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Information technology — CDIF transfer format —

Part 1: General rules for syntaxes and encodings

Technologies de l'information — Format de transfert CDIF —

Partie 1: Règles générales pour les syntaxes et les codages

Reference number
ISO/IEC 15475-1:2002(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of the joint technical committee is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 15475 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 15475-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*.

ISO/IEC 15475 consists of the following parts, under the general title *Information technology — CDIF transfer format* :

— *Part 1: General rules for syntaxes and encodings*

— *Part 2: Syntax SYNTAX.1*

— *Part 3: Encoding ENCODING.1*

Annex A forms a normative part of this part of ISO/IEC 15475. Annex B is for information only.

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Introduction

This standard will assist the vendors and users of modelling tools and metadata repositories in developing mechanisms for interchanging information. This standard specifies an element of a family of related standards. When used together, these standards specify a mechanism for transferring information between tools.

ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview* and ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility* should be read first when initially exploring CDIF. The first explains the overall CDIF Architecture and how the family of standards fits together. The second explains the scope, and modelling approach in CDIF. The CDIF Meta-metamodel and extensibility mechanisms are also defined in that document.

This document, ISO/IEC 15475-1:2002, *Information technology — CDIF transfer format — Part 1: General rules for syntaxes and encodings*, defines how CDIF supports multiple exchange syntaxes and encodings, and describes how CDIF metamodels are concretely represented during a transfer. ISO/IEC 15475-2:2002, *Information technology — CDIF transfer format — Part 2: Syntax SYNTAX.1* and ISO/IEC 15475-3:2002, *Information technology — CDIF transfer format — Part 3: Encoding ENCODING.1.* define one specific CDIF syntax and one specific CDIF encoding.

This standard has been developed with the wide support and participation of vendors, users, academia and government involved in or familiar with the CASE industry, its products and the general requirements associated with interchanging information between these products.

This document is organized into the following Clauses:

— Clauses 1 to 5 are prescribed ISO/IEC Clauses

— Clause 6: Concepts and facilities

  This describes the concepts of separation of syntax and encoding and independence of architecture components, and defines the general rules for data types and character sets in a transfer.

— Clause 7: General structure of the CDIF transfer

  This describes the purpose of a CDIF transfer, the syntax of the transfer header and the general syntax of a CDIF transfer.

— Annex A: Transfer header formal grammar

  This defines the precise format of the transfer header.

— Annex B: SQL BNF conventions

  These conventions are included for ease of reference.

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Information technology — CDIF transfer format —

Part 1:
General rules for syntaxes and encodings

1 Scope

The CDIF family of standards is primarily designed to be used as a description of a mechanism for transferring information between modelling tools. It facilitates a successful transfer when the authors of the importing and exporting tools have nothing in common except an agreement to conform to CDIF. The language that is defined for the Transfer Format also has applicability as a general language for Import/Export from repositories. The CDIF Semantic Metamodel defined for modelling tools also has applicability as the basis of standard definitions for use in repositories.

The standards, which form the complete family of CDIF Standards, are documented in ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview.* These standards cover the overall framework, the transfer format and the CDIF Semantic Metamodel.

