIBUTE-SYNTAX cardinal64Syntax
          SINGLE VALUE
          ::= id-att-total-job-octets

--*** 9.2.8.16. Intervening-jobs
intervening-jobs ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-intervening-jobs

--*** 9.2.8.17. Print-checkpoint
PrintCheckpoint ::= SEQUENCE {
        printer-name            [0] DistinguishedNameString OPTIONAL,
        job-copies-completed    [1] Cardinal OPTIONAL,
        copies-completed        [2] Cardinal OPTIONAL,
        pages-completed         [3] Cardinal OPTIONAL,
        octets-completed        [4] Cardinal64 OPTIONAL,
        context-info            [5] OCTET STRING (SIZE(0..ub-octet-string)),
                                    -- implementation-dependent
        checkpoint-format       [6] OBJECT IDENTIFIER }

printCheckpointSyntax ATTRIBUTE-SYNTAX
        PrintCheckpoint
        MATCHES FOR EQUALITY
```


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```
        ::= id-syn-print-checkpoint

print-checkpoint ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX printCheckpointSyntax
        MULTI VALUE
        ::= id-att-print-checkpoint

--*** 9.2.8.18. New-job-identifier
NewJobIdentifier ::= SEQUENCE {
        server-name             DistinguishedNameString,
        local-identifier        JobIdentifier }

newJobIdentifierSyntax ATTRIBUTE-SYNTAX
        NewJobIdentifier
        MATCHES FOR EQUALITY
        ::= id-syn-new-job-identifier

new-job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX jobIdentifierSyntax
        SINGLE VALUE
        ::= id-att-new-job-identifier

--*** 9.2.8.19. On-request-resources-required
objectIdentificationSyntax ATTRIBUTE-SYNTAX
        ObjectIdentification
        MATCHES FOR EQUALITY
        ::= id-syn-object-identification

on-request-resources-required ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentificationSyntax
        MULTI VALUE
        ::= id-att-on-request-resources-required

--*** 9.2.8.20. Job-message-from-administrator
job-message-from-administrator ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX messageSyntax
        SINGLE VALUE
        ::= id-att-job-message-from-administrator

--*** 9.2.8.21. Last-job-events
last-job-events ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-last-job-events

--*** 9.2.8.22. Name-of-last-accessor
name-of-last-accessor ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-name-of-last-accessor

--*** 9.2.8.23. Error-count
error-count ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-error-count

--*** 9.2.8.24. Warning-count
warning-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-warning-count

--*** 9.2.8.25. Processing-time
processing-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-processing-time

--*** 9.2.8.26. Completion-time
completion-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-completion-time

--*** 9.2.8.27. Number-of-documents
number-of-documents ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-number-of-documents

--*** 9.2.8.28. Job-submission-complete
job-submission-complete ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-job-submission-complete

--*** 9.2.8.29. Ignored-attributes
IgnoredAttribute ::= SEQUENCE {
        document-number   PositiveInteger OPTIONAL,
                          -- document-sequence-number if a per-document
                          -- attribute; if omitted, the ignored attribute
                          -- specification applies to all documents in the job
        attribute-id      AttributeId,
        attribute-values  SET OF ANY -- DEFINED BY attribute-id -- }

ignoredAttributeSyntax ATTRIBUTE-SYNTAX
        IgnoredAttribute
        MATCHES FOR EQUALITY
        ::= id-syn-ignored-attribute

ignored-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX ignoredAttributeSyntax
        MULTI VALUE
        ::= id-att-ignored-attributes
```


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```
--*****************************************************************************--

--*** 9.2.9 Job size attributes
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: none
   -- Specifiable in ListObjectAttributes: all

--*** 9.2.9.1. Job-page-count
job-page-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-page-count

--*** 9.2.9.2. Job-impression-count
job-impression-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-impression-count

--*** 9.2.9.3. Job-media-sheet-count
job-media-sheet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-job-media-sheet-count


--*****************************************************************************--

-- 9.3 Printable document object attributes (new subclause) --
-- Applicable Generic attributes are:
--    id-att-object-class

--*** 9.3.1 Document-information attributes
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all, except id-add-initial-value-document
   -- Specifiable in ListObjectAttributes: all

--*** 9.3.1.1. Document-name
document-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-document-name

--*** 9.3.1.2. Document-file-name
document-file-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        SINGLE VALUE
        ::= id-att-document-file-name

--*** 9.3.1.3. Document-authors
document-authors ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
```


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```
        MULTI VALUE
        ::= id-att-document-authors

--*** 9.3.1.4. Document-comment
document-comment ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX  messageSyntax
        SINGLE VALUE
        ::= id-att-document-comment

--*** 9.3.1.5. Document-revision-date
document-revision-date ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX generalizedTimeSyntax
        SINGLE VALUE
        ::= id-att-document-revision-date


--*****************************************************************************--
-- 9.3.2 Production instruction attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.3.2.1. Default-medium
default-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-medium

--*** 9.3.2.2. Default-input-tray
default-input-tray ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-input-tray

--*** 9.3.2.3. Default-font
default-font ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        SINGLE VALUE
        ::= id-att-default-font

--*** 9.3.2.4. Default-resources
Resource ::= CHOICE {
        object-name   [0] NameOrOid,    -- Identifies Resource Object
        resource-name [1] Text }        -- Identifies resource name

resourceSyntax ATTRIBUTE-SYNTAX
        Resource
        MATCHES FOR EQUALITY
        ::= id-syn-resource

default-resources ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceSyntax
```


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```
        MULTI VALUE
        ::= id-att-default-resources

--*** 9.3.2.5. Default-character-set
default-character-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-set

--*** 9.3.2.6. Default-character-repertoire
default-character-repertoire ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-repertoire

--*** 9.3.2.7. Default-character-mapping
default-character-mapping ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-default-character-mapping

--*** 9.3.2.8. Default-printer-resolution
default-printer-resolution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-printer-resolution

--*** 9.3.2.9. Medium-substitution
MediumReference ::= NameOrOid

MediumSubstitution ::= SEQUENCE {
        original-medium         MediumReference,
        substitution-medium     MediumReference }

mediumSubstitutionSyntax ATTRIBUTE-SYNTAX
        MediumSubstitution
        MATCHES FOR EQUALITY
        ::= id-syn-medium-substitution

medium-substitution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSubstitutionSyntax
        MULTI VALUE
        ::= id-att-medium-substitution

--*** 9.3.2.10. Input-tray-select
input-tray-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-input-tray-select

--*** 9.3.2.11. Font-substitution
FontSubstitution ::= SEQUENCE {
        original-font           FontReference,
```


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```
        substitution-font       FontReference }

fontSubstitutionSyntax ATTRIBUTE-SYNTAX
        FontSubstitution
        MATCHES FOR EQUALITY
        ::= id-syn-font-substitution

font-substitution ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontSubstitutionSyntax
        MULTI VALUE
        ::= id-att-font-substitution

--*** 9.3.2.12. Resource-context
ResourceContext  ::= CHOICE {
        object-name [0] NameOrOid,  -- Identifies Resource Context Object
        path-name   [1] Text }      -- Identifies server path

ResourceContextSequence ::= SEQUENCE OF ResourceContext

resourceContextSyntax ATTRIBUTE-SYNTAX
        ResourceContextSequence
        MATCHES FOR EQUALITY
        ::= id-syn-resource-context

resource-context ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-resource-context

--*** 9.3.2.13. Finishing
finishing ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-finishing

--*** 9.3.2.14. Finishing-includes-document-sheets
finishing-includes-document-sheets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-finishing-includes-document-sheets

--*** 9.3.2.15. Output
output ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-output

--*** 9.3.2.16. Imposition attributes
--*** 9.3.2.16.1. Number-up
number-up ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrNameOrOidSyntax
        SINGLE VALUE
        ::= id-att-number-up
```


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```
--*** 9.3.2.16.2. Plex
plex ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-plex

--*** 9.3.2.16.3. Binding-edge
binding-edge ATTRIBUTE
         WITH ATTRIBUTE-SYNTAX edgeSyntax
         SINGLE VALUE
         ::= id-att-binding-edge

--*** 9.3.2.16.4. Binding-edge-image-shift
binding-edge-image-shift ATTRIBUTE
         WITH ATTRIBUTE-SYNTAX nonNegativeRealSyntax
         SINGLE VALUE
         ::= id-att-binding-edge-image-shift

--*** 9.3.2.16.5. x-image-shift
x-image-shift ATTRIBUTE
         WITH ATTRIBUTE-SYNTAX realSyntax
         SINGLE VALUE
         ::= id-att-x-image-shift

--*** 9.3.2.16.6. y-image-shift
y-image-shift ATTRIBUTE
         WITH ATTRIBUTE-SYNTAX realSyntax
         SINGLE VALUE
         ::= id-att-y-image-shift

--*** 9.3.2.17. Print-quality
print-quality ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-print-quality

--*** 9.3.2.18. Medium-fidelity
medium-fidelity ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-medium-fidelity

--*** 9.3.2.19. Sides
Sides ::= INTEGER (1..2)

sidesSyntax ATTRIBUTE-SYNTAX
        Sides
        MATCHES FOR EQUALITY
        ::= id-syn-sides

sides ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
```


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```
        SINGLE VALUE
        ::= id-att-sides

--*** 9.3.2.20. Page-select
PageIdentifier ::= CHOICE {
        nominal-page-number      [0] PositiveInteger,
        alphanumeric-page-number [1] SimpleName,
        page-tag                 [2] NameOrOid }

PageSelect ::= SEQUENCE {
        beginning-page  [0] PageIdentifier OPTIONAL,
                            -- omitted means no lower bound --
        ending-page     [1] PageIdentifier OPTIONAL
                            -- omitted means no upper bound -- }

PageSelectSequence ::= SEQUENCE OF PageSelect

pageSelectSyntax ATTRIBUTE-SYNTAX
        PageSelectSequence
        MATCHES FOR EQUALITY
        ::= id-syn-page-select

page-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageSelectSyntax
        SINGLE VALUE
        ::= id-att-page-select

--*** 9.3.2.21. Page-media-select
PageMediaSelect ::= SEQUENCE {
        page-range    [0] PageSelect,
        medium-id     [1] MediumReference }

MediaSelect ::= CHOICE {
        medium-for-all-pages      [0] MediumReference,
        medium-for-selected-pages [1] SEQUENCE OF PageMediaSelect  }

pageMediaSelectSyntax ATTRIBUTE-SYNTAX
        MediaSelect
        MATCHES FOR EQUALITY
        ::= id-syn-page-media-select

page-media-select ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageMediaSelectSyntax
        SINGLE VALUE
        ::= id-att-page-media-select

--*** 9.3.2.22. Copy-count
copy-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-copy-count

--*** 9.3.2.23. Reset-printer
```


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```
reset-printer ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-reset-printer

--*** 9.3.2.24. Initial-value-document
initial-value-document ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-document


--*****************************************************************************--

-- 9.3.3 Document description attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all, except document-content
   -- Specifiable in ListObjectAttributes: all, except document-content

--*** 9.3.3.1. Document-type
document-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-type

--*** 9.3.3.2. Transfer-method
transfer-method ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method

--*** 9.3.3.3. Document-format
DocFormat  ::= SEQUENCE {
        document-format          [0] OBJECT IDENTIFIER,
        document-format-variants [1] Text OPTIONAL,
        document-format-version  [2] SimpleName OPTIONAL }

docFormatSyntax ATTRIBUTE-SYNTAX
        DocFormat
        MATCHES FOR EQUALITY
        ::= id-syn-doc-format

document-format ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        SINGLE VALUE
        ::= id-att-document-format

--*** 9.3.3.4. Document-content
DocumentContent ::= CHOICE {
        included-document     [0] EXTERNAL,
        referenced-document   [1] DOR}
```


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```
documentContentSyntax ATTRIBUTE-SYNTAX
        DocumentContent
        MATCHES FOR EQUALITY
        ::= id-syn-document-content

document-content ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX documentContentSyntax
        SINGLE VALUE
        ::= id-att-document-content

--*** 9.3.3.5. Non-compulsory-attributes
non-compulsory-attributes ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-non-compulsory-attributes


--*************************************************************************--

-- 9.3.4 Document characteristics attributes --
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.3.4.1. Intended-page-size
PageSize ::= CHOICE {
        page-size-id        OBJECT IDENTIFIER,
        page-dimensions     MediumDimensions }

pageSizeSyntax ATTRIBUTE-SYNTAX
        PageSize
        MATCHES FOR EQUALITY
        ::= id-syn-page-size

intended-page-size ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageSizeSyntax
        SINGLE VALUE
        ::= id-att-intended-page-size

--*** 9.3.4.2. Content-orientation
content-orientation ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-content-orientation

--*** 9.3.4.3. Presentation-direction
PresentationDirection   ::= ENUMERATED {
        toRight-toBottom        (0),
        toLeft-toBottom         (1),
        bidirect-toBottom       (2),
        toRight-toTop           (3),
        toLeft-toTop            (4),
```


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```
        bidirect-toTop          (5),
        toBottom-toRight        (6),
        toBottom-toLeft         (7),
        toTop-toLeft            (8),
        toTop-toRight           (9) }

presentationDirectionSyntax ATTRIBUTE-SYNTAX
        PresentationDirection
        MATCHES FOR EQUALITY
        ::= id-syn-presentation-direction

presentation-direction ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        SINGLE VALUE
        ::= id-att-presentation-direction

--*** 9.3.4.4. Page-order-received
PageOrderType ::= ENUMERATED {
        unknown (2),          -- values are the same as those for Internet
                              --   Printer MIB (RFC 1759)
        first-to-last (3),    -- the order normally viewed by a reader
        last-to-first (4) }   -- reverse order

pageOrderTypeSyntax ATTRIBUTE-SYNTAX
        PageOrderType
        MATCHES FOR EQUALITY
        ::= id-syn-page-order-type

page-order-received ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageOrderTypeSyntax
        SINGLE VALUE
        ::= id-att-page-order-received

--*** 9.3.4.5. Media-used
media-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-media-used

--*** 9.3.4.6. Assured-reproduction-areas-used
assured-reproduction-areas-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX areaSequenceSyntax
        SINGLE VALUE
        ::= id-att-assured-reproduction-areas-used

--*** 9.3.4.7. Input-trays-used
input-trays-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-used

--*** 9.3.4.8. Fonts-used
fonts-used ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MULTI VALUE
        ::= id-att-fonts-used

--*** 9.3.4.9. Resources-used
resources-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceSyntax
        MULTI VALUE
        ::= id-att-resources-used

--*** 9.3.4.10. Character-sets-used
character-sets-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-used

--*** 9.3.4.11. Character-repertoires-used
character-repertoires-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-used

--*** 9.3.4.12. Character-mappings-used
character-mappings-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-used

--*** 9.3.4.13. Printer-resolutions-used
printer-resolutions-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalOrOidSyntax
        MULTI VALUE
        ::= id-att-printer-resolutions-used

--*** 9.3.4.14. Content-orientations-used
content-orientations-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-content-orientations-used

--*** 9.3.4.15. Presentation-directions-used
presentation-directions-used ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        MULTI VALUE
        ::= id-att-presentation-directions-used


--*** 9.3.4.16. System-hints
--*** 9.3.4.16.1. Octet-count 1
octet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64Syntax
        SINGLE VALUE
        ::= id-att-octet-count
```


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```
--*** 9.3.4.16.2. Page-count
page-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-page-count

--*** 9.3.4.16.3. Glyph-count
glyph-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-glyph-count

--*** 9.3.4.16.4. Font-count
font-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-font-count

--*** 9.3.4.16.5. Font-change-count
font-change-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-font-change-count

--*** 9.3.4.16.6. Maximum-fonts-per-page
maximum-fonts-per-page ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-maximum-fonts-per-page

--*** 9.3.4.16.7. Percent-graphics
percent-graphics ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX percentSyntax
        SINGLE VALUE
        ::= id-att-percent-graphics

--*** 9.3.4.16.8. Percent-images
percent-images ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX percentSyntax
        SINGLE VALUE
        ::= id-att-percent-images


--*****************************************************************************--

-- 9.3.5 Document status attributes (new subclause) --
   -- Specifiable in Print: none
   -- Specifiable in ModifyJob: none
   -- Specifiable in ListObjectAttributes: all

--*** 9.3.5.1. Document-sequence-number
```


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```
document-sequence-number ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-document-sequence-number

--*** 9.3.5.2. Document-state
document-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-state

--*** 9.3.5.3. Copies-completed
copies-completed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-copies-completed

--*** 9.3.5.4. File-reference
fileReferenceSyntax ATTRIBUTE-SYNTAX
        DOR
        MATCHES FOR EQUALITY
        ::= id-syn-file-reference

file-reference ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fileReferenceSyntax
        SINGLE VALUE
        ::= id-att-file-reference

--*** 9.3.5.5. Current-page-order
current-page-order ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageOrderTypeSyntax
        SINGLE VALUE
        ::= id-att-current-page-order


--*****************************************************************************--

-- 9.4 Printer object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-notification-profile
--    id-att-logging-profile
--    id-att-associated-server

-- In addition, the following printer attributes may also be server attributes:
--    id-att-job-attributes-supported
--    id-att-document-attributes-supported
```


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```
--    id-att-multiple-documents-supported
--    id-att-cancel-individual-document-supported
--    id-att-translators-supported
--    id-att-translators-ready
--    id-att-delivery-methods-supported
--    id-att-delivery-methods-ready
--    id-att-are-foreign-jobs-visible
--    id-att-enabled

--*** 9.4.1. Printer-name
printer-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-printer-name

--*** 9.4.2. Printer-name-aliases
printer-name-aliases ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-printer-name-aliases

--*** 9.4.3. Printer-locations
printer-locations ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        MULTI VALUE
        ::= id-att-printer-locations

--*** 9.4.4. Printer-model
printer-model ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-printer-model

--*** 9.4.5. Printer-types
printer-types ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-types

--*** 9.4.6. Printer-realization
printer-realization ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-printer-realization

--*** 9.4.7. Maximum-printer-speed
maximum-printer-speed ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX positiveIntegerSyntax
        SINGLE VALUE
        ::= id-att-maximum-printer-speed

--*** 9.4.8. Printer-resolutions-supported
printer-resolutions-supported ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX oidCardinalMapSyntax
        MULTI VALUE
        ::= id-att-printer-resolutions-supported

--*** 9.4.9. Printer-state
printer-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-state

--*** 9.4.10. Printer-associated-printers
printer-associated-printers ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-printer-associated-printers

--*** 9.4.11. Printers-ready
printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-printers-ready

--*** 9.4.12. Printer-initial-value-job
printer-initial-value-job ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-printer-initial-value-job

--*** 9.4.13. Printer-initial-value-document
printer-initial-value-document ATTRIBUTE
           WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
           SINGLE VALUE
           ::= id-att-printer-initial-value-document

--*** 9.4.14. Media-supported
media-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-media-supported

--*** 9.4.15. Media-ready
media-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-media-ready

--*** 9.4.16. Medium-source-sizes-supported
MediumSize ::= CHOICE {
        medium-discrete-sizes    [0] SET OF SEQUENCE {
            page-size                  [0] PageSize,
            long-edge-feeds            [1] BOOLEAN DEFAULT TRUE,
            assured-reproduction-area  [2] Area },
        medium-continuous-sizes  [1] SEQUENCE {
```


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```
            size-range-across-feed-direction      [0] NonNegativeRealRange,
            size-increment-across-feed-direction [1] NonNegativeReal OPTIONAL,
            size-range-in-feed-direction          [2] NonNegativeRealRange,
            size-increment-in-feed-direction      [3] NonNegativeReal OPTIONAL,
            long-edge-feeds                       [4] BOOLEAN DEFAULT TRUE,
            generic-assured-reproduction-area     [5] Area }}

MediumSourceSize ::= SEQUENCE {
        input-tray   [0] NameOrOid OPTIONAL,
        medium-size  [1] MediumSize }

mediumSourceSizeSyntax ATTRIBUTE-SYNTAX
        MediumSourceSize
        MATCHES FOR EQUALITY
        ::= id-syn-medium-source-size

medium-source-sizes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSourceSizeSyntax
        MULTI VALUE
        ::= id-att-medium-source-sizes-supported

--*** 9.4.17. Medium-source-sizes-ready
medium-source-sizes-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumSourceSizeSyntax
        MULTI VALUE
        ::= id-att-medium-source-sizes-ready

--*** 9.4.18. Medium-fidelities-supported
medium-fidelities-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-medium-fidelities-supported

--*** 9.4.19. Fonts-supported
fonts-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MULTI VALUE
        ::= id-att-fonts-supported

--*** 9.4.20. Fonts-ready
fonts-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        MULTI VALUE
        ::= id-att-fonts-ready

--*** 9.4.21. Resources-supported
resources-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-resources-supported

--*** 9.4.22. Resources-ready
resources-ready ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-resources-ready

--*** 9.4.23. Printer-resource-context
printer-resource-context ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-printer-resource-context

--*** 9.4.24. Job-finishings-supported
job-finishings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-job-finishings-supported

--*** 9.4.25. Job-finishings-ready
job-finishings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-job-finishings-ready

--*** 9.4.26. Finishing-includes-job-sheets-supported
finishing-includes-job-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        MULTI VALUE
        ::= id-att-finishing-includes-job-sheets-supported

--*** 9.4.27. Finishings-supported
finishings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishings-supported