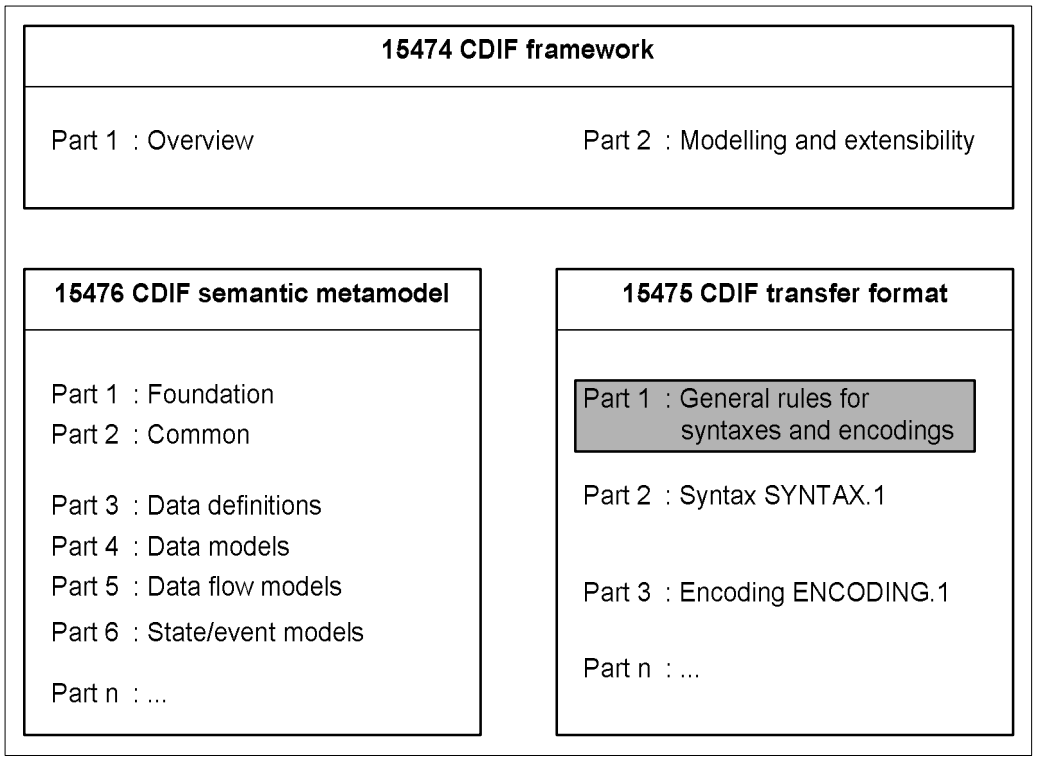


Figure 1 – Position in the CDIF family of standards

The diagram in Figure 1 depicts the various standards that comprise the CDIF family of standard. The shaded box depicts this Standard and its position in the CDIF family of standard.

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This document describes the way that CDIF metamodels are concretely represented during a transfer and the way that CDIF supports multiple exchange syntaxes and encodings. No specific exchange syntaxes or encodings are described in this document. ISO/IEC 15475-2:2002, *Information technology — CDIF transfer format — Part 2: Syntax SYNTAX.1* and ISO/IEC 15475-3:2002, *Information technology — CDIF transfer format — Part 3: Encoding ENCODING.1.* define one specific CDIF syntax and one specific CDIF encoding.

This document is intended to be used by anyone wishing to understand and/or use CDIF. This document provides an introduction to the entire CDIF family of standard. It is suitable for:

— Those evaluating CDIF,

— Those who wish to understand the principles and concepts of a CDIF transfer, and

— Those developing importers and exporters.

The documents ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview* and ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility* should be read first when initially exploring CDIF and before attempting to read other documents in the CDIF family of standard.

While there are no specific prerequisites for reading this document, it will be helpful for the reader to have familiarity with the following:

— Entity-Relationship-Attribute modelling;

— Modelling (CASE) tools;

— Information repositories;

— Data dictionaries;

— Multiple meta-layer modelling;

— Formal grammars;

— Transfer formats.

2 Conformance

A product is standards conformant this standard if and only if the product obeys all definitions and rules in Annex A of this standard, and is also CDIF architecture conformant, as defined in Clause 2 of ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview*. A product can be either transfer format standards conformant or non-conformant. Partial standards conformance to a standard defining a part of the CDIF transfer format is not defined.

A product is standards conformant to a CDIF encoding standard only if it is standards conformant to Annex A of ISO/IEC 15475-3:2002, *Information technology — CDIF transfer format — Part 3: Encoding ENCODING.1* and also conformant to Annex A of ISO/IEC 15475-2:2002, *Information technology — CDIF transfer format — Part 2: Syntax SYNTAX.1*. A product is standard conformant to a CDIF syntax standard only if it is standards conformant to Annex A of ISO/IEC 15475-2:2002, *Information technology — CDIF transfer format — Part 2: Syntax SYNTAX.1*.

3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 15475. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 15475 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For

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undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 9075:1992, *Information technology — Database languages — SQL*

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

ISO/IEC 10646-1:1993/Amd.2:1996, *Information technology — Universal Multiple-Octet Coded Character Set (UCS) — Part 1: Architecture and Basic Multilingual Plane. Amendment 2: UCS Transformation Format 8 (UTF-8)*

ISO/IEC 13238-1:—[1)], *Information technology — Data management export/import — Part 1: Standardization framework*

ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview*

ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility*

4 Terms and definitions

For the purposes of this part of ISO/IEC 15475, the following definitions apply. Unless otherwise noted, the definitions are specific to this part of ISO/IEC 15475.

4.1 From other standards

4.1.1 ISO/IEC 15474-1

This part of ISO/IEC 15475 makes use of the following terms defined in ISO/IEC 15474-1:

CDIF
CDIF family of standards
CDIF graphical notation
CDIF identifier
CDIF semantic metamodel
CDIF meta-metamodel
CDIF transfer
CDIF transfer format
Character set
Encoding
ENCODING.1
Instance
Meta-attribute
Meta-entity
Metamodel
Meta-object
Meta-relationship
Model
Non-terminal symbol
Production rule
Subject area
Syntax
SYNTAX.1
Terminal symbol
Transfer
Transfer format

1) To be published.

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4.1.2 ISO/IEC 13238-1

This part of ISO/IEC 15475 makes use of the following terms from ISO/IEC 13238-1:

Transfer file
CDIF transfer file
Export process
Exporter
Import process
Importer
Clear text file encoding

4.2 For this standard

For the purposes of this part of ISO/IEC 15475 new terms are defined when introduced. Double quotes are used to introduce new terms (e.g., “model layer.”)

5 Symbols (and abbreviated terms)

5.1 Naming and diagramming notations

All meta-objects and meta-meta-objects in CDIF (in metamodels and meta-metamodels) are named by concatenating all the words that name the meta-object or meta-meta-object; the first letter of each word is upper-case, the rest are lower-case (e.g., *MetaAttribute*, *AttributeDerivation*, *IsDrawnUsing*, *IsOptional*).

Full details of the CDIF graphical notation used in the metamodel and the meta-metamodel can be found in the Framework document (ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility*).

5.2 BNF conventions

An extended Backus Naur Form (BNF) is used to define the structure and describe the sequence of data in the transfer file.

The following symbols are used as defined in Clause 3.2 of ISO/IEC 9075. Copy of this Clause is included in an annex for reference.

Symbol

< >

::=

[ ]

{ }

|

...

!!

(space)

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The following conventions are specific to this standard:

<TokenName>	Anything emboldened and surrounded by angle braces is a **token,** a BNF non-terminal symbol that is not further defined in the syntax. The detailed representation of a token is specified in the encoding.
Terminal	Terminal would be a terminal symbol. Anything emboldened, and not surrounded by angle braces, is a literal value (i.e., it represents the character string itself).
x .. y	This is the range operator. It refers to any symbol in the range x to y. For example, **0**..**255** refer to all integers 0 to 255 inclusive.

5.3 Abbreviations

The following abbreviations are used in this part of ISO/IEC 15475:

BNF Backus Naur Form

CDIF CASE Data Interchange Format (originally)

6 CDIF transfer concepts and facilities

6.1 Separation of syntax and encoding

Because CDIF transfers are designed to be handled by different transport mechanisms (e.g., a file, an inter-process link, etc.), it is necessary to separate the definitions of the syntax of a transfer format from the definition of that syntax's encoding. A syntax is a definition of the grammar and structure of an exchange format. An encoding is a description of how a syntax is physically represented. This allows the use of a common syntax, while permitting selection of an optimal encoding for the transport mechanism being used. The dividing line between the syntax and encoding is somewhat arbitrary, and the design of each may impinge on the other.

6.2 Independence of architecture components

The CDIF family of standards supports the concept of multiple transfer formats, each consisting of a syntax and corresponding encoding. For one transfer syntax, multiple encodings can be supported. The semantics (i.e., the metamodel) are **completely separated** from the definition of the transfer format. The metamodel has been defined only by using the concepts defined in the meta-metamodel. **Any transfer format that can, in the general case, represent all of the modelling concepts defined by the meta-metamodel, can exchange all the information defined in the metamodel**, and thus transfer any model that conforms to the metamodel.

The CDIF family of standards provides at least one transfer syntax and one encoding for that syntax. This document describes the general rules for any syntax or encoding that may be defined for a CDIF transfer.