--*** 9.4.28. Finishings-ready
finishings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishings-ready

--*** 9.4.29. Finishing-includes-doc-sheets-supported
finishing-includes-doc-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        MULTI VALUE
        ::= id-att-finishing-includes-doc-sheets-supported

--*** 9.4.30. Outputs-supported
outputs-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-outputs-supported

--*** 9.4.31. Outputs-ready
```


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```
outputs-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-outputs-ready

--*** 9.4.32. Input-trays-supported
input-trays-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-supported

--*** 9.4.33. Input-trays-ready
input-trays-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-input-trays-ready

--*** 9.4.34. Input-trays-medium
InputTrayMedium ::= SEQUENCE {
        input-tray  NameOrOid,
        medium      NameOrOid }

inputTrayMediumSyntax ATTRIBUTE-SYNTAX
        InputTrayMedium
        MATCHES FOR EQUALITY
        ::= id-syn-input-tray-medium

input-trays-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX inputTrayMediumSyntax
        MULTI VALUE
        ::= id-att-input-trays-medium

--*** 9.4.35. Output-bins-supported
output-bins-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-output-bins-supported

--*** 9.4.36. Output-bins-ready
output-bins-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSequenceSyntax
        SINGLE VALUE
        ::= id-att-output-bins-ready

--*** 9.4.37. Output-bins-characteristics
PageOrientationType ::= ENUMERATED {
        unknown (2),    -- values are the same as those for the IETF Printer MIB
        face-up (3),
        face-down (4) }

pageOrientationTypeSyntax ATTRIBUTE-SYNTAX
        PageOrientationType
        MATCHES FOR EQUALITY
```


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```
        ::= id-syn-page-orientation-type

OutputBinsCharacteristics ::= SEQUENCE OF SEQUENCE {
        stacking-order       [0] PageOrderType,
        orientation          [1] PageOrientationType }

outputBinsCharacteristicsSyntax ATTRIBUTE-SYNTAX
        OutputBinsCharacteristics
        MATCHES FOR EQUALITY
        ::= id-syn-output-bins-characteristics

output-bins-characteristics ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX outputBinsCharacteristicsSyntax
        SINGLE VALUE
        ::= id-att-output-bins-characteristics

--*** 9.4.38. Print-qualities-supported
print-qualities-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-print-qualities-supported

--*** 9.4.39. Print-qualities-ready
print-qualities-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-print-qualities-ready

--*** 9.4.40. Job-sheets and document-sheets
--*** 9.4.40.1. Job-sheets-supported
job-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                             -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-job-sheets-supported

--*** 9.4.40.2. Job-sheets-ready
job-sheets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                             -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-job-sheets-ready

--*** 9.4.40.3. Document-sheets-supported
document-sheets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
                             -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-document-sheets-supported

--*** 9.4.40.4. Document-sheets-ready
document-sheets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
```


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```
                                -- identifies an auxiliary-sheet-package
        MULTI VALUE
        ::= id-att-document-sheets-ready

--*** 9.4.41. Character-sets-supported
character-sets-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-supported

--*** 9.4.42. Character-sets-ready
character-sets-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-sets-ready

--*** 9.4.43. Character-repertoires-supported
character-repertoires-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-supported

--*** 9.4.44. Character-repertoires-ready
character-repertoires-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-repertoires-ready

--*** 9.4.45. Character-mappings-supported
character-mappings-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-supported

--*** 9.4.46. Character-mappings-ready
character-mappings-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-character-mappings-ready

--*** 9.4.47. Start-message-supported
start-message-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-start-message-supported

--*** 9.4.48. End-message-supported
end-message-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-end-message-supported

--*** 9.4.49. Sides-supported
```


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```
sides-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        MULTI VALUE
        ::= id-att-sides-supported

--*** 9.4.50. Sides-ready
sides-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        MULTI VALUE
        ::= id-att-sides-ready

--*** 9.4.51. Page-select-supported
PageIdType ::= ENUMERATED {
        numeric         (1),
        alphanumeric    (2),
        tag             (3) }

pageIdTypeSyntax ATTRIBUTE-SYNTAX
        PageIdType
        MATCHES FOR EQUALITY
        ::= id-syn-page-id-type

page-select-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX pageIdTypeSyntax
        MULTI VALUE
        ::= id-att-page-select-supported

--*** 9.4.52. Maximum-copies-supported
maximum-copies-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-maximum-copies-supported

--*** 9.4.53. Document-formats-supported
document-formats-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-document-formats-supported

--*** 9.4.54. Document-formats-ready
document-formats-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-document-formats-ready

--*** 9.4.55. Native-document-formats-ready
native-document-formats-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX docFormatSyntax
        MULTI VALUE
        ::= id-att-native-document-formats-ready


--*** 9.4.56. Content-orientations-supported
```


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```
content-orientations-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-content-orientations-supported

--*** 9.4.57. Presentation-directions-supported
presentation-directions-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX presentationDirectionSyntax
        MULTI VALUE
        ::= id-att-presentation-directions-supported

--*** 9.4.58 Sheet-count
sheet-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-sheet-count

--*** 9.4.59 Printer-needs-attention-time
printer-needs-attention-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-needs-attention-time

--*** 9.4.60 Printer-needs-key-operator-attention-time
printer-needs-key-operator-attention-time ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-needs-key-operator-attention-time

--*** 9.4.61 Printer-security
--*** 9.4.61.1 Printer-confidentiality-level-range
LevelRange ::= SEQUENCE {
        organization-identifier OBJECT IDENTIFIER,
        level-minimum   MinimumInteger,
        level-maximum   MaximumInteger }

levelRangeSyntax ATTRIBUTE-SYNTAX
        LevelRange
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-level-range

printer-confidentiality-level-range ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX levelRangeSyntax
        MULTI VALUE
        ::= id-att-printer-confidentiality-level-range

--*** 9.4.61.2 Printer-confidentiality-category-sets
CategorySet ::= SEQUENCE {
        organization-identifier OBJECT IDENTIFIER,
        category-minimum        SET OF Cardinal,
        category-maximum        SET OF Cardinal }

categorySetSyntax ATTRIBUTE-SYNTAX
```


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```
        CategorySet
        MATCHES FOR EQUALITY
        ::= id-syn-category-set

printer-confidentiality-category-sets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX categorySetSyntax
        MULTI VALUE
        ::= id-att-printer-confidentiality-category-sets

--*** 9.4.61.3 Printer-confidentiality-policy
printer-confidentiality-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-confidentiality-policy

--*** 9.4.61.4 Printer-integrity-level-range
printer-integrity-level-range ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX levelRangeSyntax
        MULTI VALUE
        ::= id-att-printer-integrity-level-range

--*** 9.4.61.5 Printer-integrity-category-sets
printer-integrity-category-sets ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX categorySetSyntax
        MULTI VALUE
        ::= id-att-printer-integrity-category-sets

--*** 9.4.61.6 Printer-integrity-policy
printer-integrity-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-printer-integrity-policy

--*** 9.4.61.7 Printer-security-label-policy
printer-security-label-policy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-security-label-policy

--*** 4.62 Imposition-object attribute support
--*** 9.4.62.1 Plexes-supported
plexes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-plexes-supported

--*** 9.4.62.2 Numbers-up-supported
NumbersUpSupported ::= CHOICE {
        cardinal-value          [0] Cardinal,
        name-or-oid-value       [1] NameOrOid,
        cardinal-range          [2] CardinalRange }

numbersUpSupportedSyntax ATTRIBUTE-SYNTAX
```


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```
        NumbersUpSupported
        MATCHES FOR EQUALITY SET-COMPARISON
        ::= id-syn-numbers-up-supported

numbers-up-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX numbersUpSupportedSyntax
        MULTI VALUE
        ::= id-att-numbers-up-supported

--*** 9.4.62.3 Binding-edges-supported
binding-edges-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX edgeSyntax
        MULTI VALUE
        ::= id-att-binding-edges-supported

--*** 9.4.62.4 Binding-edge-image-shift-max-supported
binding-edge-image-shift-max-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-binding-edge-image-shift-max-supported

--*** 9.4.62.5 X-image-shift-range-supported
x-image-shift-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realRangeSyntax
        SINGLE VALUE
        ::= id-att-x-image-shift-range-supported

--*** 9.4.62.6 Y-image-shift-range-supported
y-image-shift-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realRangeSyntax
        SINGLE VALUE
        ::= id-att-y-image-shift-range-supported

--*** 9.4.63 Schedulers-supported
schedulers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-schedulers-supported

--*** 9.4.64 Scheduler-ready
scheduler-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-scheduler-ready

--*** 9.4.65 Job-size-range-supported
job-size-range-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinal64RangeSyntax
        SINGLE VALUE
        ::= id-att-job-size-range-supported

--*** 9.4.66 Job-size-range-ready
job-size-range-ready ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX cardinal64RangeSyntax
        SINGLE VALUE
        ::= id-att-job-size-range-ready

--*** 9.4.67 Printer-timeout-period
printer-timeout-period ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX deltaTimeSyntax
        SINGLE VALUE
        ::= id-att-printer-timeout-period

--*** 9.4.68 Job-abort-criteria-supported
job-abort-criteria-supported ATTRIBUTE
       WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                              -- i.e. the OID of an attribute
       MULTI VALUE
       ::= id-att-job-abort-criteria-supported

--*** 9.4.69 Job-warning-criteria-supported
job-warning-criteria-supported ATTRIBUTE
       WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                              -- i.e. the OID of an attribute
       MULTI VALUE
       ::= id-att-job-warning-criteria-supported

--*** 9.4.70 Document-abort-criteria-supported
document-abort-criteria-supported ATTRIBUTE
       WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
                              -- i.e. the OID of an attribute
       MULTI VALUE
       ::= id-att-document-abort-criteria-supported

--*** 9.4.71 Checkpoint-formats-supported
checkpoint-formats-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-checkpoint-formats-supported

--*** 9.4.72 Initial-value-jobs-supported
initial-value-jobs-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-initial-value-jobs-supported

--*** 9.4.73 Initial-value-documents-supported
initial-value-documents-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-initial-value-documents-supported

--*** 4.74 Common Printer and Server object attributes
--*** The next attributes are shared between the printer and the
--*** server object classes
--*** 9.4.74.1 Job-attributes-supported
```


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```
job-attributes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-attributes-supported

--*** 9.4.74.2 Document-attributes-supported
document-attributes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-document-attributes-supported

--*** 9.4.74.3 Multiple-documents-supported
multiple-documents-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-multiple-documents-supported

--*** 9.4.74.4 Cancel-individual-document-supported
cancel-individual-document-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-cancel-individual-document-supported

--*** 9.4.74.5 Translators-supported
TranslatorType ::= SEQUENCE {
        from    DocFormat,
        to      DocFormat }

translatorTypeSyntax ATTRIBUTE-SYNTAX
        TranslatorType
        MATCHES FOR EQUALITY
        ::= id-syn-translator-type

translators-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX translatorTypeSyntax
        MULTI VALUE
        ::= id-att-translators-supported

--*** 9.4.74.6 Translators-ready
translators-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX translatorTypeSyntax
        MULTI VALUE
        ::= id-att-translators-ready

--*** 9.4.74.7 Job-result-set-delivery-methods-supported
job-result-set-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-result-set-delivery-methods-supported

--*** 9.4.74.8 Job-result-set-delivery-methods-ready
job-result-set-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
```


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```
        MULTI VALUE
        ::= id-att-job-result-set-delivery-methods-ready

--*** 9.4.74.9 Notification-delivery-methods-supported
notification-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-notification-delivery-methods-supported

--*** 9.4.74.10 Notification-delivery-methods-ready
notification-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-notification-delivery-methods-ready

--*** 9.4.74.11 Log-delivery-methods-supported
log-delivery-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-log-delivery-methods-supported

--*** 9.4.74.12 Log-delivery-methods-ready
log-delivery-methods-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-log-delivery-methods-ready

--*** 9.4.74.13 Are-foreign-jobs-visible
are-foreign-jobs-visible ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-are-foreign-jobs-visible

--*** 9.4.74.14 Enabled
enabled ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-enabled


--*****************************************************************************--

-- 9.5 Server object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-notification-profile
--    id-att-logging-profile
```


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```
--    id-att-associated-server

-- In addition, the following printer attributes are also server attributes:
--    id-att-job-attributes-supported
--    id-att-document-attributes-supported
--    id-att-multiple-documents-supported
--    id-att-cancel-individual-document-supported
--    id-att-translators-supported
--    id-att-translators-ready
--    id-att-delivery-methods-supported
--    id-att-delivery-methods-ready
--    id-att-are-foreign-jobs-visible
--    id-att-enabled

--*** 9.5.1 Server-name
server-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        SINGLE VALUE
        ::= id-att-server-name

--*** 9.5.2 Server-name-aliases
server-name-aliases ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX simpleNameSyntax
        MULTI VALUE
        ::= id-att-server-name-aliases

--*** 9.5.3 Server-address
server-address ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX OCTET STRING (SIZE(0..ub-octet-string))
        SINGLE VALUE
        ::= id-att-server-address

--*** 9.5.4 Server-state
server-state ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-server-state

--*** 9.5.5 Object-classes-supported
object-classes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-object-classes-supported

--*** 9.5.6 Physical-printers-supported
physical-printers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-physical-printers-supported

--*** 9.5.7 Physical-printers-ready
physical-printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
```


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```
        MULTI VALUE
        ::= id-att-physical-printers-ready

--*** 9.5.8 Logical-printers-supported
logical-printers-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-logical-printers-supported

--*** 9.5.9 Logical-printers-ready
logical-printers-ready ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX distinguishedNameStringSyntax
        MULTI VALUE
        ::= id-att-logical-printers-ready

--*** 9.5.10 Job-validates-supported
job-validates-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX  objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-validates-supported

--*** 9.5.11 Events-supported
events-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-events-supported

--*** 9.5.12 Modify-individual-document-supported
modify-individual-document-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-modify-individual-document-supported

--*** 9.5.13 Transfer-methods-supported
transfer-methods-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-transfer-methods-supported

--*** 9.5.14 Extended-problems-supported
extended-problems-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-extended-problems-supported

--*** 9.5.15 Conformance-levels-supported
conformance-levels-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-conformance-levels-supported

--*** 9.5.16 Server-resource-context
server-resource-context ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX resourceContextSyntax
        SINGLE VALUE
        ::= id-att-server-resource-context

--*** 9.5.17 Job-states-supported
job-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-states-supported

--*** 9.5.18 Job-state-reasons-supported b
job-state-reasons-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-job-state-reasons-supported

--*** 9.5.19 Document-states-supported
document-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-document-states-supported

--*** 9.5.20 Printer-states-supported
printer-states-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-printer-states-supported

--*** 9.5.21 Default-distinguished-name-syntax
default-dist-name-syntax ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-default-dist-name-syntax

--*** 9.5.22 Distinguished-name-syntaxes-supported
dist-name-syntaxes-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-dist-name-syntaxes-supported

--*** 9.5.23 Locale
locale ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        SINGLE VALUE
        ::= id-att-locale

--*** 9.5.24 Locales-supported
locales-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX localeSyntax
        MULTI VALUE
        ::= id-att-locales-supported
```


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```
--*****************************************************************************--

-- 9.6 Medium object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.6.1 Medium-identifier
medium-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-identifier

--*** 9.6.2 Medium-associated-media
medium-associated-media ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-medium-associated-media

--*** 9.6.3 Medium-realization
medium-realization ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-medium-realization

--*** 9.6.4 Medium-type
medium-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-medium-type

--*** 9.6.5 Medium-size
medium-size ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-medium-size

--*** 9.6.6 Medium-dimensions
medium-dimensions ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX mediumDimensionsSyntax
        SINGLE VALUE
        ::= id-att-medium-dimensions
```


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```
--*** 9.6.7 Medium-colour
medium-colour ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-colour

--*** 9.6.8 Medium-tooth
medium-tooth ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-tooth

--*** 9.6.9 Medium-grain
medium-grain ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-medium-grain

--*** 9.6.10 Medium-sides
medium-sides ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX sidesSyntax
        SINGLE VALUE
        ::= id-att-medium-sides

--*** 9.6.11 Medium-weight
medium-weight ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-medium-weight

--*** 9.6.12 Medium-assured-reproduction-area
medium-assured-reproduction-area ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX areaSyntax
        SINGLE VALUE
        ::= id-att-medium-assured-reproduction-area

--*** 9.6.13 Medium-form-parts
medium-form-parts ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX positiveIntegerSyntax
        SINGLE VALUE
        ::= id-att-medium-form-parts

--*** 9.6.14 Medium-holes-count
medium-holes-count ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-count

--*** 9.6.15 Medium-holes-edge
medium-holes-edge ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX edgeSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-edge
```


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```
--*** 9.6.16 Medium-holes-axis-offset
medium-holes-axis-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-axis-offset

--*** 9.6.17 Medium-holes-locations
medium-holes-locations ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        MULTI VALUE
        ::= id-att-medium-holes-locations

--*** 9.6.18 Medium-holes-diameter
medium-holes-diameter ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSyntax
        SINGLE VALUE
        ::= id-att-medium-holes-diameter


--*****************************************************************************--

-- 9.7 Font resource object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-associated-server
-- Applicable Printable Document object attributes are:
--    id-att-document-type
--    id-att-transfer-method
--    id-att-document-format
--    id-att-document-content
--    id-att-non-compulsory-attributes

-- When a Font object is submitted as one of the "documents" in a
-- Print operation, the Font attributes are
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.7.1 Font-identifier
font-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX fontReferenceSyntax
        SINGLE VALUE
        ::= id-att-font-identifier
```


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```
--*****************************************************************************--

-- 9.8 Resource object attributes --
--     (new subclause replacing the named-colour sub-clause so as to
--     be near the font resource object but new id-oc-resource OID value)
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-associated-server
-- Applicable Printable Document object attributes are:
--    id-att-document-type
--    id-att-transfer-method
--    id-att-document-format
--    id-att-document-content
--    id-att-non-compulsory-attributes

-- When a Resource object is submitted as one of the "documents" in a
-- Print operation, the Resource attributes are
   -- Specifiable in Print: all
   -- Specifiable in ModifyJob: all
   -- Specifiable in ListObjectAttributes: all

--*** 9.8.1 Resource-name
resource-name ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-resource-name

--*** 9.8.2 Resource-type
resource-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-resource-type


--*****************************************************************************--

-- 9.9 Transfer method object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-associated-server

--*** 9.9.1 Transfer-method-identifier
transfer-method-identifier ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method-identifier

--*** 9.9.2 Transfer-method-type
transfer-method-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-transfer-method-type

--*** 9.9.3 Document-reference-type
document-reference-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-document-reference-type


--*****************************************************************************--

-- 9.10 Delivery method object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.10.1 Delivery-method-identifier
delivery-method-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-delivery-method-identifier


--*****************************************************************************--

-- 9.11 Auxiliary-sheet-package attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-list-of-managers
--    id-att-associated-server

--*** 9.11.1 Auxiliary-sheet-package-identifier
auxiliary-sheet-package-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-package-identifier
```


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```
--*** 9.11.2 Separator-sheet-of-set
separator-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-separator-sheet-of-set

--*** 9.11.3 Start-sheet-of-set
start-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-start-sheet-of-set

--*** 9.11.4 End-sheet-of-set
end-sheet-of-set ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-end-sheet-of-set

--*** 9.11.5 Separator-sheet-of-copy
separator-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-separator-sheet-of-copy

--*** 9.11.6 Start-sheet-of-copy
start-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-start-sheet-of-copy

--*** 9.11.7 End-sheet-of-copy
end-sheet-of-copy ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-end-sheet-of-copy


--*****************************************************************************--

-- 9.12 Auxiliary sheet object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.12.1 Auxiliary-sheet-identifier
auxiliary-sheet-identifier ATTRIBUTE
```


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```
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-identifier

--*** 9.12.2 Auxiliary-sheet-medium
auxiliary-sheet-medium ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-auxiliary-sheet-medium


--*****************************************************************************--

-- 9.13 Finishing object attributes
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.13.5 Finishing-identifier
finishing-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-finishing-identifier

--*** 9.13.6 Finishing-associated-finishings
finishing-associated-finishings ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        MULTI VALUE
        ::= id-att-finishing-associated-finishings

--*** 9.13.7 Finishing-realization
finishing-realization ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realizationSyntax
        SINGLE VALUE
        ::= id-att-finishing-realization

--*** 9.13.8 Finishing type and finishing-specification attribute
Finishing ::= SEQUENCE {
    finishing-message        [0] Message OPTIONAL,
    finishing-spec        CHOICE {
        named-finishing         [1] NameOrOid,
        finishing-spec-list     [2] SEQUENCE OF FinishingProcSpec } }

FinishingProcSpec ::= CHOICE {
    stitching-spec        [0] StitchingSpec,
    binding-spec          [1] BindingSpec,
```


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```
    trimming-spec          [2] TrimmingSpec,
    die-cutting-spec       [3] DieCuttingSpec,
    punching-spec          [4] PunchingSpec,
    perforation-spec       [5] PerforationSpec,
    slitting-spec          [6] SlittingSpec,
    insert-spec            [7] InsertSpec,
    cover-spec             [8] CoverSpec,
    folding-spec           [9] FoldingSpec,
    other-finishing-spec [10] OtherFinishingSpec }

StitchingSpec ::= CHOICE {
    named-stitching    [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        process-offset     [3] Dimension OPTIONAL,
        head-locations     [4] Locations OPTIONAL,
        stitching-type     [5] NameOrOid
                               DEFAULT id-val-stitching-type-default } }

BindingSpec ::= CHOICE {
    named-binding      [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        binding-type       [3] NameOrOid DEFAULT id-val-binding-type-default,
        binding-colour     [4] NameOrOid
                               DEFAULT id-val-binding-colour-default } }

TrimmingSpec ::= CHOICE {
    named-trimming     [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        trim-offset        [3] Dimension,
        trim-dimensions    [4] XYDimensions } }

DieCuttingSpec ::= CHOICE {
    named-die-cutting  [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
        reference-edge     [1] Edge OPTIONAL,
        jog-edge           [2] Edge OPTIONAL,
        die-cut-location   [5] XYDimensions,
        die-cut-name       [6] NameOrOid } }

PunchingSpec ::= CHOICE {
    named-punching     [0] NameOrOid,
    parameters         [1] SET {
        reference-size     [0] XYDimensions OPTIONAL,
```


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```
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        process-offset      [3] Dimension OPTIONAL,
        head-locations      [4] Locations,
        punch-diameter      [5] Dimension OPTIONAL } }

PerforationSpec ::= CHOICE {
    named-perforation  [0] NameOrOid,
    parameters         [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations,
        perforation-type    [5] NameOrOid
                                DEFAULT id-val-perforation-type-default } }

SlittingSpec ::= CHOICE {
    named-slitting     [0] NameOrOid,
    parameters         [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations } }

InsertSpec ::= CHOICE {
    named-inserting    [0] NameOrOid,
    parameters         [1] SET {
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        insert-sheet-list   [5] SEQUENCE OF InsertSheet } }

InsertSheet ::= SET {
    insert-id               CHOICE {
        insert-name             [0] NameOrOid,
        insert-bin              [1] Cardinal },
    insert-size         [2] XYDimensions OPTIONAL,
    insert-edge         [3] Edge OPTIONAL,
    insert-top-surface  [4] ENUMERATED {
                            top (0),
                            bottom (1) } DEFAULT top,
    insert-after        [5] Cardinal,
    insert-message      [6] Message OPTIONAL }

CoverSpec ::= CHOICE {
    named-covers       [0] NameOrOid,
    parameters         [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        front-cover         [5] NameOrOid OPTIONAL,
        back-cover          [6] NameOrOid OPTIONAL } }

FoldingSpec ::= CHOICE {
```


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```
    named-folding       [0] NameOrOid,
    parameters          [1] SET {
        reference-size      [0] XYDimensions OPTIONAL,
        reference-edge      [1] Edge OPTIONAL,
        jog-edge            [2] Edge OPTIONAL,
        head-locations      [4] Locations } }

OtherFinishingSpec ::= SET {
    finishing-op-type    [0] NameOrOid,
    finishing-op-spec        CHOICE {
        named-finishing-op     [1] NameOrOid,
        parameters             [2] SET {
            reference-size         [0] XYDimensions OPTIONAL,
            reference-edge         [1] Edge OPTIONAL,
            jog-edge               [2] Edge OPTIONAL,
            process-offset         [3] Dimension OPTIONAL,
            head-locations         [4] Locations OPTIONAL,
            other-parameters       [5] ANY } } }

finishing-specification ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX finishingSyntax
        SINGLE VALUE
        ::= id-att-finishing-specification


--*****************************************************************************--

-- 9.14 Output method object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-state
--    id-att-message
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.14.1 Output-identifier
output-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-output-identifier


--*****************************************************************************--

-- 9.15 Imposition object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
```


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```
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.15.1 Imposition-identifier
imposition-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-imposition-identifier

--*** 9.15.2 Imposition-n-up
imposition-n-up ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX cardinalSyntax
        SINGLE VALUE
        ::= id-att-imposition-n-up

--*** 9.15.3 Logical-page-origin
logical-page-origin ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-origin

--*** 9.15.4 Logical-page-x-offset
logical-page-x-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-x-offset

--*** 9.15.5 Logical-page-y-offset 5
logical-page-y-offset ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-y-offset

--*** 9.15.6 Logical-page-scaling
logical-page-scaling ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX realSequenceSyntax
        SINGLE VALUE
        ::= id-att-logical-page-scaling


--*****************************************************************************--

-- 9.16 Scheduler object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.16.1 Scheduler-identifier
```


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```
scheduler-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-scheduler-identifier


--*****************************************************************************--

-- 9.17 Initial-value-job object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-notification-profile
--    id-att-logging-profile
--    id-att-associated-server
--    id-att-logical-printers-ready   - server attribute
--    id-att-physical-printers-ready  - server attribute

--*** 9.17.1 Initial-value-job-identifier
initial-value-job-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-job-identifier


--*****************************************************************************--

-- 9.18 Initial-value-document object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-availability
--    id-att-list-of-managers
--    id-att-associated-server
--    id-att-logical-printers-ready   - server attribute
--    id-att-physical-printers-ready  - server attribute

--*** 9.18.1 Initial-value-document-identifier
initial-value-document-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-initial-value-document-identifier
```


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```
--*****************************************************************************--

-- 9.19 Resource Context object attributes --
-- Applicable Generic attributes are:
--    id-att-object-class
--    id-att-descriptor
--    id-att-descriptive-name
--    id-att-message
--    id-att-list-of-managers
--    id-att-associated-server

--*** 9.19.1 Resource-context-identifier
resource-context-identifier ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX nameOrOidSyntax
        SINGLE VALUE
        ::= id-att-resource-context-identifier

--*** 9.19.2 Context-address
context-address ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX textSyntax
        SINGLE VALUE
        ::= id-att-context-address


END -- of DPAStandardAttributes --
```


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Annex D

(normative)

Formal definition of DPA standard parameter upper and lower bounds

This Annex, a supplement to sections two and three, formally defines the standard parameter upper and lower bounds applicable to DPA. It employs ASN.1.

```
--  File:  DPA_0D.ASN,  Version 0.5, 15-Nov-1994-, 10:00AM
--  Version 0.4 - 7-Nov-1994: Apply all remaining agreed Change Requests
--  Version 0.5, 15-Nov-1994: fix ASN.1 compiler-detected errors

--  ANNEX D

--  FORMAL DEFINITION OF THE DPA STANDARD PARAMETER UPPER AND LOWER BOUNDS

--  This normative annex is an integral part of this part of ISO/IEC
--  10175.

--  This Annex is a supplement to section two and three and formally
--  defines the upper and lower bounds applicable to DPA.  It employs
--  ASN.1.

DPABounds { iso standard dpa(10175) part-1(1) modules(0) bounds(3) }
DEFINITIONS IMPLICIT TAGS ::=

BEGIN
-- PROLOGUE --
-- EXPORTS everything --
IMPORTS;  -- nothing --

-- Upper Bounds --
ub-text-string          INTEGER ::= 4095
ub-descriptor-string    INTEGER ::= 4095
ub-message-string       INTEGER ::= 4095
ub-name-string          INTEGER ::= 255
ub-octet-string         INTEGER ::= 255

ub-integer              INTEGER ::= 2147483647  -- biggest int = 2**31-1
ub-integer64            INTEGER ::= 9223372036854775807 -- 2**63 - 1

-- Lower Bounds --
lb-integer              INTEGER ::= -2147483648 -- smallest int = -(2**31)
lb-integer64            INTEGER ::= -9223372036854775808 -- -2**63

END   -- of DPABounds --
```


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Annex E

(normative)

Conformance requirements

This Annex is a supplement to sections two and three. Its purpose is to define different levels of DP-Server functionality in terms of the level of support provided for the abstract operations and attributes defined in this International Standard. These levels are to be used in specifying the conformance levels which particular DP-Servers purport to implement, and thus, which features and facilities clients of those DP-Servers may expect to access.

Two levels of functionality are defined, levels 1 and 2, and an additional set of attributes are for multiple-document job support, indicated by the letter M. Thus, level 1M indicates the server supports the basic set of operations and attributes, and can support multiple-document jobs.

The Conformance level operation and attribute sets are defined in the following sub-clauses:

E.1 Conformance level 1

Servers conforming to level 1 shall offer basic functionality by supporting the following operations, objects, and attributes, as a minimum:

a) Abstract operations supported:

Print
CancelJob
ListObjectAttributes

b) Object classes supported:

job
document

c) Job object attributes supported:

Job-information:
job-identifier
job-owner
job-non-compulsory-attributes

Printer-selection:
printer-name-requested

Job-status:
current-job-state
printers-assigned

d) Document object attributes supported:

Document-description:
document-format
document-content
non-compulsory-attributes

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E.2 Conformance level 2

In addition to the operations, objects, and attributes that shall be supported for level 1 conformance, servers conforming to level 2 shall support the following operations, objects, and attributes, as a minimum:

a) Abstract operations supported, in addition to those of level 1:

ModifyJob
PromoteJob
PauseJob
ResumeJob

b) Object classes supported, in addition to those of level 1:

printer
server
initial-value-job
initial-value-document

c) Operation attributes:

operation-locale

default-delivery-addresses

d) Job object attributes supported, in addition to those of level 1:

Job-information:
job-name

Job-results-handling
job-sheets
document-sheets

Job-event-handling:
notification-profile (generic attribute)

Job-scheduling-instructions:
job-hold
job-priority
job-print-after
job-retention-period

Job-status:
submission-time
print-checkpoint
job-message-from-administrator
completion-time
job-state-reasons

e) Document object attributes supported, in addition to those of level 1:

Document-production-instructions:
default-font
default-medium
number-up
finishing
sides
copy-count

Document-description:
transfer-method

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Document-attributes:
fonts-used
media-used

f) Printer object attributes:

printer-name
printer-state
message (generic attribute)
printer-initial-value-job
printer-initial-value-document
fonts-supported
fonts-ready
media-supported
media-ready
printer-associated-printers
document-formats-supported
numbers-up-supported
finishings-supported
sides-supported
job-sheets-supported
document-sheets-supported
maximum-copies-supported
notification-delivery-methods-supported

g) Server object attributes:

server-name
server-state
physical-printers-supported
logical-printers-supported
conformance-levels-supported
events-supported
transfer-methods-supported
locales-supported

For the above listed attributes, it is not required that a conforming server support all (standard) values of all supported attributes. For example, it is not required that a level 2 server implement all finishing methods indicated by the standard values defined in ISO/IEC 10175-1.

The explicit requirement of the term "supported", with respect to one of the attributes that deal with printer functions or resources, is that the server shall recognize the attribute and those values that are supported, and shall be able to respond to a query about which values that printer does, in fact, support.

E.3 Conformance level 1M

This classification is applicable to level 1 servers that support multiple-document jobs.

A conforming server of level 1M shall be able to print multiple-document jobs, but is not compelled to support modification or cancellation of individual documents in a multiple document job.

In addition to the attributes of level 1 that shall be supported for level 1 conformance, servers conforming to level 1M shall support the following attributes, as a minimum:

a) Job object attributes supported, in addition to those of level 1:

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Job-status:
number-of-documents
job-submission-complete

b) Document object attributes supported, in addition to those of level 1:

Production-instructions:
reset-printer

Document-status:
document-sequence-number

E.4 Conformance level 2M

This classification is applicable to level 2 servers that support multiple-document jobs.

A conforming server of level 2M shall be able to print multiple-document jobs, but is not compelled to support modification or cancellation of individual documents in a multiple document job.

In addition to the attributes of level 2 that shall be supported for level 2 conformance, servers conforming to level 2M shall support the attributes required for level 1M conformance, and the following additional attributes, as a minimum:

a) Server object attributes supported, in addition to those of level 2

multiple-documents-supported
cancel-individual-document-supported
modify-individual-document-supported

E.5 Conformance requirements for the abstract operations

This subclause specifies the detailed server conformance requirements for accepting and supporting the OPTIONAL and CHOICE components of the ASN.1 types specified as part of the abstract operations.

Servers may implement or shall ignore any of the components of the **CommonArguments** type (see 8.1.2).

E.5.1 Print operation conformance requirements

E.5.1.1 PrintArgument conformance requirements

If a server implements the Print operation, the server shall perform the required action indicated in the following table with respect to the indicated OPTIONAL and DEFAULT components of the **PrintArgument** types depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

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create-job element:

OPTIONAL component	level 1	level 1M	level 2	level 2M
job-submission-complete	shall	shall	shall	shall
job-attributes	shall	shall	shall	shall
first-document	shall	shall	shall	shall
transfer-method	shall	shall	shall	shall
document-content	shall	shall	shall	shall
document-type	shall	shall	shall	shall
document-attributes	shall	shall	shall	shall
common-arguments	may/error	may/error	shall	shall

add-document element:

document-content	shall	shall	shall	shall
document-attributes	shall	shall	shall	shall
common-arguments	may/error	may/error	shall	shall

close-job element:

common-arguments	may/error	may/error	shall	shall

NOTE – Requiring all servers, even level 1 and level 2 servers that do not support multiple documents, to support the **add-document** and **close-job** **CHOICE** components, permits a client to submit single document jobs, using the same sequence (**create-job** with no document, **add-document**, and **close-job**) as the client may use when submitting multiple documents, thereby simplifying some client implementations.

E.5.1.2 PrintResult conformance requirements

Servers (1) "shall" implement and return or (2) "may" implement and return the following **OPTIONAL** components of the **PrintResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
server-state	may	may	shall	shall
server-message	may	may	may	may
document-status	may	shall	may	shall

E.5.2 ModifyJob operation conformance requirements

The ModifyJob operation is a level 2 conformance operation. However, if a level 1 server chooses to implement the ModifyJob operation, the server shall conform to the level 2 requirements for the ModifyJob operation (rather than implementing a subset of the ModifyJob operation).

E.5.2.1 ModifyJobArgument conformance requirements

If a server implements the ModifyJob operation, the server shall perform the required action indicated in the following table with respect to the indicated **OPTIONAL** and **DEFAULT** components of the **ModifyJobArgument** and **JobAttrModification** types, depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may - error > 1" - The server may accept and implement the **OPTIONAL** component, but shall return the **unsupported-parameter-value** ServiceError if the **document-number** is greater than 1 or (2) shall return a **modify-document-unsupported** ServiceError, depending on implementation

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"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return a **modify-document-unsupported** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

"N/A" - not applicable

OPTIONAL component	level 1	level 1M	level 2	level 2M
document-number	N/A	N/A	may - error > 1	may or error
modify-message	N/A	N/A	may or ignore	may or ignore
common-arguments	N/A	N/A	shall	shall
attribute-values	N/A	N/A	shall	shall
modify-operator all 4 values	N/A	N/A	shall	shall

As specified in 8.3.2, E.3, and E.4, implementation of the modification of specified individual documents in a job, is a server implementation option.

E.5.2.2 ModifyJobResult conformance requirements

Servers "shall" implement and return the following **OPTIONAL** components of the **ModifyJobResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
status	N/A	N/A	shall	shall

E.5.3 CancelJob operation conformance requirements

E.5.3.1 CancelJobArgument conformance requirements

A server shall perform the required action indicated in the following table with respect to the indicated **CHOICE**, **OPTIONAL** and **DEFAULT** components of the **CancelJobArgument** type, depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may - error > 1" - The server may accept and implement the **OPTIONAL** component, but shall return the **unsupported-parameter-value** ServiceError if the **document-number** is greater than 1 or (2) shall return a **cancel-document-unsupported** ServiceError, depending on implementation

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return a **cancel-document-unsupported** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

OPTIONAL component	level 1	level 1M	level 2	level 2M
document-number	may - error > 1	may or error	may - error > 1	may or error
cancel-message	may or ignore	may or ignore	may or ignore	may or ignore
retention-period	may or ignore	may or ignore	shall	shall
common-arguments	may or ignore	may or ignore	shall	shall

As specified in 8.3.2, E.3, and E.4, implementation of the cancellation of specified individual documents in a job, is a server implementation option.

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E.5.3.2 CancelJobResult conformance requirements

Servers "shall" implement and return the following **OPTIONAL** components of the **CancelJobResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
status	shall	shall	shall	shall

E.5.4 ListObjectAttributes operation conformance requirements

E.5.4.1 ListObjectAttributesArgument conformance requirements

A server shall perform the required action indicated in the following table with respect to the indicated **CHOICE**, **OPTIONAL** and **DEFAULT** components of the **ListObjectAttributesArgument** type, depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

OPTIONAL component	level 1	level 1M	level 2	level 2M
continuation	shall	shall	shall	shall
abort	shall	shall	shall	shall
specification	shall	shall	shall	shall
scope	shall	shall	shall	shall
selector	shall	shall	shall	shall
object-identification	shall	shall	shall	shall
job-identifier	shall	shall	shall	shall
document-identifier	may or ignore	shall	may or ignore	shall
document-number	may or ignore	shall	may or ignore	shall
object-identifier	may or error	may or error	may or error	may or error
object-name	may or error	may or error	shall	shall
font-reference	may or error	may or error	may or error	may or error
name-or-oid	shall	shall	shall	shall
simple-name	shall	shall	shall	shall
object-filter	may or ignore	may or ignore	may or ignore	may or ignore
initial-string	may or error	may or error	may or error	may or error
any-string	may or error	may or error	may or error	may or error
final-string	may or error	may or error	may or error	may or error
time-limit	may or ignore	may or ignore	may or ignore	may or ignore
count-limit	shall	shall	shall	shall
requested-attributes	shall	shall	shall	shall
list-operator	shall	shall	shall	shall
get-attributes	shall	shall	shall	shall
get-ordered-jobs	shall	shall	shall	shall
common-arguments	may or ignore	may or ignore	shall	shall

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E.5.4.2 ListObjectAttributesResult conformance requirements

Servers (1) "shall" implement and return or (2) "may" return the following **CHOICE** or **OPTIONAL** components of the **ListObjectAttributesResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
context	shall	shall	shall	shall
limit-encountered	may	may	may	may

E.5.5 PromoteJob operation conformance requirements

The PromoteJob operation is a level 2 conformance operation. However, if a level 1 server chooses to implement the PromoteJob operation, the server shall conform to the level 2 requirements for the PromoteJob operation (rather than implementing a subset of the PromoteJob operation).

E.5.5.1 PromoteJobArgument conformance requirements

A level 2 server (1) may accept and implement the **OPTIONAL promote-message**, or (2) shall ignore (and shall not indicate a warning or error), depending on implementation. A level 2 server shall implement the OPTIONAL **common-arguments** element.

E.5.5.2 PromoteJobResult conformance requirements

Servers "shall" implement and return the following **OPTIONAL** components of the **PromoteJobResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
job-status	N/A	N/A	shall	shall

E.5.6 InterruptJob operation conformance requirements

The InterruptJob operation is neither a level 1 nor a level 2 conformance operation. However, if a level 1 or level 2 server chooses to implement the InterruptJob operation, the server shall conform to the requirements specified in this sub-clause for the InterruptJob operation (rather than implementing a subset of the InterruptJob operation).

E.5.6.1 InterruptJobArgument conformance requirements

If a server implements the InterruptJob operation, the server shall perform the required action indicated in the following table with respect to the indicated **CHOICE**, **OPTIONAL** and **DEFAULT** components of the **InterruptJobArgument** type, depending on the server's level of conformance. The notation used is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

OPTIONAL component	if InterruptJob implemented
interrupted-job	shall
job-identifier	shall
printer-name	may or error
interrupt-message	may or ignore
common-arguments	shall

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E.5.6.2 InterruptJobResult conformance requirements

If a server implements the InterruptJob operation, the server "shall" implement and return the **job-status** **OPTIONAL** components of the **InterruptJobResult**.

E.5.7 PauseJob operation conformance requirements

The PauseJob operation is a level 2 conformance operation. However, if a level 1 server chooses to implement the PauseJob operation, the server shall conform to the level 2 requirements for the PauseJob operation (rather than implementing a subset of the PauseJob operation).

E.5.7.1 PauseJobArgument conformance requirements

If a server implements the PauseJob operation, the server shall perform the required action indicated in the following table with respect to the indicated **CHOICE**, **OPTIONAL** and **DEFAULT** components of the **ListObjectAttributesArgument** type, depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

"N/A" - not applicable

OPTIONAL component	level 1	level 1M	level 2	level 2M
paused-job	N/A	N/A	shall	shall
job-identifier	N/A	N/A	shall	shall
printer-name	N/A	N/A	may or error	may or error
pause-message	N/A	N/A	may or ignore	may or ignore
common-arguments	N/A	N/A	shall	shall

E.5.7.2 PauseJobResult conformance requirements

Servers "shall" implement and return the following **OPTIONAL** components of the **PauseJobResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
job-status	N/A	N/A	shall	shall

E.5.8 ResumeJob operation conformance requirements

The ResumeJob operation is a level 2 conformance operation. However, if a level 1 server chooses to implement the ResumeJob operation, the server shall conform to the level 2 requirements for the ResumeJob operation (rather than implementing a subset of the ResumeJob operation).