6.3 Data types

Meta-attribute values must be of a given data type. The metamodel description of the relevant meta-entity or meta-relationship will define the data type for each of its meta-attributes.

There is a defined set of meta-attribute data types in CDIF. These types are defined in ISO/IEC 15474-2. Any syntax and encoding that supports CDIF transfers shall provide the definitions for how each of these data types occur in a transfer.

6.4 Character sets

The transfer header (syntax element <TransferHeader> defined in subclause 7.2 below) shall contain only characters from Table 1 of ISO/IEC 10646-1, because the transfer header must be understandable for any CDIF parser. Each syntax shall support the use of the characters in the character set (CODESET) specified in the transfer header for values of string and text meta-attributes within a transfer. If no character set is specified in the

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transfer header, then the Basic Multilingual Plane (BMP) of ISO/IEC 10646-1 character set shall be assumed, with the character coding being the UCS-2 coding of ISO/IEC 10646-1.

7 General structure of a CDIF transfer

7.1 Introduction

The purpose of a CDIF transfer is to support the transfer of:

— References to the CDIF subject areas to be used during the transfer

— Extensions to the CDIF metamodel to be used during the transfer

— Instances of meta-entities, meta-relationships and meta-attributes, as defined in the metamodel section of the transfer.

Every transfer is expressed using one syntax and one encoding.

Figure 2 shows the general structure of all CDIF transfers. A CDIF transfer consists of the transfer envelope and the transfer contents as described below.

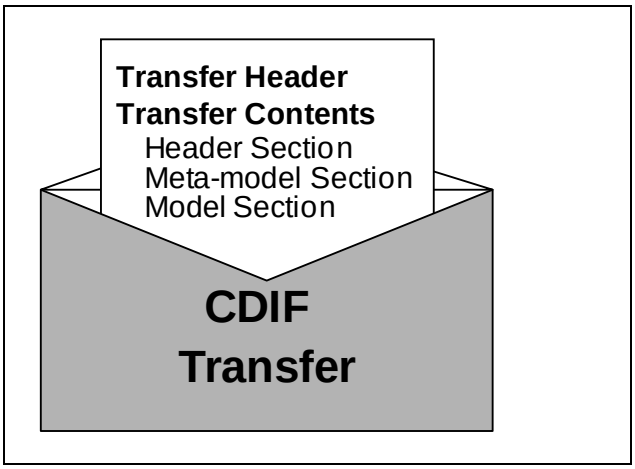


Figure 2 – The general structure of a CDIF transfer

The general syntax of a CDIF Transfer is as follows:

```
<CDIFTransfer> ::=      <TransferHeader>
                        <TransferContents>
```

7.2 Transfer header

7.2.1 Introduction

The transfer header consists of the CDIF signature, the syntax identifier, the encoding identifier and the optional character set (CODESET) identifier.

The syntax of the transfer header is as follows:

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```
<TransferHeader> ::=      <CDIFSignature> <TransferHeaderComma> <SyntaxIdentifier>
                          <TransferHeaderComma> <EncodingIdentifier>
                          [ <TransferHeaderComma> <CharacterSetIdentifier> ]
```

The transfer header is the only section of the transfer that has exactly the same format for all combinations of CDIF transfer syntaxes, encodings and character sets. It is used to identify the syntax, encoding and character set that are used in the remainder of the transfer. The format of the transfer header is restricted to that defined - i.e., no whitespace characters are allowed anywhere in the transfer header section.

The format of this section is shown in Figure 3.

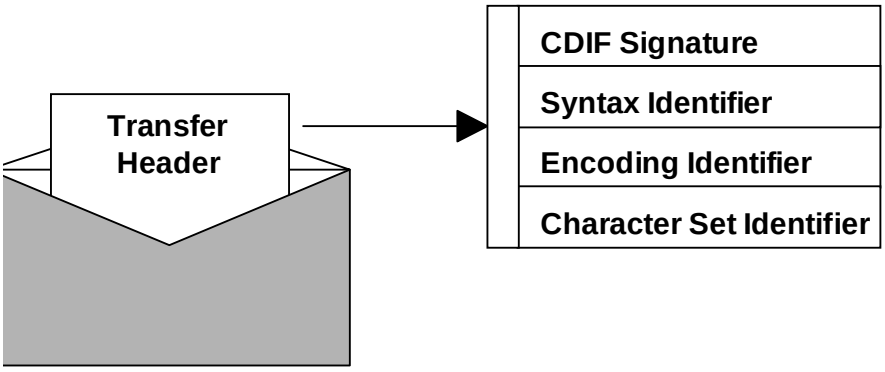


Figure 3 – The transfer header

7.2.2 CDIF signature

The CDIF signature is a marker that uniquely identifies the transfer as a CDIF transfer.

The syntax of the CDIF signature is as follows:

```
<CDIFSignature> ::=       CDIF
```

7.2.3 Syntax identifier

The syntax of the syntax identifier is as follows:

```
<SyntaxIdentifier> ::=    SYNTAX <TransferHeaderSpace> <SyntaxID> <TransferHeaderSpace>
                          <SyntaxVersion>
<SyntaxID> ::=            <TransferHeaderString>
<SyntaxVersion> ::=       <TransferHeaderString>
<TransferHeaderString> ::=
                          <TransferHeaderSingleQuote>
                          [ <TransferHeaderPrintableCharacter> ] ...
                          <TransferHeaderSingleQuote>
<TransferHeaderComma> ::= ,
```

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```
                              !! A comma character defined in ISO 10646-1 Table 1 as row C
                              column 002.
    <TransferHeaderSpace> ::=
                              !! A space character defined in ISO 10646-1 Table 1 as row 0
                              column 002.
    <TransferHeaderSingleQuote> ::=
                              '
                              !! A single quote defined in ISO 10646-1 Table 1 as row 7
                              column 002.
    <TransferHeaderPrintableCharacter> ::= 0|1|2|3|4|5|6|7|8|9|-|.|:
                              |A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z
                              !! These characters are as defined in ISO 10646-1 Table 1.
```

An example of a syntax identifier would be:

SYNTAX 'SYNTAX.1' '15475-2:2002'

7.2.4 Encoding identifier

The syntax of the encoding identifier is as follows:

```
    <EncodingIdentifier> ::=  ENCODING <TransferHeaderSpace> <EncodingID>
                              <TransferHeaderSpace> <EncodingVersion>
    <EncodingID> ::=          <TransferHeaderString>
    <EncodingVersion> ::=     <TransferHeaderString>
```

An example of an encoding identifier would be:

ENCODING 'ENCODING.1' '15475-3:2002'

7.2.5 Character set identifier

The syntax of the character set identifier is as follows:

```
    <CharacterSetIdentifier> ::=
                              CODESET <TransferHeaderSpace> <CharacterSetID>
    <CharacterSetID> ::=      <TransferHeaderString>
```

Some examples of a character set identifier are:

CODESET 'ISO-8859-1'

CODESET 'ISO-2022-JP'

The transfer contents following the transfer header are encoded according to the identified syntax, encoding and character set. Each transfer syntax may have multiple encodings. The encoding identifier and character set identifier in the header uniquely identifies the encoding. A transfer syntax and encoding pair may have multiple character sets.

7.2.6 Transfer header example

Using the syntax rules defined in the preceding sections, here is an example of a complete header description:

CDIF,SYNTAX 'SYNTAX.1' '15475-2:2002',ENCODING 'ENCODING.1' '15475-3:2002',CODESET 'ISO-2022-JP'

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7.3 Transfer contents

7.3.1 Introduction

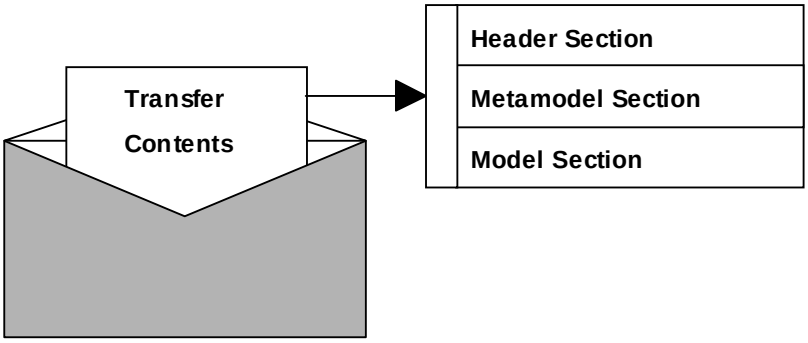


Figure 4 – The transfer contents

The transfer contents consist of the header section, metamodel section and model section. Figure 4 shows the transfer contents.