E.5.8.1 ResumeJobArgument conformance requirements

If a server implements the ResumeJob operation, the server shall perform the required action indicated in the following table with respect to the indicated **CHOICE**, **OPTIONAL** and **DEFAULT** components of the **ResumeJobArgument** type, depending on the server's level of conformance. The notation used in the four columns is:

"shall" - The server shall accept and implement the **OPTIONAL** component

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"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

"N/A" - not applicable

OPTIONAL component	level 1	level 1M	level 2	level 2M
resume-message	N/A	N/A	may or ignore	may or ignore
checkpoint	N/A	N/A	may or ignore	may or ignore
common-arguments	N/A	N/A	shall	shall

E.5.8.2 ResumeJobResult conformance requirements

Servers shall implement and return the following **OPTIONAL** components of the **ResumeJobResult** type as shown in the following table:

OPTIONAL component	level 1	level 1M	level 2	level 2M
job-status	N/A	N/A	shall	shall

E.6 Conformance requirements for the CHOICE types contained in attributes

This subclause specifies the detailed server conformance requirements for accepting and supporting the components of the ASN.1 **CHOICE** types specified as part of attribute-values.

The **CHOICE** types for attributes have been specified so that the simplest and required component is first, for most of the types used in attribute-values (see clause 9). If a server implements an attribute that contains one of the **CHOICE** data types indicated in the following table, the server shall accept and implement the component(s) of the attribute **CHOICE** type indicated in the following table; for the *other* components of such a **CHOICE** type, the server either (1) shall accept and implement the component, or (2) shall return the **unsupported-parameter-value** ServiceError:

CHOICE type	component	position	component type
Text	**iso-646-irv**	1st	**VisibleString**
DescriptiveName	**iso-646-irv**	1st	**VisibleString**
Descriptor	**iso-646-irv**	1st	**VisibleString**
Message	**iso-646-irv**	1st	**VisibleString**
ErrorMessage	**iso-646-irv**	1st	**VisibleString**
SimpleName	**iso-646-irv**	1st	**VisibleString**
NameOrOid	**global-form**	1st	**OBJECT IDENTIFIER**
	local-form	2nd	**SimpleName**
Dimension	**numeric-valued**	1st	**NonNegativeReal**
XYDimensions	**numeric-valued**	1st	**SEQUENCE {NonNegativeReal, NonNegativeReal}**
Locations	**numeric-valued**	1st	**SEQUENCE OF NonNegativeReal**
FontReference	**simple-font-name**	1st	**SimpleName**
CardinalOrOid	**cardinal-value**	1st	**Cardinal**
	oid-value	2nd	**OBJECT IDENTIFIER**
CardinalOrNameOrOid	**cardinal-value**	1st	**Cardinal**
	name-or-oid-value	2nd	**NameOrOid**

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PositiveIntegerOrOid	**object-identifier**	1st	**OBJECT IDENTIFIER**
	positive-integer	2nd	**PositiveInteger**
RPCAddress	**ip-rpc**	1st	**Text**
DeliveryAddress	**distinguished-name**	2nd	**DistinguishedName**
	text	3rd	**Text**
Resource	**resource-name**	2nd	**Text**
ResourceContext	**path-name**	2nd	**Text**
PageIdentifier	**nominal-page-number**	1st	**PositiveInteger**
MediaSelect	**medium-for-all-pages**	1st	**MediumReference**
DocumentContent	**included-document**	1st	**EXTERNAL**
PageSize	**page-size-id**	1st	**OBJECT IDENTIFIER**
MediumSize	**medium-discrete-sizes**	1st	**SET OF SEQUENCE {PageSize, BOOLEAN, Area}**
NumbersUpSupported	**cardinal-value**	1st	**Cardinal**
Finishing	**named-finishing**	1st	**NameOrOid**

For the **FinishingProcSpec** and the **XxxxSpec** types, the server shall accept and implement which ever of the **CHOICE** components are supported by the finishing system.

E.7 Conformance requirements for the OPTIONAL components contained in attributes

This subclause specifies the detailed server conformance requirements for accepting and supporting the **OPTIONAL** components of the ASN.1 types specified as part of attribute-values.

Most **OPTIONAL** components of data types that represent attribute-values (see clause 9) may be ignored by a server, if the server doesn't support that component, even though the server supports the attribute. If a server implements an attribute that contains one of the data types that contain **OPTIONAL** components, the server shall perform the required action indicated in the following table. The notation used in the "server required action" column is:

"shall" - The server shall accept and implement the **OPTIONAL** component

"may or ignore" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall ignore (and shall not indicate a warning or error), depending on implementation

"may or error" - The server (1) may accept and implement the **OPTIONAL** component or (2) shall return an **unsupported-parameter-value** ServiceError, depending on implementation

"shall return" - The server shall implement and return the **OPTIONAL** component in the result to the client

"may return" - The server may implement and return the **OPTIONAL** component, if the component is not present for that attribute

type containing **OPTIONAL** component	**OPTIONAL** component	**OPTIONAL** component type	server required action
DistinguishedNameString	**name-syntax**	**NameOrOid**	shall
Dimension	**tolerance**	**NonNegativeReal**	may or ignore
XYDimensions	**tolerance**	**NonNegativeReal**	may or ignore
Locations	**tolerance**	**NonNegativeReal**	may or ignore
ResultsProfile	**delivery-method**	**OBJECT IDENTIFIER**	may or ignore
	delivery-descriptor	**Text**	may or ignore
	delivery-address	**DeliveryAddress**	may or ignore
	job-copies	**PositiveInteger**	may or error

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	collate	**BOOLEAN**	may or error
EventHandlingProfile	**event-identifiers**	**OBJECT IDENTIFIER**	may or ignore
	delivery-method	**OBJECT IDENTIFIER**	may or ignore
	delivery-descriptor	**Text**	may or ignore
	delivery-address	**DeliveryAddress**	may or ignore
	locale	**Locale**	may or ignore
PrintCheckpoint	**printer-name**	**DistinguishedName**	may return
	job-copies-completed	**Cardinal**	may return
	copies-completed	**Cardinal**	may return
	pages-completed	**Cardinal**	may return
	octets-completed	**Cardinal**	may return
IgnoredAttribute	**document-number**	**PositiveInteger**	shall return
PageSelect	**beginning-page**	**PageIdentifier**	shall return
	ending-page	**PageIdentifier**	shall return
DocFormat	**document-format-variant**	**Text**	may return
	document-format-version	**SimpleName**	may return
Finishing	**finishing-message**	**Message**	may or ignore
XxxxSpec	*all*	...	may or error

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Annex F

(informative)

Document Format Definitions

This annex lists document formats that are implemented by printer vendors and print system implementors. This annex also specifies certain document attributes that are specific to certain document formats. These attributes are to be considered adjunct to the document production instructions specified in clause 9.

F.1 Document formats

This sub-clause lists the standard **document-format** values that may be used in the various ISO DPA attributes that have document-formats as values. The document-formats listed in the following syntax have been extracted from the Internet Printer MIB **prtInterpreterLangFamily** object specification (RFC 1759), and augmented by newly registered values. These document formats, and future additions to the list, are registered with the Internet Assigned Number Authority. The list may be obtained by anonyous ftp from the ftp-server containing the iana/assignments directory:

```
--   The ftp server is ftp.isi.edu.
--   The subdirectory is /in-notes/iana/assignments/.
--   The file name is printer-language-numbers.


prtInterpreterLangFamily OBJECT-TYPE
    -- This value is a type 2 enumeration
    SYNTAX     INTEGER {
          other(1),
          langPCL(3),          -- PCL.  Starting with PCL version 5,
                               -- HP-GL/2 is included as part of the
                               -- PCL language.
                               -- PCL and HP-GL/2 are registered
                               -- trademarks of Hewlett-Packard Company.
          langHPGL(4),         -- Hewlett-Packard Graphics Language.
                               -- HP-GL is a registered trademark of
                               -- Hewlett-Packard Company.
          langPJL(5),          -- Peripheral Job Language. Appears in the
                               -- data stream between data intended for a
                               -- page description language.
                               -- Hewlett-Packard Co.
          langPS(6),           -- PostScript Language (tm)
                               -- Postscript - a trademark of Adobe
                               -- Systems Incorporated which may be
                               -- registered in certain jurisdictions
          langPSPrinter(42),   -- The PostScript Language used for
                               -- control (with any PDLs)
                               -- Adobe Systems Incorporated
          langIPDS(7),         -- Intelligent Printer Data Stream
                               -- Bi-directional print data stream for
                               -- documents consisting of data objects
```


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```
                    -- (text, image, graphics, bar codes),
                    -- resources (fonts, overlays) and page,
                    -- form and finishing instructions.
                    -- Facilitates system level device
                    -- control, document tracking and error
                    -- recovery throughout the print process.
                    -- Pennant Systems, IBM
langPPDS(8),        -- IBM Personal Printer Data Stream.
                    -- Originally called IBM ASCII, the name
                    -- was changed to PPDS when the Laser
                    -- Printer was introduced in 1989.
                    -- Lexmark International, Inc.
langEscapeP(9),
langEpson(10),
langDDIF(11),       -- Digital Document Interchange Format
                    -- Digital Equipment Corp., Maynard MA
langInterpress(12),
langISO6429(13),    -- ISO/IEC 6429.  Control functions for Coded
                    -- Character Sets (has ASCII control
                    -- characters, plus additional controls for
                    -- character imaging devices.)
                    -- ISO Standard, Geneva, Switzerland
langLineData(14),   -- line-data:  Lines of data as separate
                    -- ASCII or EBCDIC records and containing
                    -- no control functions (no CR, LF, HT, FF,
                    -- etc.). For use with traditional line
                    -- printers.  May use CR and/or LF to
                    -- delimit lines, instead of records.  See
                    -- ISO/IEC 10175 Document Printing Application
                    -- (DPA)
                    -- ISO standard, Geneva, Switzerland
langMODCA(15),      -- Mixed Object Document Content Architecture
                    -- Definitions that allow the composition,
                    -- interchange -- and presentation of final
                    -- form documents as a collection of data
                    -- objects (text, image, graphics, bar
                    -- codes), resources (fonts, overlays) and
                    -- page, form and finishing instructions.
                    -- Pennant Systems, IBM
langREGIS(16),      -- Remote Graphics Instruction Set,
                    -- Digital Equipment Corp., Maynard MA
langSCS(17),        -- SNA Character String
                    -- Bi-directional print data stream for SNA
                    -- LU-1 mode of communications
                    -- IBM
langSPDL(18),       -- ISO/IEC 10180 Standard Page Description
                    -- Language
                    -- ISO Standard
langTEK4014(19),
langPDS(20),
langIGP(21),
langCodeV(22),      -- Magnum Code-V, Image and printer control
```


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```
                    -- language used to control impact/dot-
                    -- matrix printers.
                    -- QMS, Inc., Mobile AL
langDSCDSE(23),     -- DSC-DSE:  Data Stream Compatible and
                    -- Emulation Bi-directional print data
                    -- stream for non-SNA (DSC) and SNA LU-3
                    -- 3270 controller (DSE) communications
                    -- IBM
langWPS(24),        -- Windows Printing System, Resource based
                    -- command/data stream used by Microsoft At
                    -- Work Peripherals.
                    -- Developed by the Microsoft Corporation.
langLN03(25),       -- Early DEC-PPL3, Digital Equipment Corp.
langCCITT(26),
langQUIC(27),       -- QUIC (Quality Information Code), Page
                    -- Description Language for laser printers.
                    -- Included graphics, printer control
                    -- capability and emulation of other well-
                    -- known printer .
                    -- QMS, Inc.
langCPAP(28),       -- Common Printer Access Protocol
                    -- Digital Equipment Corp.
langDecPPL(29),     -- Digital ANSI-Compliant Printing Protocol
                    -- (DEC-PPL)
                    -- Digital Equipment Corp.
langSimpleText(30),-- simple-text:  character coded data,
                    -- including NUL, CR , LF, HT, and FF
                    -- control characters.  See ISO/IEC 10175
                    -- Document Printing Application (DPA)
                    -- ISO standard, Geneva, Switzerland
langNPAP(31),       -- Network Printer Alliance Protocol
                    -- IEEE 1284.1
langDOC(32),        -- Document Option Commands, Appears in the
                    -- data stream between data intended for a
                    -- page description .
                    -- QMS, Inc.
langimPress(33),    -- imPRESS, Page description language
                    -- originally developed for the ImageServer
                    -- line of systems. A binary language
                    -- providing representations for text,
                    -- simple graphics (rules, lines, conic
                    -- sections), and some large forms (simple
                    -- bit-map and CCITT group 3/4 encoded).The
                    -- language was intended to be sent over an
                    -- 8-bit channel and supported early
                    -- document preparation languages (e.g. TeX
                    -- and TROFF).
                    -- QMS, Inc.
langPinwriter(34), -- 24 wire dot matrix printer  for
                    -- USA, Europe, and Asia except Japan.
                    -- More widely used in Germany, and some
                    -- Asian countries than in US.
                    -- NEC
```


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```
        langNPDL(35),       -- Page printer  for Japanese
                            -- market.
                            -- NEC
        langNEC201PL(36),   -- Serial printer language used in the
                            -- Japanese market.
                            -- NEC
        langAutomatic(37),  -- Automatic PDL sensing.  Automatic
                            -- sensing of the interpreter language
                            -- family by the printer examining the
                            -- document content.  Which actual
                            -- interpreter language families are sensed
                            -- depends on the printer implementation.
        langPages(38),      -- Page printer Advanced Graphic Escape Set
                            -- IBM Japan
        langLIPS(39),       -- LBP Image Processing System
        langTIFF(40),       -- Tagged Image File Format (Aldus)
        langDiagnostic(41),-- A hex dump of the input to the
                            -- interpreter
        langCaPSL(43),      -- Canon Print Systems Language
        langEXCL(44),       -- Extended Command Language
                            -- Talaris Systems Inc.
        langLCDS(45),       -- Line Conditioned Data Stream
                            -- Xerox Corporation
        langXES(46)         -- Xerox Escape Sequences
                            -- Xerox Corporation
        langPCLXL(47)       -- Printer Control Language. Extended language
                            -- features for printing, and printer control.
                            -- Technical reference manual # TBD.
                            -- Hewlett-Packard Co.
        langART(48)         -- Advanced Rendering Tools (ART). Page
                            -- Description language originally developed for
                            -- the Laser Press printers. Technical reference
                            -- manual: "ART IV Reference Manual", No F33M.
                            -- Fuji Xerox Co., Ltd.
        langTIPSI(49)       -- Transport Independent Printer System Interface
                            -- Tech Reference - see IEEE Std. 1284.1
            }
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The family name of a Page Description Language (PDL) or
        control language which this interpreter in the printer can interpret
        or emulate.  This type 2 list of enumerations requires review before
        additional entries are made."
    ::= { prtInterpreterEntry 2 }
```

F.1.1 Relationship between ISO/IEC 10175 OIDs and IANA enum values

ISO/IEC 10175 uses Object Identifiers to identify document formats, as ISO/IEC 10175 does for all attributes for which implementor extension is desired with implementor-defined Object Identifiers. However, the Internet Printer MIB (RFC 1759) uses simple enum integer values that are registered with the IANA. Implementors must submit requests to IANA in order to obtain unique values.

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ISO/IEC 10175 assigns a value-class Object Identifier for purposes of assigning full Object Identifiers: **id-vc-document-format**:

```
iso(1) standard(0) dpa(10175) part-1(1) vc(6) document-format(14)
```

The complete ISO/IEC 10175 **id-val-document-format-*xxx*** object identifier is formed by appending the Printer MIB **prtInterpreterLangFamily** enum value to the **id-vc-document-format** OID.

For example, consider the **PCL** enum value **3**. The ISO/IEC 10175 document-format OID for PCL is:

```
iso(1) standard(0) dpa(10175) part-1(1) vc(6) document-format(14) PCL(3)
```

See F.5 Document-format object identifiers for the complete list of OID assignments of document-format object identifiers.

F.2 Document-production-instruction (DPI) attributes

Many document formats support document production instruction (DPI) attributes that the client may specify to control the processing of a document. The following attributes are available for use by various document formats (see table in F.4):

F.2.1 New-line-option

This attribute identifies how the server shall determine how lines are delimited in the document data. Document data is represented as stream or record data:

- In stream data, the lines are delimited by the ASCII control codes: CARRIAGE RETURN (CR = hex 0D) and LINE FEED (LF = hex 0A) to reflect the various actual implementations. The value of the **new-line-option** attribute identifies whether LF, CR, neither, or both shall be interpreted to start a new line. See ANSI ANS X3.4 and ISO/IEC 6429.
- In record data, the lines are delimited by a record count embedded in the data.

```
new-line-option ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-new-line-option
```

The following standard values are defined:

Simple Name	Object Identifier	Descriptor Text
cr-and-lf	id-val-nl-option-cr-and-lf	Both CR and LF are needed for each new line. The server shall interpret CR as strict horizontal movement of the active position (to the first character position on the same line) and LF as strict vertical movement (to the same character position on the next line). So both a CR and an LF are needed to signify a new line as specified in ISO/IEC 6429.
lf	id-val-nl-option-lf	Interpret LF as a new-line. The server shall interpret LF as implying a CR as well, i.e., a single LF shall move the active position to the first character position on the next line. NOTE: This option is the so-called "new-line" option, permitted by ASCII (ANS X3.4) and used by UNIX(tm), C, and C++. CR shall have strict horizontal movement of the active (to the first character position on the same line).

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cr	id-val-nl-option-cr	Interpret CR as a new-line. The server shall interpret CR as moving the active position to the first character position on the next line and LF as strict vertical movement (to the same character position on the next line). NOTE: This option is used in a number of PC applications.
cr-or-lf	id-val-nl-option-cr-or-lf	Interpret either CR or LF as new-lines. The server shall interpret either a CR or a LF as moving the active position to the first character position on the next line.
counted-4-octet-aligned	id-val-nl-option-counted-4-octet-aligned	The document data is a sequence of octets that is broken up into aligned counted records. Each count is a four-octet unsigned integer specifying the number of octets following in the record, not counting the 0 to 3 pad octets at the end of the record data so that the integers (and records) are four-octet aligned.
unknown	id-val-nl-option-unknown	The document delimits lines according to one of the four options using 1) CR and LF, 2) LF, 3) CR, or 4) CR or LF, and does not use counted records. The server shall provide some implementation default action, which may correspond to one of the actions of the other **id-val-nl-option-*xxx*** options, except **id-val-nl-option-counted-4-octet-aligned**, or may include the server auto-sensing between the other **id-val-nl-option-*xxx*** options, except **id-val-nl-option-counted-4-octet-aligned**, by examining an implementation-defined number of octets of document data.

F.2.2 Carriage-control-type

This attribute identifies the type of carriage control that the server shall assume when interpreting the document. Carriage control specifies the amount of advancement, if any, of the active position (carriage on old technologies), at the beginning of each line or record. When carriage control information is stored in the document content, the first octet(s) of each line or record specify the amount of the advancement.

```
carriage-control-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-carriage-control-type
```

The following standard values are defined:

Simple Name	Object Identifier	Descriptor Text
none	id-val-generic-none	The document does not contain carriage control information. See 9.1.2.
ansi-ascii	id-val-cc-type-ansi-ascii	The first character of each line (or record) of the document shall be interpreted as carriage control specified according to the ANSI ANS X3.78 standard and coded in the ASCII (ANS X3.4) character set. Note: **ansi-ascii** is the so-called "FORTRAN carriage control" for use with the ASCII coded character set.
ansi-ebcdic	id-val-cc-type-ansi-ebcdic	The first character of each line (or record) of the document shall be interpreted as carriage control as specified according to the ANSI ANS X3.78 standard and coded in the EBCDIC character set. Note: **ansi-ebcdic** is the so-called "FORTRAN carriage control" for use with the EBCDIC coded character set.

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machine	id-val-cc-type-machine	The first character of each line (or record) shall be interpreted as carriage control. The carriage controls are somewhat machine dependent but there are a standard set defined by the IBM System/370 Extended Architecture Reference Summary with IBM Document Order Number GX20-0157. It is intended that the server pass this carriage control information directly to the printer.

F.2.3 Table-reference-characters

This attribute specifies whether the first character of each line (or record) is a table reference character (TRC) which selects a character arrangement table. When TRC is specified with carriage controls (see F2.2 **carriage-control-type**), e.g. **id-val-cc-type-ansi-xxx**, the first character of each line (or record) is a print carriage control character and the second character (instead of the first character) of each line contains a table reference character (TRC) which selects a character arrangement table.

```
table-reference-characters ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-table-reference-characters
```

F.2.4 Shift-out-shift-in

This attribute specifies that the server shall change scanning modes when processing EBCDIC line-data that is to be printed with both a single-byte and a double-byte font. The server shall scan single-octet data one octet at a time until the server finds a shift-out control code (hex 0E), after which it shall scan data two octets as a time. When the server finds a shift-in control code (hex 0F), the server shall return to scanning one octet at a time.

```
shift-out-shift-in ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-shift-out-shift-in
```

The following standard values are defined:

Simple Name	Object Identifier	Descriptor Text
none	id-val-generic-none	The document does not contain shift-out or shift-in control codes that are to be interpreted as specified for the other values of this attribute, i.e., this value specifies that shift-out and shift-in controls, if present, shall be interpreted as in ISO/IEC 2022. See 9.1.2.
one	id-val-shift-out-shift-in-one	Specifies that each shift-out code shall be converted to a blank followed by a Set Coded Font Local text-control code for the second font and each shift-in code be converted to a Set Coded Font Local text-control code for the first font followed by a blank.
two	id-val-shift-out-shift-in-two	Specifies that each shift-out code shall be converted to a Set Coded Font Local text-control code for the second font and each shift-in code be converted to a Set Coded Font Local text-control code for the first font.
three	id-val-shift-out-shift-in-three	Specifies that each shift-out code shall be converted to a Set Coded Font Local text-control code for the second font and each shift-in code be converted to a Set Coded Font Local text-control code for the first font followed by two blanks.

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F.3 Printer object attributes

The following document-format-specific printer object attributes are defined:

F.3.1 New-line-options-supported

This attribute identifies the particular **new-line-option** attribute values that are supported by this printer.