The syntax of the transfer contents shall be the same for all syntax definitions:

```
<TransferContents> ::=    <HeaderSectionClause>
                          <MetaModelSectionClause>
                          [ <ModelSectionClause> ]
```

7.3.2 Header section

The header section contains information about the transfer. All syntax definitions shall provide a mechanism for expressing at least the following information, although it is not mandatory to transfer it:

— Identification of the exporting tool, both name and version

— Configuration management information including, as a minimum, publisher and date & time of export.

Each syntax definition shall provide ability for the exporting tool to express additional information of this type. The CDIF family of standard provides at least one transfer syntax such as ISO/IEC 15475-2.

Figure 5 shows the transfer contents header section.

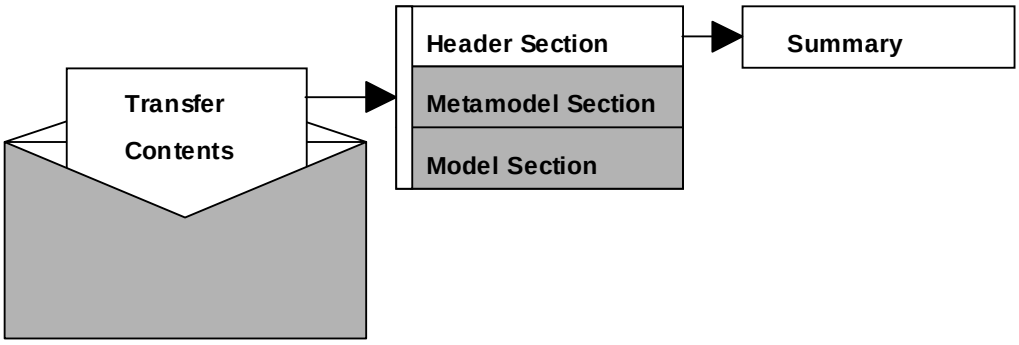


Figure 5 – The transfer contents header section

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7.3.3 Metamodel section

7.3.3.1 Introduction

The metamodel section defines the metamodel used in the transfer. It contains references to the standardized CDIF subject areas used in the transfer. It may also contain extensions to the CDIF semantic metamodel. The CDIF family of standard provides at least one transfer syntax such as ISO/IEC 15475-2.

The general structure of this section is shown in Figure 6.

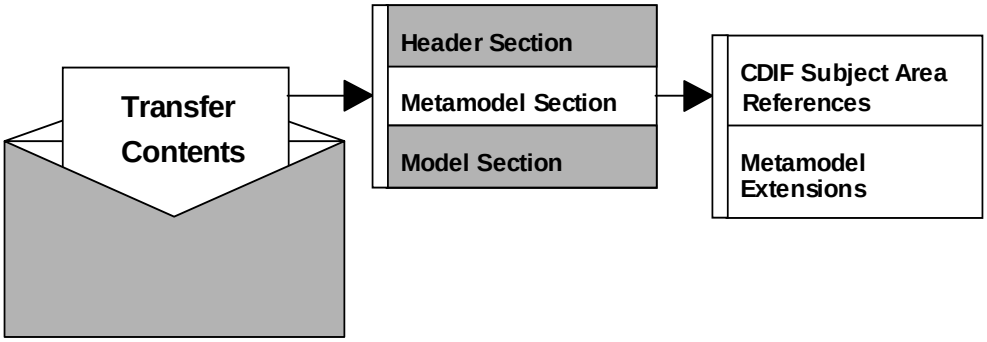


Figure 6 – The transfer contents metamodel section

7.3.3.2 CDIF subject area references

This section identifies the standardized CDIF subject areas that should be used by the importer when interpreting model data. The appropriate version of each of these subject areas is also identified (as defined in the relevant subject area standard, a part of ISO/IEC 15476 or 15477).

7.3.3.3 Metamodel extensions

This section contains metamodel extension information that must be communicated to the importer before it encounters model data. This section must be empty if importers and exporters use only the standardized CDIF subject areas.

When an exporter needs to extend the standardized CDIF metamodel or to provide its own metamodel definition(s), it places these extensions in this section. All syntaxes shall provide mechanisms for extension.

The form of the extensibility that must be supported and the exact information that must be communicated for each meta-object definition is determined by the CDIF meta-metamodel. For a complete description of this information, see ISO/IEC 15474-2:2002*, Information technology — CDIF framework — Part 2: Modelling and extensibility*.

Forward references are not allowed within the metamodel extensions part of a transfer. This means that all metamodel objects referenced must be defined in the identified subject areas or in previous extensions within the transfer.

All meta-entities, meta-attributes and meta-relationships that occur in the metamodel section shall be uniquely identified within a single transfer. This identification is accomplished by providing a unique identifier, known as a CDIF meta-identifier, for every meta-object in a transfer. These identifiers shall not be used to convey any semantic information between an exporter and an importer and need not be retained by a CDIF importer. Meta-identifiers beginning with a numeric character are reserved for use in the CDIF semantic metamodel, to avoid clashes.

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7.3.4 Model section

The model section contains instances of meta-entities and meta-relationships, along with their associated meta-attributes, as defined in the metamodel section. The CDIF family of standard provides at least one transfer syntax such as ISO/IEC 15475-2. Figure 7 shows the structure of the transfer contents model section.

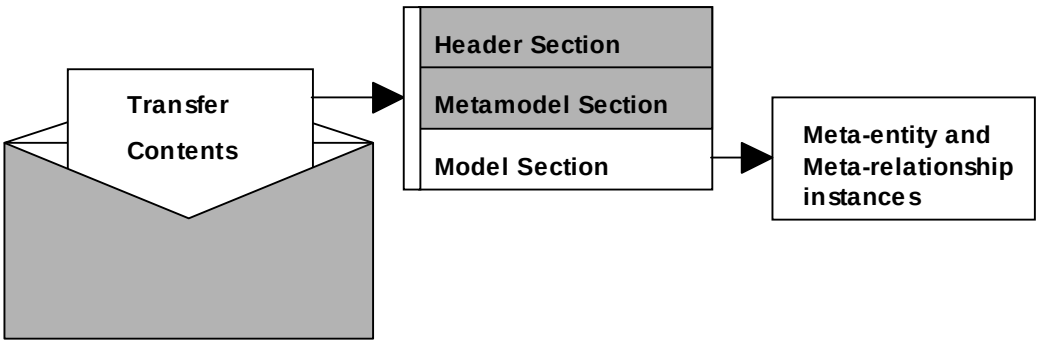


Figure 7 – The transfer contents model section

All meta-entity and meta-relationship instances that occur in the model section shall be uniquely identified within a single transfer. This identification is accomplished by providing a unique identifier, known as a CDIF identifier, for every meta-entity and meta-relationship instance in a transfer. These identifiers shall not be used to convey any semantic information between an exporter and an importer and need not be retained by a CDIF importer.

There shall be no forward references, implicit or explicit, within the model section.

The model section of a CDIF transfer may be omitted if only metamodel information is being transferred.

Meta-attribute values are present in a transfer only if they are non-null.

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Annex A
(normative)

Transfer header formal grammar

This section contains a collection of the syntax presented in Clause 7 General structure of CDIF transfer. The exact representation of information in the transfer header is described in the following grammar:

```
<CDIFTransfer> ::=          <TransferHeader>
                            <TransferContents>
<TransferContents> ::=      <HeaderSectionClause>
                            <MetaModelSectionClause>
                            [ <ModelSectionClause> ]

<TransferHeader> ::=        <CDIFSignature> <TransferHeaderComma> <SyntaxIdentifier>
                            <TransferHeaderComma> <EncodingIdentifier>
                            [ <TransferHeaderComma> <CharacterSetIdentifier> ]
<CDIFSignature> ::=         CDIF
<SyntaxIdentifier> ::=      SYNTAX <TransferHeaderSpace> <SyntaxID> <TransferHeaderSpace>
                            <SyntaxVersion>
<EncodingIdentifier> ::=    ENCODING <TransferHeaderSpace> <EncodingID>
                            <TransferHeaderSpace> <EncodingVersion>
<CharacterSetIdentifier> ::=
                            CODESET <TransferHeaderSpace> <CharacterSetID>
<SyntaxID> ::=              <TransferHeaderString>
<SyntaxVersion> ::=         <TransferHeaderString>
<EncodingID> ::=            <TransferHeaderString>
<EncodingVersion> ::=       <TransferHeaderString>
<CharacterSetID> ::=        <TransferHeaderString>
<TransferHeaderString> ::=
                            <TransferHeaderSingleQuote>
                            [ <TransferHeaderPrintableCharacter> ] ...
                            <TransferHeaderSingleQuote>
<TransferHeaderComma> ::= ,
                            !! A comma character defined in ISO 10646-1 Table 1 as row C
                            column 002.
<TransferHeaderSpace> ::=
                            !! A space character defined in ISO 10646-1 Table 1 as row 0
                            column 002.
<TransferHeaderSingleQuote> ::=
                            '
```