```
new-line-options-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-new-line-options-supported
```

The standard values are those of the **new-line-option** document attribute (see F.2.1).

F.3.2 Carriage-control-types-supported

```
carriage-control-types-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-carriage-control-types-supported
```

The standard values are those of the **carriage-control-type** document attribute (see F.2.2).

F.3.3 Table-reference-characters-supported

This attribute identifies the particular **table-reference-characters** attribute values that are supported by this printer.

```
table-reference-characters-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
         ::= id-att-table-reference-characters-supported
```

F.3.4 Shift-out-shift-in-supported

This attribute identifies the particular **shift-out-shift-in** attribute values that are supported by this printer.

```
shift-out-shift-in-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-shift-out-shift-in-supported
```

The standard values are those of the **shift-out-shift-in** document attribute (see F.2.4).

F.4 Document-format-variants

The following table lists the values of the **document-format-variants** attributes that are currently defined, along with the document-formats that they qualify. A brief description of some of the document formats and associated document format variants follows the table. Other document-formats (see F.1) may also use some of these document-format-variant values as well as their own, depending on implementation.

> NOTE - The **document-format-variant** attribute corresponds to the Printer MIB **prtInterpreterLangLevel** object/attribute having the same semantics, data type, and values. However, the Printer MIB specification does *not* list any of the values; each implementor is free to invent variants, without the need of standardization or registration.

The following table also lists the document production instruction (DPI) attributes defined for use with some of the document-formats (the usage of these DPI attributes is not repeated in the description of each document-format in F.4. These DPI attributes are specified in F.2.

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document-format	document-format-variant (strings, not OIDs)	DPI attributes
DDIF	`"text", "graphics", "images", "colour"`	
DEC-PPL	`"DEC-PPL2", "DEC-PPL3"`	**new-line-option, carriage-control-type, default-character-set**
PCL	`"1", "2", "3", "4", "5", "5e"`	**new-line-option, default-character-set**
PPDS	`"level 1", "level 2", "level 3"`	
Interpress	`"level 1", "level 2", "level 3"`	
ISO-6429	`"iso-10538-pif-level1", "iso-10538-pif-level2", "iso-10538-pif-level3", "iso-10538-pif-level4", "iso-10538-fft-level1", "iso-10538-fft-level2a", "iso-10538-fft-level", "iso-10538-fft-level2b", "iso-10538-fft-level2c", "ht", "sgr-underline-bold", "cr-overstrike", "bs-overstrike"`	**new-line-option, default-character-set**
line-data		**new-line-option, carriage-control-type, table-reference-characters, shift-out-shift-in, default-character-set**
MODCA	`"is1", "pt1", "dr2", "dr3", "fs10", "fs20", "bcd1", "im1"`	
PostScript	`"1", "2" (mandatory); "dsc1", "dsc2", "dsc3" (optional)`	
ReGIS	`"color"`	
SCS		**new-line-option, carriage-control-type, table-reference-characters, shift-out-shift-in**
simple-text	`"sgr-underline-bold", "cr-overstrike", "bs-overstrike"`	**new-line-option, carriage-control-type, default-character-set, size-unit-type, width, length, left-margin, right-margin, top-margin, bottom-margin, repeated-tab-stops, explicit-tab-stops, header-text, footer-text, number-pages**
SPDL	`"binary", "clear-text"`	

Multiple values shall be represented as a comma list, e.g., `"b,c"`.

The remainder of this sub-clause lists the document formats, in alphabetical order, that have known document-format-variants and specifies those variants. This sub-clause does not list the document production instructions attributes that these document formats employ; instead, see the table in F.1.

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F.4.1 DDIF (Digital Document Interchange Format)

DDIF is the CDA(tm) Architecture document format used to represent formattable text, graphics, and images by Digital Equipment Corporation and third party applications. DDIF uses ASN.1 for its representation and is capable of representing the semantics of the popular de-facto and de-jure formattable document formats. DDIF is defined in the CDA Reference Manual, Digital Order Number AA-PBD3A-TE.

For purposes of ISO/IEC 10175, the DDIF document-format does not specify or imply any subsets. The following **document-format-variant** attributes may be used as hints of the content which may help in selecting an appropriate printer, but are not required:

Document-format-variant	Description
"text"	the document contains text
"graphics"	the document contains synthetic graphics, e.g., line drawings
"images"	the document contains raster image data in CCITT Group 3 or Group 4 compressed or uncompressed representation.
"colour"	the document contains colour specifications

F.4.2 DEC ANSI-Compliant Printing Protocol (DEC-PPL)

DEC ANSI-Compliant Printing Protocol (DEC-PPL) is a conforming implementation of ISO/IEC 6429 with extensions. There are two levels:

Document-format-variant	Description
"dec-ppl2"	Level 2 subset (with conforming private extensions) for nonpage printers, such as the LA70, LA75, and LA324. See LA324 Programming Reference Manual, Digital document Order number EK-LA324-PM-002.
"dec-ppl3"	Level 3 subset (with conforming private extensions) for page printers, such as the LN03 and DEClaser2000. See Digital Printer Protocol Level 3, order number AA-PBWGA-TE.

F.4.3 HPGL (Hewlett Packard Graphics Language)

HPGL is a vector graphics language designed for pen-plotters. It consists of two letter mnemonic instructions designed to remind the user of its function. HPGL/2 is designed to meet a wider range of technologies such as electrostatic, laser or ink jet devices. Commands are grouped in areas like: configuration and status, vector, polygon, line and fill, character attributes.

HPGL is defined in the following documents:

HPGL Programming Reference Manual.

HPGL/2 The HPGL/2 Reference Guide. ISBN 0-201-56308-8.

F.4.4 Interpress

Levels, or subsets of Interpress may be identified via the **document-format-variant** attribute which may include one of the following applicable values:

Document-format-variant	Description
"level 1"	Commercial Set
"level 2"	Publication Set
"level 3"	Professional Graphics Set

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F.4.5 ISO/IEC 6429 (Control Functions for Coded Character Sets)

The ISO/IEC 6429 document format consists of control functions coded according to ISO/IEC 6429 Control Functions for Coded Character Sets. ISO/IEC 6429:1992 contains the 7-bit ASCII (ANS X3.4) control characters (CR, LF, HT, FF, etc.) as the C0 set (hex 00 to 1F) and additional controls for character imaging devices as the C1 set (hex 80 to 9F). The control functions that may be included in the document include graphic character set selection, font selection, line spacing, and character spacing. These will take precedence over ISO DPA document production attributes included with the job, if any.

For purposes of ISO/IEC 10175, levels and subsets of ISO/IEC 6429 may be identified by the **document-format-variant** attribute which may include one the following applicable values:

Document-format-variant	Description
"iso-10538-pif-level1"	Level 1 Page Image Format (PIF) from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-pif-level2"	Level 2 PIF from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-pif-level3"	Level 3 PIF from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-pif-level4"	Level 4 PIF from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-fft-level1"	Level 1 Formatted and Formattable Text (FFT) from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-fft-level2"	Level 2 FFT from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-fft-level2a"	Level 2a FFT from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-fft-level2b"	Level 2b FFT from ISO/IEC 10538 Control Functions for Text Communication.
"iso-10538-fft-level2c"	Level 2c FFT from ISO/IEC 10538 Control Functions for Text Communication.

The **document-format-variant** attribute may include any of the following additional values, indicating additional information about the data, including the presence of additional control characters:

Document-format-variant	Description
"ht"	indicates that the HORIZONTAL TAB (HT) control character may occur. The tab stops may be specified by the **repeated-tab-stops** or the **explicit-tab-stops** document attribute (see F.4.13 **simple-text** document format description). If these attributes are omitted, the server may use implementation-defined tab stops, such as every 8 positions.
"sgr-underline-bold"	the underline or bold rendition. See ISO/IEC 6429 for coding of the underline and bold SGR parameters.
"cr-overstrike"	indicates that the CARRIAGE RETURN (CR) control character may occur to overstrike entire lines to represent an underline or bold rendition.
"bs-overstrike"	indicates that the BACKSPACE (BS) control character may occur to overstrike the previous character to represent an underline or bold rendition.

F.4.6 Line-data

The **line-data** document format consists solely of 8-bit printing characters and SPACE (ASCII hex 20, EBCDIC hex 40). The **new-line-option** attribute specifies how lines of data are delimited, namely, by ASCII or EBCDIC CARRIAGE RETURN (CR) and/or LINE FEED (LF), or by a record count in the data (**id-val-nl-option-counted-4-**

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octet-aligned). If the **new-line-option** attribute is not specified, the default action shall be the action of **id-val-nl-option-unknown**.

NOTE: **line-data** is frequently used with counted records.

Line-data shall not include any other ASCII or EBCDIC control characters, such as HORIZONTAL TAB (HT), BACK SPACE (BS), VERTICAL TAB (VT), or FORM FEED (FF).

If the server accesses the document data directly through a (local or distributed) file system, that file system may provide a record access method to the server that delimit each record, but such a document transfer-method is not specified by ISO/IEC 10175.

For the purposes of ISO/IEC 10175, the line-data document-format does not delineate or specify any particular subset or set of towers within the data stream.

F.4.7 MODCA (Mixed object document content architecture)

MODCA is an IBM SAA data format which has gained wide spread acceptance and usage within IBM. It is a self defining document format based on an architected set of structured fields supporting text, image and graphics. A structured field consists of a length, introducer identifying MODCA and an ID which identifies the semantic content and syntax of the field. MODCA is defined by IBM publication SC31-6802.

For the purposes of ISO/IEC 10175, the MODCA document-format does not delineate or specify any particular subset or set of towers within the data stream. Levels, or subsets of MODCA may be identified via the **document-format-variant** document attribute which may include one or more of the following applicable values:

Document-format-variant	Description
`"is1"`	MODCA Interchange Set 1 (SC31-6802). This is a formatted final form document interchange subset of IBM's Mixed Object Document Content Architecture.
`"pt1"`	PTOCA Presentation Text Interchange Subset 1 (SC31-6803). This is the MODCA Object Content Architecture for final form, presentation text.
`"dr2"`	GOCA Graphics Interchange Subset 2 (SC31-6804). This is Subset Level 2 of the MODCA Object Content Architecture for geometric vector graphics.
`"dr3"`	GOCA Graphics Interchange Subset 3 (SC31-6804). This is Subset Level 3 of the MODCA Object Content Architecture for geometric vector graphics.
`"fs10"`	IOCA Image Function Set 10 (SC31-6805). This identifies an Interchange function set of the MODCA Object Content Architecture for Raster Image data.
`"fs20"`	IOCA Image Function Set 20 (SC31-6805). This identifies an Interchange function set of the MODCA Object Content Architecture for Raster Image data.
`"bcd1"`	Bar Code Object Interchange Subset 1 (SH544-3202). This identifies an interchange subset of the MODCA Object Content Architecture for Bar Code data.
`"im1"`	Compatibility Image (SH544-3202). This is a device dependent image object format for bi-level raster data.

F.4.8 PCL (Hewlett Packard Printer Control Language)

PCL is a popular PDL containing escape control sequences developed by Hewlett-Packard.

PCL printer language structure has evolved through five major levels of functionality driven by the combination of printer technology development, changing user needs and application software improvements. The five levels are:

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Document-format-variant	Description
"1"	Print and Space functionality for simple, convenient, single user workstation output.
"2"	EDP (Electronic Data Processing)/Transaction functionality is a superset of PCL1. Functions were added for general purpose, multi-user system printing.
"3"	Office Word Processing functionality is a superset of PCL2. Functions were added for high quality, office document production.
"4"	Page Formatting functionality is a superset of PCL3. Functions were added for new page printing capabilities.
"5"	Office Publishing functionality is a superset of PCL4. New publishing capabilities include font scaling and HP-GL/2 graphics.
"5e"	Level 5 plus extensions.

PCL is defined in the Laserjet III Technical Reference Manual, Hewlett Packard order number 33449-90903.

For the purposes of ISO/IEC 10175, the PCL format specifier does not delineate or specify any particular subset or set of towers within the data stream. Levels, or subsets of PCL may be identified via the **document-format-variant**. Each level is a subset of the level that follows it.

F.4.9 PostScript

The PostScript[1] language (PS) is a high function PDL supported in many environments. For the purposes of ISO/IEC 10175, the PostScript language is defined by the PostScript Language Reference Manual, Second Edition, ISBN 0-201-18127-4.

PS must have a mandatory level variant specified by the **document-format-variant** attribute with meanings as follows:

Document-format-variant	Description
"1"	Level 1. This variant identifies a PostScript language data stream that uses only operators from the PostScript Language Reference Manual, Second Edition, that are not noted as being Level 2 or DPS-specific.
"2"	Level 2. This variant identifies a PostScript language data stream that uses only operators from the PostScript Language Reference Manual, Second Edition, that are not noted as being DPS-specific.

An optional **document-format-variant** value may specify a variant that, if present, indicates both the fact that the document conforms to the Adobe Document Structuring Conventions and the version of the Document Structuring Conventions to which it adheres. Currently valid values for this variant are:

Document-format-variant	Description
"dsc1"	This variant value identifies a PostScript language data stream that adheres to the commenting conventions set forth in Appendix C of the PostScript Language Reference Manual, ISBN 0-201-10174-2.
"dsc2"	This variant value identifies a PostScript language data stream that adheres to the commenting conventions set forth in the document, Document Structuring Conventions Specification, Version 2.1, dated January 16, 1989, available free of charge from Adobe Systems Incorporated; 1585 Charleston Road; P.O. Box 7900; Mountain View, CA 94039-7900.

[1]PostScript is a trademark of Adobe Systems, Incorporated, which may be registered in some jurisdictions.

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"dsc3"	This variant value identifies a PostScript language data stream that adheres to the commenting conventions set forth in Appendix G of the PostScript Language Reference Manual, Second Edition, ISBN 0-201-18127-4.

Version may be specified (in the future) by the **document-format-version** attribute. This would identify major language changes or additions between levels of the PostScript Language.

F.4.10 PPDS (Page Printer Data Stream)

Page Printer Data Stream (PPDS) is similar to ISO/IEC 6429 and includes support for APA printing and image in a fashion very similar to PCL. PPDS is defined within the IBM document, IBM Laser Printer Technical Reference, S544-4226-1.

For the purposes of ISO/IEC 10175, the PPDS format specifier does not delineate or specify any particular subset or set of towers within the data stream. Levels, or subsets of PPDS may be identified via the **document-format-variant** attribute. Each level of PPDS is a subset of the level that follows it.

The following levels provide a progression of capabilities from one level to the next.

Document-format-variant	Description
"level 1"	This is the basic level of PPDS, represented by the 9- and 24-wire Proprinter family of printers. These printers are categorized as wire matrix printers using continuous forms paper.
"level 2"	This level of PPDS, characterized by data stream enhancements in font selection, print quality selection, and paper handling, is represented by the Quietwriter and Quietwriter families of printers.
"level 3"	This level provides enhancements to the previous PPDS levels for page type printers such as the IBM 4019. The enhancements to the data stream allow random placement of text and graphics images. The font selection commands of Level 2 are enhanced to allow selection of typographic fonts.

F.4.11 ReGIS (Remote graphics instruction set)

ReGIS is the Digital Equipment Corporation's Remote Graphics Instruction Set which images text and graphics in a resolution-independent manner on video terminals and hardcopy printers (using a translator). See PostScript Translator's Manual for ReGIS, order number AA-PBWFA-TE.

The following variant values may be included in the **document-format-variant** attribute:

Document-format-variant	Description
"colour"	the document contains color

F.4.12 SCS (SNA character string)

SCS (SNA Character String) data streams contain EBCDIC character data and embedded escape control sequences for formatting line sequential text in a presentation space.

For the purposes of ISO/IEC 10175, the SCS document format does not delineate or specify any particular subset or set of towers within the data stream.

F.4.13 Simple-text

The **simple-text** document format consists of 8-bit character coded data that is imaged character by character and line by line on one or more pages without loss of information. By default the values from hex 00 to hex 7F shall consist only of the following characters:

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Name	hex	Server action - the server shall:
Null (NUL)	00	ignore NUL and images nothing for it.
HORIZONTAL TAB (HT)	09	advance the active character position 1 to 8 character positions simulating tab stops set every 8 character positions by default. The **repeated-tab-stops** or the **explicit-tab-stops** attributes, if implemented, shall be used to specify different tab stops than the default values.
LINE FEED (LF)	0A	advance the active character position (1) to the corresponding character position on the next line or (2) to the first character position on the next line, depending on the value of the **new-line-option** document attribute.
FORM FEED (FF)	0C	advance the active character position to the corresponding character position on the first line of the next logical page.
CARRIAGE RETURN (CR)	0D	return the active character position to the first character position (1) on the current line or (2) on the next line, depending on the value of the **new-line-option** document attribute.
SPACE (SP)	20	advance the active character position one character position along the current line.

and the ASCII graphic characters (hex 21 to hex 7E). See American National Standard ANS X3.4 (ASCII) which is also specified in ISO/IEC 646-1991 and ISO/IEC 6429. If other control characters are encountered in the range hex 00 to 1F, the results are implementation-dependent.

The meaning of characters in the range hex 80 to FF is implementation defined and may be specified by the **default-character-set** document attribute. The **default-character-set** document attribute may also be used to specify a different default character set for characters in the range hex 00 to hex 7F. The **default-font** document attribute may be used to specify the font that is to be used with the **simple-text** document format.

The width of margins (white space not used to image **simple-text** characters) on all four edges of a logical page is implementation-dependent. The **left-margin**, **right-margin**, **top-margin** and **bottom-margin** attributes, if implemented, shall be used to specify explicit margins.

The number of characters per line and the number of lines per page, is implementation-dependent. A minimum of 80 characters per line and a minimum of 60 lines per page is recommended. The **width** and **length** attributes, if implemented, shall be used to specify explicit values for the width and length of the area to be used to image **simple-text**.

If a character would be imaged beyond the last character position on a line, i.e., in the right margin area, the server shall advance the active character positions to an implementation-defined character position on the next line, so that no data is lost. Similarly, if a line would be imaged beyond the last line on a logical page, i.e., in the bottom margin area, the server shall advance the active character position to an implementation-defined line on the next logical page.

Whether the server interprets lines as delimited by:

1. CARRIAGE RETURN (CR) LINE FEED (LF) pairs
2. LF only
3. CR only
4. either CR or LF

depends on the value of the **new-line-option** attribute (see F.2.1).

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To give the user and print client more control over the placement of the text on the page, any of the following 12 additional attributes may be specified. These attributes are defined in the M.I.T. Athena Palladium Printing System[2] specification, entitled: "Additional Simple Text Formatting Attributes for use with ISO/IEC 10175, Document Printing Application standard". Requests for this specification may be sent to:

MIT Project Athena
Massachusetts Institute of Technology
1 Amherst St.
Cambridge, MA 02139

NOTE – While these attributes were designed to be used with the ISO/IEC 6429 **simple-text** document format, the specification of other document formats may make use of these attributes as well.

The M.I.T. specification includes the following per-document attributes and MIT Palladium assigned object identifiers:

Attribute	Description
size-unit-type	identifies the unit of measure for the following 8 attributes. Values are: character (default), millimeter, computer-decipoint, decididot, mil, basic-measuring-unit, micrometer, pixel, decipoint, TWIPS (one-twentieth of a point). If this attribute is omitted or not implemented, the values are in units of characters.
width	specifies the width of the text area, i.e., the maximum line width before wrapping (in units of characters, millimeters, e tc., depending on the size-unit-type attribute, if any).
length	specifies the length of the text area, i.e., the maximum page length before lines are automatically placed on the next page.
left-margin	specifies the distance between the left edge of the logical page and the left edge of the text area when held in the intended reading orientation.
right-margin	specifies the distance between the right edge of the logical page and the right edge of the text area when held in the intended reading orientation.
top-margin	specifies the distance between the top edge of the logical page and the top edge of the text area when held in the intended reading orientation.
bottom-margin	specifies the distance between the bottom edge of the logical page and the bottom edge of the text area when held in the intended reading orientation.
repeated-tab-stops	specifies the SINGLE VALUE Integer number of units between tab stops.
explicit-tab-stops	specifies the MULTI VALUE Integer placement of each tab stop.
header-text	specifies the text for the first line of each page.
footer-text	specifies the text for the last line of each page.
number-pages	indicates whether to number pages or not.

In addition to any of the above attributes, the print server may use additional attributes, such as **default-font, default-medium**, **content-orientation**, **assured-reproduction-area**, **page-size**, and **presentation-directions-contained** to determine the size and/or spacing of the font used and the placement and/or orientation of the text on the page, depending on implementation.

F.4.14 SPDL (Standard Page Description Language)

This document format describes the interchange formats for the Standard Page Description Language (ISO/IEC 10180), as defined in that standard. The applicable format is identified via the required **document-format-variant** attribute, which must specify either binary or cleartext, where:

[2]The M.I.T. Project Athena Palladium Printing System is a public domain implementation of the ISO/IEC (DIS) 10175 Draft International Standard and an open systems distributed printing system.

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Document-format-variant	Description
"binary"	This variant identifies the ASN.1 binary interchange format for SPDL structure and the binary format for SPDL content.
"cleartext"	This variant identifies the SGML cleartext interchange format for SPDL structure and the cleartext format for SPDL content.

Version may be specified by the **document-format-version** attribute.

F.5 Document-format identifiers

The Object Identifiers used to identify document-formats are assigned according to the transformation specified in F.1.1 from the Printer MIB **prtInterpreterLangFamily** object/attribute enum values to produce the final arc of the ISO/IEC 10175 Object Identifier.

The list of document-format OIDs corresponds to the Printer MIB **prtInterpreterLangFamily** object/attribute enum values that were registered at the time of publication of this International Standard. Implementors registering additional values with the IANA may automatically use the corresponding ISO/IEC 10175 Object Identifier using the algorithm specified in F.1.

> NOTE: The simple names corresponding to these OIDs were derived from the IANA assigned enum symbol names. However, the case of some of the letters has been changed in some instances to conform to documentation and naming conventions used in this International Standard. Simple names that are proper names or acronyms of proper names are rendered in upper-case when constructiong the simple-names used in ISO/IEC 10175. For simple names that would normally contain spaces (e.g., *simple text*), a hyphen is inserted to follow ISO DPA conventions for simple OID names (e.g., ***simple-text***).

See the ASN.1 in F.7 for the OID assignments.

F.6 Simple-text Object Identifiers

The Object Identifiers used to identify attributes for use with the **simple-text** document format (see F.4.13) were assigned by MIT. These attributes may be used with other document formats as well. See F.7 for the OID assignments.

F.7 ASN.1 for document-format specific attributes of ANNEX F

This sub-clause formally defines the document-format specific attribute-types applicable to DPA. It employs ASN.1 with the ATTRIBUTE and ATTRIBUTE-SYNTAX macros.

The order of the ASN.1 production in this sub-clause follows the order of the attribute definitions in ANNEX F.

The ASN.1 in this sub-clause has been compiled with Annexes A, B, C, and D by a recognized ASN.1 compiler. In case of discrepancies between this sub-clause and the rest of ANNEX F, this sub-clause shall take precedence.

```
-- File: DPA_0F.ASN, Version 0.5, 15-May-1995

-- Version 0.5, 15-May-1995: Add simple-text attribute OID assignments

-- This sub-clause formally defines the document-format specific
-- attribute-types applicable to DPA. It employs ASN.1 with the
-- ATTRIBUTE and ATTRIBUTE-SYNTAX macros.

-- The order of the ASN.1 production in this sub-clause follows the
-- order of the attribute definitions in ANNEX F. The ASN.1 in this
-- sub-clause has been compiled with Annexes A, B, C, and D by
```


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```
--  a recognized ASN.1 compiler.  In case of discrepancies between
--  this sub-clause and the rest of ANNEX F, this sub-clause shall
--  take precedence.

DPAStandardDocumentFormatDefinitions { iso standard dpa(10175) part-1(1)
                                modules(0) document-format-definitions(5)}
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- PROLOGUE --
-- EXPORTS  everything --
IMPORTS
-- some attribute-type OIDs from ANNEX A:
id-att-carriage-control-type,
id-att-carriage-control-types-supported,
id-att-new-line-option,
id-att-new-line-options-supported,
id-att-shift-out-shift-in,
id-att-shift-out-shift-in-supported,
id-att-table-reference-characters,
id-att-table-reference-characters-supported,
id-vc-document-format
    FROM DPAStandardObjectIdentifiers
        { iso standard dpa(10175) part-1(1) modules(0) object-identifiers(0) }

-- Some macros from ANNEX C:
ATTRIBUTE, ATTRIBUTE-SYNTAX
    FROM DPAStandardAttributes
      { iso standard dpa(10175) part-1(1) modules(0) attributes(2) }
    ;
-- end of IMPORTS --



-- Attribute-type OID assignments from MIT Palladium

ID ::=  OBJECT IDENTIFIER

id-pd           ID ::= { iso(1) member-body(2) usa(840)
                         mit(113554) project-athena(1) palladium(1) }

  id-pd-oc      ID ::= { id-pd  3 }
  id-pd-vc      ID ::= { id-pd  6 }

  id-pd-job     ID ::= { id-pd-oc  1 }

  id-att-size-unit-type                          ID ::= { id-pd-job    1 }
     id-vc-size-unit                               ID ::= { id-pd-vc   199 }
        id-val-size-unit-character                    ID ::= { id-vc-size-unit  1 }
        id-val-size-unit-millimeter                   ID ::= { id-vc-size-unit  2 }
        id-val-size-unit-computer-decipoint           ID ::= { id-vc-size-unit  3 }
        id-val-size-unit-decididot                    ID ::= { id-vc-size-unit  4 }
        id-val-size-unit-mil                          ID ::= { id-vc-size-unit  5 }
        id-val-size-unit-basic-measuring-unit         ID ::= { id-vc-size-unit  6 }
```


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```
        id-val-size-unit-micrometer                ID ::= { id-vc-size-unit  7 }
        id-val-size-unit-pixel                     ID ::= { id-vc-size-unit  8 }
        id-val-size-unit-decipoint                 ID ::= { id-vc-size-unit  9 }
        id-val-size-unit-TWIPS                     ID ::= { id-vc-size-unit 10 }
  id-att-width                                  ID ::= { id-pd-job  2 }
  id-att-length                                 ID ::= { id-pd-job  3 }
  id-att-left-margin                            ID ::= { id-pd-job 4 }
  id-att-right-margin                           ID ::= { id-pd-job 5 }
  id-att-top-margin                             ID ::= { id-pd-job 6 }
  id-att-bottom-margin                          ID ::= { id-pd-job 7 }
  id-att-repeated-tab-stops                     ID ::= { id-pd-job 8 }
  id-att-explicit-tab-stops                     ID ::= { id-pd-job 9 }
  id-att-header-text                            ID ::= { id-pd-job 10 }
  id-att-footer-text                            ID ::= { id-pd-job 11 }
  id-att-number-pages                           ID ::= { id-pd-job 12 }


--  document-format attribute-value assignments --
id-val-document-format-other          ID ::= { id-vc-document-format  1 }
id-val-document-format-unknown        ID ::= { id-vc-document-format  2 }
      --  value 2 is reserved by Internet Printer MIB in case
      --  the "unknown" value is needed.
      --  The "unknown" OID may be used in ISO DPA.
id-val-document-format-PCL            ID ::= { id-vc-document-format  3 }
id-val-document-format-HPGL           ID ::= { id-vc-document-format  4 }
id-val-document-format-PJL            ID ::= { id-vc-document-format  5 }
id-val-document-format-PostScript     ID ::= { id-vc-document-format  6 }
id-val-document-format-IPDS           ID ::= { id-vc-document-format  7 }
id-val-document-format-PPDS           ID ::= { id-vc-document-format  8 }
id-val-document-format-EscapeP        ID ::= { id-vc-document-format  9 }
id-val-document-format-Epson          ID ::= { id-vc-document-format 10 }
id-val-document-format-DDIF           ID ::= { id-vc-document-format 11 }
id-val-document-format-Interpress     ID ::= { id-vc-document-format 12 }
id-val-document-format-ISO6429        ID ::= { id-vc-document-format 13 }
id-val-document-format-line-data      ID ::= { id-vc-document-format 14 }
id-val-document-format-MODCA          ID ::= { id-vc-document-format 15 }
id-val-document-format-ReGIS          ID ::= { id-vc-document-format 16 }
id-val-document-format-SCS            ID ::= { id-vc-document-format 17 }
id-val-document-format-SPDL           ID ::= { id-vc-document-format 18 }
id-val-document-format-Tek4014        ID ::= { id-vc-document-format 19 }
id-val-document-format-PDS            ID ::= { id-vc-document-format 20 }
id-val-document-format-IGP            ID ::= { id-vc-document-format 21 }
id-val-document-format-CodeV          ID ::= { id-vc-document-format 22 }
id-val-document-format-DSC-DSE        ID ::= { id-vc-document-format 23 }
id-val-document-format-WPS            ID ::= { id-vc-document-format 24 }
id-val-document-format-LN03           ID ::= { id-vc-document-format 25 }
id-val-document-format-CCITT          ID ::= { id-vc-document-format 26 }
id-val-document-format-QUIC           ID ::= { id-vc-document-format 27 }
id-val-document-format-CPAP           ID ::= { id-vc-document-format 28 }
id-val-document-format-DEC-PPL        ID ::= { id-vc-document-format 29 }
id-val-document-format-simple-text    ID ::= { id-vc-document-format 30 }
id-val-document-format-NPAP           ID ::= { id-vc-document-format 31 }
```


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```
id-val-document-format-DOC          ID ::= { id-vc-document-format 32 }
id-val-document-format-imPRESS      ID ::= { id-vc-document-format 33 }
id-val-document-format-Pinwriter    ID ::= { id-vc-document-format 34 }
id-val-document-format-NPDL         ID ::= { id-vc-document-format 35 }
id-val-document-format-201PL        ID ::= { id-vc-document-format 36 }
id-val-document-format-automatic    ID ::= { id-vc-document-format 37 }
id-val-document-format-PAGES        ID ::= { id-vc-document-format 38 }
id-val-document-format-LIPS         ID ::= { id-vc-document-format 39 }
id-val-document-format-TIFF         ID ::= { id-vc-document-format 40 }
id-val-document-format-Diagnostic   ID ::= { id-vc-document-format 41 }
id-val-document-format-PSPrinter    ID ::= { id-vc-document-format 42 }
id-val-document-format-CaPSL        ID ::= { id-vc-document-format 43 }
id-val-document-format-EXCL         ID ::= { id-vc-document-format 44 }
id-val-document-format-LCDS         ID ::= { id-vc-document-format 45 }
id-val-document-format-XES          ID ::= { id-vc-document-format 46 }
id-val-document-format-PCLXL        ID ::= { id-vc-document-format 47 }
id-val-document-format-ART          ID ::= { id-vc-document-format 48 }
id-val-document-format-TIPSI        ID ::= { id-vc-document-format 49 }


--*****************************************************************************--

--  attribute definitions --

new-line-option ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-new-line-option

carriage-control-type ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-carriage-control-type

table-reference-characters ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
        ::= id-att-table-reference-characters

shift-out-shift-in ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        SINGLE VALUE
        ::= id-att-shift-out-shift-in

new-line-options-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-new-line-options-supported

carriage-control-types-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
```


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```
        ::= id-att-carriage-control-types-supported

table-reference-characters-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX booleanSyntax
        SINGLE VALUE
         ::= id-att-table-reference-characters-supported

shift-out-shift-in-supported ATTRIBUTE
        WITH ATTRIBUTE-SYNTAX objectIdentifierSyntax
        MULTI VALUE
        ::= id-att-shift-out-shift-in-supported