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```
                                !! A single quote defined in ISO 10646-1 Table 1 as row 7
                                column 002.
    <TransferHeaderPrintableCharacter> ::= 0|1|2|3|4|5|6|7|8|9|-|.|:
                                |A|B|C|D|E|F|G|H|I|J|K|L|M|N|O|P|Q|R|S|T|U|V|W|X|Y|Z
                                !! These characters are as defined in ISO 10646-1 Table 1.
```

The Header has a rigid format, with no arbitrary whitespace allowed.

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Annex B
(informative)

SQL BNF conventions

Text from Clause 3.2 Notation of ISO/IEC 9075:1992, given for reference.

The syntactic notation used in this International Standard is an extended version of BNF ("Backus Normal Form" or "Backus Naur Form").

In BNF, each syntactic element of the language is defined by means of a production rule. This defines the element in terms of a formula consisting of the characters, character strings, and syntactic elements that can be used to form an instance of it.

The version of BNF used in this International Standard makes use of the following symbols:

Symbol	Meaning
< >	Angle brackets delimit character strings that are the names of syntactic elements, the non-terminal symbols of the SQL language.
::=	The definition operator. This is used in a production rule to separate the element defined by the rule from its definition. The element being defined appears to the left of the operator and the formula that defines the element appears to the right.
[ ]	Square brackets indicate optional elements in a formula. The portion of the formula within the brackets may be explicitly specified or may be omitted.
{ }	Braces group elements in a formula. The portion of the formula within the braces must be explicitly specified.
|	The alternative operator. The vertical bar indicates that the portion of the formula following the bar is an alternative to the portion preceding the bar. If the vertical bar appears at a position where it is not enclosed in braces or square brackets, it specifies a complete alternative for the element defined by the production rule. If the vertical bar appears in a portion of a formula enclosed in braces or square brackets, it specifies alternatives for the contents of the innermost pair of such braces or brackets.
...	The ellipsis indicates that the element to which it applies in a formula may be repeated any number of times. If the ellipsis appears immediately after a closing brace "}", then it applies to the portion of the formula enclosed between that closing brace and the corresponding opening brace "{". If an ellipsis appears after any other element, then it applies only to that element.
!!	Introduces normal English text. This is used when the definition of a syntactic element is not expressed in BNF.

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Spaces are used to separate syntactic elements. Multiple spaces and line breaks are treated as a single space. Apart from those symbols to which special functions were given above, other characters and character strings in a formula stand for themselves. In addition, if the symbols to the right of the definition operator in a production consist entirely of BNF symbols, then those symbols stand for themselves and do not take on their special meaning.

Pairs of braces and square brackets may be nested to any depth, and the alternative operator may appear at any depth within such a nest.

A character string that forms an instance of any syntactic element may be generated from the BNF definition of that syntactic element by application of the following steps:

a) Select any one option from those defined in the right hand side of a production rule for the element, and replace the element with this option.

b) Replace each ellipsis and the object to which it applies with one or more instances of that object.

c) For every portion of the string enclosed in square brackets, either delete the brackets and their contents or change the brackets to braces.

d) For every portion of the string enclosed in braces, apply steps a) through e) to the substring between the braces, then remove the braces.

e) Apply steps a) through e) to any non-terminal syntactic element (i.e., name enclosed in angle brackets) that remains in the string.

The expansion or production is complete when no further non-terminal symbols remain in the character string.

--`,,`-`-`,,`,,`,`,,`---

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