END -- of DPAStandardDocumentFormatDefinitions --
```


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Annex G

(informative)

List of Object Identifier Characteristics

This Annex, a supplement to sections two and three, formally lists the characteristics of attribute-type OIDs and the attribute-value OIDs. This information should prove helpful to client and server implementors implementing attribute validation. The following explanation is given for each column in the tables:

Column heading	Description
Identifier (id-att-xxx)	The object identifier name
object class (id-oc-xxx)	The object class(es) which may contain the attribute. Generic means that most of the object classes may contain the attribute
value object class (id-oc-...)	The object class for which the values of this attribute belong, if any. A blank entry indicates that the attribute has values that are not specifying object instances.
value class (id-vc-...)	For those attributes whose values are object identifiers, the value class is an OID that an implementation may find useful to group such OIDs into disjoint sets for purposes of validation, e.g., for purposes of determining whether this OID is a valid OID for the attribute. The corresponding object identifier values (id-val-xxx) also specify the same value-class.
values supported id (id-att-...)	Specifies the corresponding xxx-supported attribute, if any.
ready id (id-att-...)	Specifies the corresponding xxx-ready attribute, if any.
modifiable	Specifies whether the attribute may be modified by the ModifyJob operation or not. The following values are indicated: **true** Print may pass as an attribute (as opposed to a parameter) and ModifyJob can modify the attribute. **false** Print cannot pass as an attribute (as opposed to a parameter) and ModifyJob cannot modify the attribute. **false*** ModifyJob cannot modify the attribute, but Print can pass as an attribute. **n/a** Not applicable. NOTE - Some of the **false** entries are passed as explicit parameters of the Print operation, rather than as an attribute. For example, **printer-name-requested** is passed as the **printer-name** parameter. Also **transfer-method**, **document-content**, and **document-type** are passed as explicit parameters of the Print operation.

In the following tables, the OID name prefixes **id-att-**, **id-oc-**, and **id-vc-** are omitted to save space; the headings of the columns indicate these omitted OID name prefixes. In some cases, a table entry has a different OID name prefix than the one indicated at the top of the column; in such cases, the OID name prefix is indicated explicitly in the OID name in the table entry.

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The order of the attributes is the same as clause 9 and the ASN.1 in ANNEX C and F. The attribute values that are ObjectIdentifiers (the attribute has objectIdentifierSyntax or nameOrOidSyntax or cardinalOrNameOrOidSyntax) are listed under the first occurrence of the attribute that has those values.

Operation pseudo object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
id-att-priority	operation					n/a
id-att-privileges	operation					n/a
operation-locale	operation			locales-supported		n/a
default-delivery-addresses	operation					n/a

Generic object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
object-class	generic		id-oc	object-classes-supported		false
id-oc-generic			id-oc			
id-oc-job			id-oc			
id-oc-document			id-oc			
id-oc-printer			id-oc			
id-oc-server			id-oc			
id-oc-medium			id-oc			
id-oc-font			id-oc			
id-oc-resource			id-oc			
id-oc-transfer-method			id-oc			
id-oc-delivery-method			id-oc			
id-oc-auxiliary-sheet-package			id-oc			
id-oc-auxiliary-sheet			id-oc			
id-oc-finishing			id-oc			
id-oc-output			id-oc			
id-oc-imposition			id-oc			
id-oc-scheduler			id-oc			
id-oc-initial-value-job			id-oc			
id-oc-initial-value-document			id-oc			
id-oc-resource-context			id-oc			
descriptor	generic					False
descriptive-name	generic					False
state	generic		state			False
id-val-state-ready			state			
id-val-state-initializing			state			
id-val-state-on-request			state			

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id-val-state-unavailable			state			
id-val-state-busy			state			
id-val-state-terminating			state			
id-val-state-unknown			state			
message	generic					False
availability	generic		availability			False
id-val-availability-high			availability			
id-val-availability-normal			availability			
id-val-availability-low			availability			
id-val-generic-none			generic			
id-val-availability-unknown			availability			
list-of-managers	generic					False
notification-profile	job, printer, server					True
logging-profile	job, printer, server					True
associated-server	generic					

Job object attributes

From 9.2.1 Job-information attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-identifier	job	job				False
id-att-job-identifier-on-printer	job	job				False*
id-att-job-identifier-on-client	job	job				False*
job-client-id	job					True
job-name	job					True
job-originator	job					False*
job-owner	job					False*
job-comment	job					True
job-start-message	job					True
job-end-message	job					True
job-non-compulsory-attributes	job					True
initial-value-job	job	initial-value-job	initial-value-job	initial-value-jobs-supported		False*

From 9.2.2 Job-results-handling attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable

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results-profile	job					True
id-val-pick-up			delivery-method			
id-val-secure-pickup			delivery-method			
id-val-interoffice-mail			delivery-method			
id-val-postal-mail			delivery-method			
id-val-notification-service			delivery-method			
id-val-electronic-mail			delivery-method			
id-val-file			delivery-method			
id-val-with-job-result-set			delivery-method			
id-val-output-bin-top			printer-output-bin			
id-val-output-bin-middle			printer-output-bin			
id-val-output-bin-bottom			printer-output-bin			
id-val-output-bin-side			printer-output-bin			
id-val-output-bin-left			printer-output-bin			
id-val-output-bin-right			printer-output-bin			
id-val-output-bin-face-up			printer-output-bin			
id-val-output-bin-face-down			printer-output-bin			
id-val-output-bin-large			printer-output-bin			
id-val-output-bin-private			printer-output-bin			
id-val-output-bin-collator			printer-output-bin			
job-finishing	job	finishing	finishing	job-finishings-supported	job-finishings-ready	True
id-att-finishing-includes-job-sheets	job			finishing-includes-job-sheets-supported		True
id-att-job-sheets	job	auxiliary-sheet-package	aux-pkg	job-sheets-supported	job-sheets-ready	True
id-val-generic-none			generic			
id-val-aux-pkg-job-separators			aux-pkg			
id-val-aux-pkg-job-set-start			aux-pkg			
id-val-aux-pkg-job-set-end			aux-pkg			
id-val-aux-pkg-job-set-wrap			aux-pkg			
id-val-aux-pkg-job-start-copies-separate			aux-pkg			
id-val-aux-pkg-job-end-copies-separate			aux-pkg			
id-val-aux-pkg-job-set-wrap-copies-separate			aux-pkg			
id-val-aux-pkg-job-copy-start			aux-pkg			
id-val-aux-pkg-job-copy-end			aux-pkg			
id-val-aux-pkg-job-copy-wrap			aux-pkg			
id-att-document-sheets	job	auxiliary-sheet-package	aux-pkg	document-sheets-supported	document-sheets-ready	True
id-val-generic-none			generic			
id-val-aux-pkg-doc-separators			aux-pkg			
id-val-aux-pkg-doc-set-start			aux-pkg			
id-val-aux-pkg-doc-set-end			aux-pkg			
id-val-aux-pkg-doc-set-wrap			aux-pkg			
id-val-aux-pkg-doc-start-copies-separate			aux-pkg			
id-val-aux-pkg-doc-end-copies-separate			aux-pkg			
id-val-aux-pkg-doc-set-wrap-copies-separate			aux-pkg			

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id-val-aux-pkg-doc-copy-start	aux-pkg
id-val-aux-pkg-doc-copy-end	aux-pkg
id-val-aux-pkg-doc-copy-wrap	aux-pkg

From 9.2.3 Job-event-handling attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-abort-criteria	job					True
job-warning-criteria	job					True
document-abort-criteria	job					True

From 9.2.4 Job-scheduling-instruction attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-start-wait	job					True
job-end-wait	job					True
job-hold	job					True
job-password	job					True
job-print-after	job					True
job-priority	job					True
job-deadline-time	job					True
job-discard-time	job					True
job-retention-period	job					True
job-message-to-operator	job					True
job-scheduling	job		job-scheduling			True
id-val-job-scheduling-after-complete			job-scheduling			
id-val-job-scheduling-before-complete			job-scheduling			
id-val-job-scheduling-either			job-scheduling			
job-validate	job		job-validate	job-validates-supported		True
id-val-job-validate-and-print			job-validate			
id-val-job-validate-submit-only			job-validate			

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From 9.2.5 Printer-selection attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
printer-name-requested	job	printer		physical-printers-supported, logical-printers-supported	physical-printers-ready, logical-printers-supported	False
physical-printers-requested	job	printer		physical-printers-supported	physical-printers-ready	True
printer-locations-requested	job					True
printer-models-requested	job					True
printer-types-requested	job		printer-type			True
printer-speed-range-requested	job					True

From 9.2.6 Access-and-accounting attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
user-name	job					False*
accounting-information	job					False*

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From 9.2.7 Job-security-handling attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-security-confidentiality-level	job					False*
job-security-confidentiality-category	job					False*
job-security-confidentiality-policy	job		confidentiality-policy			False*
id-val-confidentiality-policy-b-and-l			confidentiality-policy			
job-security-integrity-level	job					False*
job-security-integrity-category	job					False*
job-security-integrity-policy	job		integrity-policy			False*
id-val-integrity-policy-biba			integrity-policy			
job-security-label	job		security-label			False*
id-val-security-label-sheet-top			security-label			
id-val-security-label-no-sheet-top			security-label			
id-val-security-label-sheet-bottom			security-label			
id-val-security-label-no-sheet-bottom			security-label			
id-val-security-label-job-start-sheet			security-label			
id-val-security-label-job-end-sheet			security-label			

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From 9.2.8 Job status attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
current-job-state	job		job-state	job-states-supported		False
id-val-job-state-unknown			job-state			
id-val-job-state-pre-processing			job-state			
id-val-job-state-held			job-state			
id-val-job-state-pending			job-state			
id-val-job-state-processing			job-state			
id-val-job-state-printing			job-state			
id-val-job-state-paused			job-state			
id-val-job-state-interrupted			job-state			
id-val-job-state-terminating			job-state			
id-val-job-state-retained			job-state			
id-val-job-state-completed			job-state			
job-state-reasons	job		reasons	job-state-reasons-supported		False
id-val-reasons-documents-needed			reasons			
id-val-reasons-job-hold-set			reasons			
id-val-reasons-job-print-after-specified			reasons			
id-val-reasons-required-resource-not-ready			reasons			
id-val-reasons-successful-completion			reasons			
id-val-reasons-completed-with-warnings			reasons			
id-val-reasons-completed-with-errors			reasons			
id-val-reasons-cancelled-by-user			reasons			
id-val-reasons-cancelled-by-operator			reasons			
id-val-reasons-aborted-by-system			reasons			
id-val-reasons-logfile-pending			reasons			
id-val-reasons-logfile-transferring			reasons			
previous-job-state	job		job-state	job-states-supported		False
printers-assigned	job					False
printer-state-of-printers-assigned	job		job-state	job-states-supported		
estimated-completion-time	job					False
submission-time	job					False
modification-time	job					False
started-printing-time	job					False
job-copies-completed	job					False
pages-completed	job					False
impressions-completed	job					False
media-sheets-completed	job					False
octets-completed	job					False
total-job-octets	job					False

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intervening-jobs	job					False
print-checkpoint	job					False
new-job-identifier	job					False
on-request-resources-required	job					False
job-message-from-administrator	job					False
last-job-events	job					False

id-val-event-class-aborted	event-class
id-val-event-class-error	event-class
id-val-event-class-warning	event-class
id-val-event-class-report	event-class
id-val-event-class-state-changed	event-class
id-val-event-job-aborted-by-server	event-aborted
id-val-event-job-cancelled-by-operator	event-aborted
id-val-event-job-cancelled-by-user	event-aborted
id-val-event-document-aborted-by-server	event-aborted
id-val-event-document-cancelled-by-operator	event-aborted
id-val-event-document-cancelled-by-user	event-aborted
id-val-event-error-past-deadline	event-error
id-val-event-error-past-discard-time	event-error
id-val-event-error-printer-shutdown	event-error
id-val-event-error-no-resource	event-error
id-val-event-error-unrecognized-resource	event-error
id-val-event-error-no-document	event-error
id-val-event-error-job-submission-not-complete	event-error
id-val-event-error-page-select	event-error
id-val-event-error-document-content	event-error
id-val-event-error-other	event-error
id-val-event-error-document-aborted	event-error
id-val-event-warning-resource-needs-attention	event-warning
id-val-event-warning-resource-needs-operator	event-warning
id-val-event-warning-printer-shutdown	event-warning
id-val-event-warning-job-modified	event-warning
id-val-event-warning-close-to-deadline	event-warning
id-val-event-warning-close-to-discard-time	event-warning
id-val-event-warning-criterion-exceeded	event-warning
id-val-event-warning-duplicate-attribute-ignored	event-warning
id-val-event-warning-attribute-ignored	event-warning
id-val-event-warning-job-paused	event-warning
id-val-event-warning-job-interrupted	event-warning
id-val-event-warning-other	event-warning
id-val-event-report-job-completed	event-report
id-val-event-report-checkpoint-taken	event-report
id-val-event-report-resource-message	event-report
id-val-event-report-job-discarded	event-report
id-val-event-report-file-transferred	event-report
id-val-event-report-job-promoted	event-report
id-val-event-report-job-resumed	event-report

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id-val-event-report-processing-started			event-report			
id-val-event-state-changed-job			event-state-changed			
id-val-event-state-changed-printer			event-state-changed			
id-val-event-state-changed-server			event-state-changed			
name-of-last-accessor	job					False
error-count	job					False
warning-count	job					False
processing-time	job					False
completion-time	job					False
number-of-documents	job					False
job-submission-complete	job					False
ignored-attributes	job					False

From 9.2.9 Job size attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-page-count	job					False
job-impression-count	job					False
job-media-sheet-count	job					False

Document object attribute

From 9.3.1 Document-information attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
document-name	document					True
document-file-name	document					True
document-authors	document					True
document-comment	document					True
document-revision-date	document					True

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From 9.3.2 Document production instructions:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
default-medium	document	medium	medium	media-supported	media-ready	True
default-input-tray	document		input-tray	input-trays-supported	input-trays-ready	True
id-val-input-tray-top			input-tray			
id-val-input-tray-middle			input-tray			
id-val-input-tray-bottom			input-tray			
id-val-input-tray-envelope			input-tray			
id-val-input-tray-manual			input-tray			
id-val-input-tray-large-capacity			input-tray			
id-val-input-tray-main			input-tray			
id-val-input-tray-side			input-tray			
default-font	document	font		fonts-supported	fonts-ready	True
default-resource	document	resource	resource	resources-supported	resources-ready	True
id-val-resource-...			resource			
default-character-set	document		code-set	character-sets-supported	character-sets-ready	True
id-val-code-set-ISO-UCS-2-level2			code-set			
id-val-code-set-other			code-set			
id-val-code-set-ASCII			code-set			
id-val-code-set-ISO-Latin1			code-set			
id-val-code-set-ISO-Latin2			code-set			
id-val-code-set-ISO-Latin3			code-set			
id-val-code-set-ISO-Latin4			code-set			
id-val-code-set-ISO-Latin-Cyrillic			code-set			
id-val-code-set-ISO-Latin-Arabic			code-set			
id-val-code-set-ISO-Latin-Greek			code-set			
id-val-code-set-ISO-Latin-Hebrew			code-set			
id-val-code-set-ISO-Latin5			code-set			
id-val-code-set-ISO-Latin6			code-set			
id-val-code-set-ISO-Text-Communication			code-set			
id-val-code-set-Half-Width-Katakana			code-set			
id-val-code-set-JIS-Encoding			code-set			
id-val-code-set-Shift-JIS			code-set			
id-val-code-set-EUC-Packed-Format-Japanese			code-set			
id-val-code-set-EUC-Fixed-Width-Japanese			code-set			
id-val-code-set-ISO-reg4-United-Kingdom			code-set			
id-val-code-set-ISO-reg11-Swedish-for-Names			code-set			
id-val-code-set-ISO-reg15-Italian			code-set			
id-val-code-set-ISO-reg17-Spanish			code-set			
id-val-code-set-ISO-reg21-German			code-set			
id-val-code-set-ISO-reg60-Danish-Norwegian			code-set			
id-val-code-set-ISO-reg69-French			code-set			
id-val-code-set-Unicode			code-set			
id-val-code-set-UCS4			code-set			

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id-val-code-set-Unicode-ASCII			code-set			
id-val-code-set-Unicode-Latin1			code-set			
id-val-code-set-Unicode-IBM-2039			code-set			
id-val-code-set-Unicode-IBM-1261			code-set			
id-val-code-set-Unicode-IBM-1268			code-set			
id-val-code-set-Unicode-IBM-1276			code-set			
id-val-code-set-Unicode-IBM-1264			code-set			
id-val-code-set-Unicode-IBM-1265			code-set			
id-val-code-set-Windows30-Latin1			code-set			
id-val-code-set-Windows31-Latin1			code-set			
id-val-code-set-Windows31-Latin2			code-set			
id-val-code-set-Windows31-Latin5			code-set			
id-val-code-set-HP-Roman8			code-set			
id-val-code-set-Adobe-Standard-Encoding			code-set			
id-val-code-set-Ventura-US			code-set			
id-val-code-set-Ventura-International			code-set			
id-val-code-set-DEC-MCS			code-set			
id-val-code-set-PC-page-850-Multilingual			code-set			
id-val-code-set-PC-page-852-Latin2			code-set			
id-val-code-set-PC8-page-437-US			code-set			
id-val-code-set-PC8-Danish-Norwegian			code-set			
id-val-code-set-PC-page-862-Latin-Hebrew			code-set			
id-val-code-set-PC8-Turkish			code-set			
id-val-code-set-IBM-Symbols			code-set			
id-val-code-set-IBM-Thai			code-set			
id-val-code-set-HP-Legal			code-set			
id-val-code-set-HP-PiFont			code-set			
id-val-code-set-HP-Math8			code-set			
id-val-code-set-HP-PS-Math			code-set			
id-val-code-set-HP-Desktop			code-set			
id-val-code-set-Ventura-Math			code-set			
id-val-code-set-Microsoft-Publishing			code-set			
id-val-code-set-Windows31J			code-set			
id-val-code-set-GB-2312			code-set			
id-val-code-set-Big5			code-set			
default-character-repertoire	document		character-repertoire	character-repertoires-supported	character-repertoires-ready	True
none defined by ISO/IEC 10175			character-repertoire			
default-character-mapping			character-mapping	character-mappings-supported	character-mappings-ready	True
none defined by ISO/IEC 10175			character-mapping			
default-printer-resolution	document		printer-resolution	printer-resolutions-supported		True
id-val-printer-resolution-lowest			printer-resolution			
id-val-printer-resolution-medium			printer-resolution			
id-val-printer-resolution-highest			printer-resolution			

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medium-substitution	document			media-supported	media-ready	True
input-tray-select	document		input-tray	input-trays-supported	input-trays-ready	True
font-substitution	document					True
resource-context	document					True
finishing	document	finishing	finishing	finishings-supported	finishings-ready	True
finishing-includes-document-sheets	document			finishing-includes-doc-sheets-supported		True
output	document	output	output	outputs-supported	outputs-ready	True
id-val-output-page-collate						
id-val-output-no-page-collate						
id-val-output-decollate						
id-val-output-no-decollate						
id-val-output-burst						
id-val-output-no-burst						
id-val-output-stacking-default						
number-up	document	imposition	imposition	impositions-supported	impositions-ready	True
id-val-generic-none			generic			
id-val-imposition-simple-1-up			imposition			
id-val-imposition-simple-2-up			imposition			
id-val-imposition-simple-4-up			imposition			
plex	document		plex	plexes-supported		True
id-val-plex-simplex			plex			
id-val-plex-duplex			plex			
id-val-plex-tumble			plex			
binding-edge	document			binding-edges-supported		True
binding-edge-image-shift	document			binding-edge-image-shift-max-supported		True
x-image-shift	document			x-image-shift-range-supported		True
y-image-shift	document			y-image-shift-range-supported		True
print-quality	document		print-quality	print-qualities-supported	print-qualities-ready	True
id-val-print-quality-draft			print-quality			
id-val-print-quality-normal			print-quality			
id-val-print-quality-high			print-quality			
medium-fidelity	document		medium-fidelity	medium-fidelities-supported		True
id-val-medium-fidelity-size			medium-fidelity			
id-val-medium-fidelity-colour			medium-fidelity			
id-val-medium-fidelity-tooth			medium-fidelity			
id-val-medium-fidelity-grain			medium-fidelity			

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id-val-medium-fidelity-weight			medium-fidelity			
id-val-medium-fidelity-ara			medium-fidelity			
sides	document			sides-supported	sides-ready	True
page-select	document					True
page-media-select	document					True
copy-count	document					True
reset-printer	document					True
initial-value-document	document	initial-value-document	initial-value-document	initial-value-documents-supported		True

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From 9.3.3 Document-description attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
document-type	document		document-type			True
id-val-document-type-printable			document-type			
id-val-document-type-font			document-type			
id-val-document-type-resource			document-type			
transfer-method	document	transfer-method	transfer-method	transfer-methods-supported		False*
id-val-transfer-method-with-request			transfer-method			
id-val-transfer-method-referenced-data-transfer			transfer-method			
id-val-transfer-method-ftam-by-client			transfer-method			
id-val-transfer-method-ftam-by-server			transfer-method			
document-format	document		document-format	document-formats-supported, document-format-variants-supported		True
id-val-document-format-other			document-format			
id-val-document-format-unknown			document-format			
id-val-document-format-PCL			document-format			
id-val-document-format-HPGL			document-format			
id-val-document-format-PJL			document-format			
id-val-document-format-PostScript			document-format			
id-val-document-format-IPDS			document-format			
id-val-document-format-PPDS			document-format			
id-val-document-format-EscapeP			document-format			
id-val-document-format-Epson			document-format			
id-val-document-format-DDIF			document-format			
id-val-document-format-Interpress			document-format			
id-val-document-format-ISO6429			document-format			
id-val-document-format-line-data			document-format			
id-val-document-format-MODCA			document-format			
id-val-document-format-ReGIS			document-format			
id-val-document-format-SCS			document-format			
id-val-document-format-SPDL			document-format			
id-val-document-format-Tek4014			document-format			
id-val-document-format-PDS			document-format			
id-val-document-format-IGP			document-format			
id-val-document-format-CodeV			document-format			
id-val-document-format-DSC-DSE			document-format			
id-val-document-format-WPS			document-format			
id-val-document-format-LN03			document-format			
id-val-document-format-CCITT			document-format			
id-val-document-format-QUIC			document-format			
id-val-document-format-CPAP			document-format			

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id-val-document-format-DEC-PPL			document-format			
id-val-document-format-simple-text			document-format			
id-val-document-format-NPAP			document-format			
id-val-document-format-DOC			document-format			
id-val-document-format-imPRESS			document-format			
id-val-document-format-Pinwriter			document-format			
id-val-document-format-NPDL			document-format			
id-val-document-format-201PL			document-format			
id-val-document-format-automatic			document-format			
id-val-document-format-PAGES			document-format			
id-val-document-format-LIPS			document-format			
id-val-document-format-TIFF			document-format			
id-val-document-format-Diagnostic			document-format			
id-val-document-format-PSPrinter						
id-val-document-format-CaPSL						
id-val-document-format-EXCL						
id-val-document-format-LCDS						
id-val-document-format-XES						
document-content	document					False*
non-compulsory-attributes	document					True

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From 9.3.4 Document-characteristic attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
assured-reproduction-area	document			medium-source-sizes-supported	medium-source-sizes-ready	True
intended-page-size	document		page-size	medium-source-sizes-supported	medium-source-sizes-ready	True
content-orientation	document		content-orientation	orientations-supported		True
content-orientation-portrait			content-orientation			
content-orientation-landscape			content-orientation			
content-orientation-reverse-portrait			content-orientation			
content-orientation-reverse-landscape			content-orientation			
presentation-direction	document			presentation-directions-supported		True
page-order-received	document			page-orders-supported		True
page-independent	document					True
media-used	document	medium	medium	media-supported	media-ready	True
assured-reproduction-areas-used	document					True
input-trays-used	document		input-tray	input-trays-supported	input-trays-ready	True
fonts-used	document	font		fonts-supported	fonts-used	True
resources-used	document	resource	resource	resources-supported	resources-ready	True
character-sets-used	document		code-set	character-sets-supported	character-sets-ready	True
character-repertoires-used	document		character-repertoire	character-repertoires-supported	character-repertoires-ready	True
character-mappings-used	document		character-mapping	character-mappings-supported	character-mappings-ready	True
printer-resolutions-used	document		printer-resolution	printer-resolutions-supported		True
content-orientations-used	document		content-orientation	content-orientations-supported		True
presentation-directions-used	document			presentation-directions-supported		True

From 9.3.4.16. System-hints:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable

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octet-count	document					True
page-count	document					True
glyph-count	document					True
font-count	document					True
font-change-count	document					True
maximum-fonts-per-page	document					True
percent-graphics	document					True
percent-images	document					True

From 9.3.5 Document-status:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
document-sequence-number	document					False
document-state	document		document-state	document-states-supported		False
id-val-document-state-transfer-pending			document-state			
id-val-document-state-pending			document-state			
id-val-document-state-processing			document-state			
id-val-document-state-printing			document-state			
id-val-document-state-completed			document-state			
copies-completed	document					False
file-reference	document					False
current-page-order	document					False

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From ANNEX F document-format-specific document-production-instruction (DPI) attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
new-line-option	document		nl-option	new-line-options-supported		True
id-val-nl-option-cr-and-lf			nl-option			
id-val-nl-option-lf			nl-option			
id-val-nl-option-cr			nl-option			
id-val-nl-option-cr-or-lf			nl-option			
id-val-nl-option-counted-4-octet-aligned			nl-option			
id-val-nl-option-unknown			nl-option			
carriage-control-type	document		cc-type	carriage-control-types-supported		True
id-val-generic-none			generic			
id-val-cc-type-ansi-ascii			cc-type			
id-val-cc-type-ansi-ebcdic			cc-type			
id-val-cc-type-machine			cc-type			
table-reference-characters	document			table-reference-characters-supported		True
shift-out-shift-in	document		shift-out-shift-in	shift-out-shift-in-supported		True
id-val-generic-none			generic			
id-val-shift-out-shift-in-one			shift-out-shift-in			
id-val-shift-out-shift-in-two			shift-out-shift-in			
id-val-shift-out-shift-in-three			shift-out-shift-in			
new-line-options-supported	document		nl-option			False
carriage-control-types-supported	document		cc-type			False
table-reference-characters-supported	document					False
shift-out-shift-in-supported	document		shift-out-shift-in			False

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From ANNEX F Palladium extension document-production-instructions for simple-text attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
size-unit-type	document		size-unit			True
id-val-size-unit-character			size-unit			
id-val-size-unit-millimeter			size-unit			
id-val-size-unit-computer-decipoint			size-unit			
id-val-size-unit-decididot			size-unit			
id-val-size-unit-mil			size-unit			
id-val-size-unit-basic-measuring-unit			size-unit			
id-val-size-unit-micrometer			size-unit			
id-val-size-unit-pixel			size-unit			
id-val-size-unit-decipoint			size-unit			
id-val-size-unit-TWIPS			size-unit			
width	document					True
length	document					True
left-margin	document					True
right-margin	document					True
top-margin	document					True
bottom-margin	document					True
repeated-tab-stops	document					True
explicit-tab-stops	document					True
header-text	document					True
footer-text	document					True
number-pages	document					True

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Printer object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
printer-name	printer	printer				False
printer-name-aliases	printer	printer				False
printer-locations	printer					False
printer-model	printer					False
printer-types	printer		printer-type			False
id-val-printer-type-other			printer-type			
id-val-printer-type-unknown			printer-type			
id-val-printer-type-electrophotographic-LED			printer-type			
id-val-printer-type-electrophotographic-laser			printer-type			
id-val-printer-type-electrophotographic-other			printer-type			
id-val-printer-type-impact-moving-head-dot-matrix-9-pin			printer-type			
id-val-printer-type-impact-moving-head-dot-matrix-24-pin			printer-type			
id-val-printer-type-impact-moving-head-dot-matrix-other			printer-type			
id-val-printer-type-impact-moving-head-fully-formed			printer-type			
id-val-printer-type-impact-band			printer-type			
id-val-printer-type-impact-other			printer-type			
id-val-printer-type-inkjet-aqueous			printer-type			
id-val-printer-type-inkjet-solid			printer-type			
id-val-printer-type-inkjet-other			printer-type			
id-val-printer-type-pen			printer-type			
id-val-printer-type-thermal-transfer			printer-type			
id-val-printer-type-thermal-sensitive			printer-type			
id-val-printer-type-thermal-diffusion			printer-type			
id-val-printer-type-thermal-other			printer-type			
id-val-printer-type-electro-erosion			printer-type			
id-val-printer-type-electro-static			printer-type			
id-val-printer-type-photographic-microfiche			printer-type			
id-val-printer-type-photographic-imagesetter			printer-type			
id-val-printer-type-photographic-other			printer-type			
id-val-printer-type-ion-deposition			printer-type			
id-val-printer-type-E-beam			printer-type			
id-val-printer-type-typesetter			printer-type			
printer-realization	printer		printer-realization			False
maximum-printer-speed	printer					False
printer-resolutions-supported	printer					False

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printer-state	printer		printer-state	printer-states-supported		False
id-val-printer-state-unknown			printer-state			
id-val-printer-state-idle			printer-state			
id-val-printer-state-printing			printer-state			
id-val-printer-state-needs-attention			printer-state			
id-val-printer-state-paused			printer-state			
id-val-printer-state-shutdown			printer-state			
id-val-printer-state-job-start-wait			printer-state			
id-val-printer-state-job-end-wait			printer-state			
id-val-printer-state-job-password-wait			printer-state			
id-val-printer-state-needs-key-operator			printer-state			
id-val-printer-state-connecting-to-printer			printer-state			
id-val-printer-state-timed-out			printer-state			
printer-associated-printers	printer	printer				False
printers-ready	printer	printer				False
printer-initial-value-job	printer	initial-value-job	initial-value-job	initial-value-jobs-supported		False
printer-initial-value-document	printer	initial-value-document	initial-value-document	initial-value-documents-supported		False
media-supported	printer	medium	medium			False
media-ready	printer	medium	medium			False
medium-source-sizes-supported	printer					False
medium-source-sizes-ready	printer					False
medium-fidelities-supported	printer		medium-fidelities			False
fonts-supported	printer	font				False
fonts-ready	printer	font				False
resources-supported	printer	resource				False
resources-ready	printer	resource				False
printer-resource-context	printer					False
job-finishings-supported	printer	finishing	finishing			False
job-finishings-ready	printer	finishing	finishing			False
finishing-includes-job-sheets-supported	printer					False
finishings-supported	printer	finishing	finishing			False
finishings-ready	printer	finishing	finishing			False
finishing-includes-doc-sheets-supported	printer					False
outputs-supported	printer	output	output			False
outputs-ready	printer	output	output			False
input-trays-supported	printer					False
input-trays-ready	printer					False
input-trays-medium	printer					False

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output-bins-supported	printer		printer-output-bin			False
output-bins-ready	printer		printer-output-bin			False
output-bins-characteristics	printer					False
print-qualities-supported	printer		print-quality			False
print-qualities-ready	printer		print-quality			False
job-sheets-supported	printer	auxiliary-sheet-package	aux-pkg			False
job-sheets-ready	printer	auxiliary-sheet-package	aux-pkg			False
document-sheets-supported	printer	auxiliary-sheet-package	aux-pkg			False
document-sheets-ready	printer	auxiliary-sheet-package	aux-pkg			False
character-sets-supported	printer		code-set			False
character-sets-ready	printer		code-set			False
character-repertoires-supported	printer		character-repertoire			False
character-repertoires-ready	printer		character-repertoire			False
character-mappings-supported	printer		character-mapping			False
character-mappings-ready	printer		character-mapping			False
start-message-supported	printer					False
end-message-supported	printer					False
sides-supported	printer					False
sides-ready	printer					False
page-select-supported	printer					False
maximum-copies-supported	printer					False
document-formats-supported	printer		document-format			False
document-formats-ready	printer		document-format			False
native-document-formats-ready	printer		document-format			False
document-format-variants-supported	printer					False
content-orientations-supported	printer		content-orientation			False

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presentation-directions-supported	printer					False
sheet-count	printer					False
printer-needs-attention-time	printer					False
printer-needs-key-operator-attention-time	printer					False
printer-confidentiality-level-range	printer					False
printer-confidentiality-category-sets	printer					False
printer-confidentiality-policy	printer		confidentiality-policy			False
printer-integrity-level-range	printer					False
printer-integrity-category-sets	printer					False
printer-integrity-policy	printer		integrity-policy			False
printer-security-label-policy	printer		security-label			False
plexes-supported	printer		plex			False
numbers-up-supported	printer	imposition				False
binding-edges-supported	printer					False
binding-edge-image-shift-max-supported	printer					False
x-image-shift-range-supported	printer					False
y-image-shift-range-supported	printer					False
schedulers-supported	printer	scheduler	scheduler			False
scheduler-ready	printer	scheduler	scheduler			False
job-size-range-supported	printer					False
job-size-range-ready	printer					False
printer-timeout-period	printer					False
job-abort-criteria-supported	printer					False
job-warning-criteria-supported	printer					False
document-abort-criteria-supported	printer					False
checkpoint-formats-supported	printer		checkpoint-formats			False
id-val-checkpoint-format-no-context-info			checkpoint-formats			
initial-value-jobs-supported	printer	initial-value-job	initial-value-job			False

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initial-value-documents-supported	printer	initial-value-document	initial-value-document			False

The following printer attributes are also server object attributes:

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
job-attributes-supported	printer, server					False
document-attributes-supported	printer, server					False
multiple-documents-supported	printer, server					False
cancel-individual-document-supported	printer, server					False
translators-supported	printer, server					False
translators-ready	printer, server					False
job-result-set-delivery-methods-supported	printer, server	delivery-method	delivery-method			False
job-result-set-delivery-methods-ready	printer, server	delivery-method	delivery-method			False
notification-delivery-methods-supported	printer, server	delivery-method	delivery-method			False
notification-delivery-methods-ready	printer, server	delivery-method	delivery-method			False
log-delivery-methods-supported	printer, server	delivery-method	delivery-method			False
log-delivery-methods-ready	printer, server	delivery-method	delivery-method			False
are-foreign-jobs-visible	printer, server					False
enabled	printer, server					False

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Server object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
server-name	server	server				False
server-name-aliases	server	server				False
server-address	server					False
server-state	server		state			False
object-classes-supported	server		id-oc			False
physical-printers-supported	server					False
physical-printers-ready	server					False
logical-printers-supported	server					False
logical-printers-ready	server					False
job-validates-supported	server		job-validate			False
events-supported	server					False
modify-individual-document-supported	printer					False
transfer-methods-supported	server	transfer-method	transfer-method			False
extended-problems-supported	server					False
conformance-levels-supported	server		conformance-level			False
id-val-conformance-level-1			conformance-level			
id-val-conformance-level-1m			conformance-level			
id-val-conformance-level-2			conformance-level			
id-val-conformance-level-2m			conformance-level			
server-resource-context	server					False
job-states-supported	server		job-state			False
job-state-reasons-supported	server		reasons			False
document-states-supported	server		document-state			False
printer-states-supported	server		printer-state			False
default-dist-name-syntax	server		dist-name-syntax			False
id-val-dn-syntax-automatic			dist-name-syntax			
id-val-dn-syntax-x-500			dist-name-syntax			
id-val-dn-syntax-xfn			dist-name-syntax			
id-val-dn-syntax-dce			dist-name-syntax			
id-val-dn-syntax-cds			dist-name-syntax			

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id-val-dn-syntax-nis			dist-name-syntax			
id-val-dn-syntax-dns			dist-name-syntax			
id-val-dn-syntax-dec-ns			dist-name-syntax			
id-val-dn-syntax-internet-mail			dist-name-syntax			
id-val-dn-syntax-xns			dist-name-syntax			
id-val-dn-syntax-bindery			dist-name-syntax			
id-val-dn-syntax-nds			dist-name-syntax			
id-val-dn-syntax-url			dist-name-syntax			
id-val-dn-syntax-posix			dist-name-syntax			
id-val-dn-syntax-unix			dist-name-syntax			
id-val-dn-syntax-os2			dist-name-syntax			
id-val-dn-syntax-pc-dos			dist-name-syntax			
id-val-dn-syntax-nt			dist-name-syntax			
id-val-dn-syntax-mvs			dist-name-syntax			
id-val-dn-syntax-vm			dist-name-syntax			
id-val-dn-syntax-os400			dist-name-syntax			
id-val-dn-syntax-vms			dist-name-syntax			
id-val-dn-syntax-unc			dist-name-syntax			
id-val-dn-syntax-netware			dist-name-syntax			
dist-name-syntaxes-supported	server		dist-name-syntax			False
locale	server			locales-supported		False
locales-supported	server					False

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Medium object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
medium-identifier	medium	medium	medium			False
id-val-medium-default			medium			
id-val-medium-iso-a4-white			medium			
id-val-medium-iso-a4-coloured			medium			
id-val-medium-iso-a4-transparent			medium			
id-val-medium-iso-a3-white			medium			
id-val-medium-iso-a3-coloured			medium			
id-val-medium-iso-a5-white			medium			
id-val-medium-iso-a5-coloured			medium			
id-val-medium-iso-b4-white			medium			
id-val-medium-iso-b4-coloured			medium			
id-val-medium-iso-b5-white			medium			
id-val-medium-iso-b5-coloured			medium			
id-val-medium-jis-b4-white			medium			
id-val-medium-jis-b4-coloured			medium			
id-val-medium-jis-b5-white			medium			
id-val-medium-jis-b5-coloured			medium			
id-val-medium-na-letter-white			medium			
id-val-medium-na-letter-coloured			medium			
id-val-medium-na-letter-transparent			medium			
id-val-medium-na-legal-white			medium			
id-val-medium-na-legal-coloured			medium			
id-val-medium-iso-b4-envelope			medium			
id-val-medium-iso-b5-envelope			medium			
id-val-medium-iso-c3-envelope			medium			
id-val-medium-iso-c4-envelope			medium			
id-val-medium-iso-c5-envelope			medium			
id-val-medium-iso-c6-envelope			medium			
id-val-medium-iso-designated-long-envelope			medium			
id-val-medium-na-10x13-envelope			medium			
id-val-medium-na-9x12-envelope			medium			
id-val-medium-monarch-envelope			medium			
id-val-medium-na-number-10-envelope			medium			
id-val-medium-na-7x9-envelope			medium			
id-val-medium-na-9x11-envelope			medium			
id-val-medium-na-10x14-envelope			medium			
id-val-medium-na-number-9-envelope			medium			
id-val-medium-na-6x9-envelope			medium			
id-val-medium-na-10x15-envelope			medium			
id-val-medium-executive-white						
id-val-medium-folio-white						
id-val-medium-invoice-white						
id-val-medium-ledger-white						

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id-val-medium-quarto-white						
id-val-medium-iso-a0-white			medium			
id-val-medium-iso-a1-white			medium			
id-val-medium-iso-a2-white			medium			
id-val-medium-iso-a6-white			medium			
id-val-medium-iso-a7-white			medium			
id-val-medium-iso-a8-white			medium			
id-val-medium-iso-a9-white			medium			
id-val-medium-iso-a10-white			medium			
id-val-medium-iso-b0-white			medium			
id-val-medium-iso-b1-white			medium			
id-val-medium-iso-b2-white			medium			
id-val-medium-iso-b3-white			medium			
id-val-medium-iso-b6-white			medium			
id-val-medium-iso-b7-white			medium			
id-val-medium-iso-b8-white			medium			
id-val-medium-iso-b9-white			medium			
id-val-medium-iso-b10-white			medium			
id-val-medium-jis-b0-white			medium			
id-val-medium-jis-b1-white			medium			
id-val-medium-jis-b2-white			medium			
id-val-medium-jis-b3-white			medium			
id-val-medium-jis-b6-white			medium			
id-val-medium-jis-b7-white			medium			
id-val-medium-jis-b8-white			medium			
id-val-medium-jis-b9-white			medium			
id-val-medium-jis-b10-white			medium			
id-val-medium-a			medium			
id-val-medium-b			medium			
id-val-medium-c			medium			
id-val-medium-d			medium			
id-val-medium-e			medium			
medium-associated-media	medium	medium	medium			False
medium-realization	medium					False
medium-type	medium		medium-type			False
id-val-medium-type-stationery			medium-type			
id-val-medium-type-transparency			medium-type			
id-val-medium-type-envelope			medium-type			
id-val-medium-type-envelope-plain			medium-type			
id-val-medium-type-envelope-window			medium-type			
id-val-medium-type-continuous-long			medium-type			
id-val-medium-type-continuous-short			medium-type			
id-val-medium-type-tab-stock			medium-type			
id-val-medium-type-multi-part-form			medium-type			
id-val-medium-type-labels			medium-type			
id-val-medium-type-multi-layer			medium-type			
medium-size	medium		medium-size			False
id-val-medium-size-iso-a0			medium-size			

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id-val-medium-size-iso-a1	medium-size
id-val-medium-size-iso-a2	medium-size
id-val-medium-size-iso-a3	medium-size
id-val-medium-size-iso-a4	medium-size
id-val-medium-size-iso-a5	medium-size
id-val-medium-size-iso-a6	medium-size
id-val-medium-size-iso-a7	medium-size
id-val-medium-size-iso-a8	medium-size
id-val-medium-size-iso-a9	medium-size
id-val-medium-size-iso-a10	medium-size
id-val-medium-size-iso-b0	medium-size
id-val-medium-size-iso-b1	medium-size
id-val-medium-size-iso-b2	medium-size
id-val-medium-size-iso-b3	medium-size
id-val-medium-size-iso-b4	medium-size
id-val-medium-size-iso-b5	medium-size
id-val-medium-size-iso-b6	medium-size
id-val-medium-size-iso-b7	medium-size
id-val-medium-size-iso-b8	medium-size
id-val-medium-size-iso-b9	medium-size
id-val-medium-size-iso-b10	medium-size
id-val-medium-size-na-letter	medium-size
id-val-medium-size-na-legal	medium-size
id-val-medium-size-executive-white	
id-val-medium-size-folio-white	
id-val-medium-size-invoice-white	
id-val-medium-size-ledger-white	
id-val-medium-size-quarto-white	
id-val-medium-size-iso-c3	medium-size
id-val-medium-size-iso-c4	medium-size
id-val-medium-size-iso-c5	medium-size
id-val-medium-size-iso-c6	medium-size
id-val-medium-size-iso-designated-long	medium-size
id-val-medium-size-na-10x13-envelope	medium-size
id-val-medium-size-na-9x12-envelope	medium-size
id-val-medium-size-na-number-10-envelope	medium-size
id-val-medium-size-na-7x9-envelope	medium-size
id-val-medium-size-na-9x11-envelope	medium-size
id-val-medium-size-na-10x14-envelope	medium-size
id-val-medium-size-na-number-9-envelope	medium-size
id-val-medium-size-na-6x9-envelope	medium-size
id-val-medium-size-na-10x15-envelope	medium-size
id-val-medium-size-monarch-envelope	medium-size
id-val-medium-size-a	medium-size
id-val-medium-size-b	medium-size
id-val-medium-size-c	medium-size
id-val-medium-size-d	medium-size
id-val-medium-size-e	medium-size
id-val-medium-size-jis-b0	medium-size

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id-val-medium-size-jis-b1			medium-size			
id-val-medium-size-jis-b2			medium-size			
id-val-medium-size-jis-b3			medium-size			
id-val-medium-size-jis-b4			medium-size			
id-val-medium-size-jis-b5			medium-size			
id-val-medium-size-jis-b6			medium-size			
id-val-medium-size-jis-b7			medium-size			
id-val-medium-size-jis-b8			medium-size			
id-val-medium-size-jis-b9			medium-size			
id-val-medium-size-jis-b10			medium-size			
medium-dimensions	medium					False
medium-colour	medium		medium-colour			False
id-val-medium-colour-white			medium-colour			
id-val-medium-colour-pink			medium-colour			
id-val-medium-colour-yellow			medium-colour			
id-val-medium-colour-buff			medium-colour			
id-val-medium-colour-goldenrod			medium-colour			
id-val-medium-colour-blue			medium-colour			
id-val-medium-colour-green			medium-colour			
id-val-medium-colour-transparent-untinted			medium-colour			
medium-tooth	medium		medium-tooth			False
id-val-medium-tooth-fine			medium-tooth			
id-val-medium-tooth-coarse			medium-tooth			
medium-grain	medium		medium-grain			False
id-val-medium-grain-long			medium-grain			
id-val-medium-grain-short			medium-grain			
medium-sides	medium					False
medium-weight	medium					False
medium-assured-reproduction-area	medium					False
medium-form-parts	medium					False
medium-holes-count	medium					False
medium-holes-edge	medium					False
medium-holes-axis-offset	medium					False
medium-holes-locations	medium					False
medium-holes-diameter	medium					False

Font object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
font-identifier	font	font	font			False

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Resource object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
resource-name	resource	resource	resource			False
resource-type	resource		resource			False
id-val-resource-type-overlay			resource			

Transfer-method object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
transfer-method-identifier	transfer-method	transfer-method	transfer-method			False
id-val-transfer-method-with-request			transfer-method			
id-val-transfer-method-referenced-data-transfer			transfer-method			
id-val-transfer-method-ftam-by-client			transfer-method			
id-val-transfer-method-ftam-by-server			transfer-method			
transfer-method-type	transfer-method					False
id-val-transfer-method-type-push			transfer-method-type			
id-val-transfer-method-type-pull			transfer-method-type			
id-val-transfer-method-type-immediate			transfer-method-type			
document-reference-type	transfer-method		document-ref-type			False
id-val-document-ref-type-immediate			document-ref-type			
id-val-document-ref-type-dor			document-ref-type			

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Delivery-method object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
delivery-method-identifier	delivery-method	delivery-method	delivery-method			False
id-val-delivery-method-pick-up			delivery-method			
id-val-delivery-method-secure-pickup			delivery-method			
id-val-delivery-method-interoffice-mail			delivery-method			
id-val-delivery-method-postal-mail			delivery-method			
id-val-delivery-method-printed-matter-mail			delivery-method			
id-val-delivery-method-bulk-mail			delivery-method			
id-val-delivery-method-express-mail			delivery-method			
id-val-delivery-method-budget-express-mail			delivery-method			
id-val-delivery-method-with-job-result-set			delivery-method			
id-val-delivery-method-doc-file			delivery-method			
id-val-delivery-method-job-file			delivery-method			
id-val-delivery-method-electronic-mail			delivery-method			
id-val-delivery-method-file			delivery-method			
id-val-delivery-method-file-add-to			delivery-method			
id-val-delivery-method-notification-service			delivery-method			
id-val-generic-none			delivery-method			

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Auxiliary-sheet-package object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
auxiliary-sheet-package-identifier	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
separator-sheet-of-set	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
start-sheet-of-set	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
end-sheet-of-set	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
separator-sheet-of-copy	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
start-sheet-of-copy	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False
end-sheet-of-copy	auxiliary-sheet-package	auxiliary-sheet-package	aux-pkg			False

Auxiliary-sheet object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
auxiliary-sheet-identifier	auxiliary-sheet	auxiliary-sheet	aux-sheet			False
auxiliary-sheet-medium	auxiliary-sheet	medium	medium			False

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Finishing object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
finishing-identifier	finishing	finishing	finishing			False
id-val-finishing-staple			finishing			
id-val-finishing-staple-top-left			finishing			
id-val-finishing-staple-bottom-left			finishing			
id-val-finishing-staple-top-right			finishing			
id-val-finishing-staple-bottom-right			finishing			
id-val-finishing-saddle-stitch			finishing			
id-val-finishing-edge-stitch			finishing			
id-val-finishing-punch			finishing			
id-val-finishing-cover			finishing			
id-val-finishing-bind			finishing			
id-val-generic-none			generic			
id-val-stitching-default			stitching			
id-val-stitching-staple			stitching			
id-val-stitching-staple-top-left			stitching			
id-val-stitching-staple-bottom-left			stitching			
id-val-stitching-staple-top-right			stitching			
id-val-stitching-staple-bottom-right			stitching			
id-val-stitching-saddle-stitch			stitching			
id-val-stitching-edge-stitch			stitching			
id-val-stitching-edge-stitch-right			stitching			
id-val-stitching-edge-stitch-left			stitching			
id-val-stitching-edge-stitch-top			stitching			
id-val-stitching-type-default			stitching-type			
id-val-stitching-type-staple			stitching-type			
id-val-stitching-type-edge-stitch			stitching-type			
id-val-stitching-type-saddle-stitch			stitching-type			
id-val-binding-default			binding			
id-val-binding-type-default			binding-type			
id-val-binding-type-tape			binding-type			
id-val-binding-type-plastic			binding-type			
id-val-binding-type-velo			binding-type			
id-val-binding-type-perfect			binding-type			
id-val-binding-type-spiral			binding-type			
id-val-binding-colour-default			binding-colour			
id-val-binding-colour-black			binding-colour			
id-val-binding-colour-blue			binding-colour			
id-val-binding-colour-gray			binding-colour			
id-val-binding-colour-brown			binding-colour			
id-val-perforation-default			perforation-default			
id-val-perforation-type-default			perforation-type			
id-val-trimming-default			trimming			
id-val-punching-default			punching			

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id-val-perforation-default			perforation			
id-val-perforation-type-default			perforation-type			
id-val-slitting-default			slitting			
id-val-covers-default			covers			
id-val-cover-name-default			cover-name			
id-val-folding-default			folding			
finishing-associated-finishings	finishing	finishing				False
finishing-realization	finishing					False
finishing-specification						False

Output object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
output-identifier	output	output	output			False
id-val-output-page-collate			output			
id-val-output-no-page-collate			output			
id-val-output-decollate			output			
id-val-output-no-decollate			output			
id-val-output-burst			output			
id-val-output-no-burst			output			
id-val-output-stacking-default			output			

Imposition object attributes

Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
imposition-identifier	imposition	imposition	imposition			False
imposition-n-up	imposition					False
logical-page-origin	imposition		logical-page-origin			False
id-val-logical-page-origin-lower-left			logical-page-origin			
id-val-logical-page-origin-lower-right			logical-page-origin			
id-val-logical-page-origin-upper-right			logical-page-origin			
id-val-logical-page-origin-upper-left			logical-page-origin			
logical-page-x-offset	imposition					False
logical-page-y-offset	imposition					False
logical-page-scaling	imposition					False

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Scheduler object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
scheduler-identifier	scheduler	scheduler	scheduler			False
id-val-scheduler-fifo			scheduler			
id-val-scheduler-shortest-job-first			scheduler			

Initial-value-job object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
initial-value-job-identifier	initial-value-job					False

Initial-value-document object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
initial-value-document-identifier	initial-value-document	initial-value-document				False

Resource-context object attributes						
Identifier (id-att-...)	object class (id-oc-...)	value object class (id-oc-...)	value class (id-vc-...)	values supported id (id-att-...)	ready id (id-att-...)	modifiable
resource-context-identifier	resource-context	resource-context	resource-context			False
context-address	resource-context					False

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Annex H

(informative)

Future Work

H.1 Amendments to Part 1 of ISO/IEC 10175

The following items are for future work for amendment to Part 1 of ISO/IEC 10175:

1. Localization of descriptive-names, descriptors, and messages
2. Ways to allow the server to interpret a **SimpleName** value of a **NameOrOid** syntax as the descriptive-name of an object, both in the context of an attribute value and **ObjectIdentification**.
3. Ways to query OIDs characteristics using an object model approach with pseudo object classes for attribute-type, attribute-value, object-class, value-class, and syntax and attributes to contain the various characteristic values for each OID, such as **descriptive-name**, **descriptor**, **associated-supported**, **associated-ready**, etc.
4. Support for colour
5. Printer resolution needs to allow for different X and Y values.
6. Conformance requirements for errors and events.
7. Addition of a log-file object.
8. Addition of a pager delivery-method.

H.2 A New Part 3 for ISO/IEC 10175, System Management Operations

The following items are for future work for addition to ISO/IEC 10175 as a new part (part 3), System Management Operations:

1. The following system management operations that correspond to the IEEE POSIX System Administration - Part 4: Printing Interfaces command utilities and API requests for operating on the DPA objects that are not in ISO/IEC 10175-1:

POSIX command/API	ISO DPA Management Operation
pdclean/DPA_CLEAN_OP	Clean
pdcreate/DPA_CREATE_OP	Create
pddelete/DPA_DELETE_OP	Delete
pddisable/DPA_DISABLE_OP	Disable
pdenable/DPA_ENABLE_OP	Enable
pdpause/DPA_PAUSE_OP	Pause
pdresubmit/DPA_RESUBMIT_OP	ResubmitJob
pdresume/DPA_RESUME_OP	Resume
pdset/DPA_SET_OP	Set
pdshutdown/DPA_SHUTDOWN_OP	Shutdown

   See Draft Standard for Information Technology--POSIX System Administration--Part 4: Printing Interface

2. Ways to create OIDs and modify OID characteristics.

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