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Information technology — Multimedia framework (MPEG-21) —

Part 14: Conformance Testing

Technologies de l'information — Cadre multimédia (MPEG-21) —

Partie 14: Essais de conformité

Reference number
ISO/IEC 21000-14:2007(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 2.

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 document 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 21000-14 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

ISO/IEC 21000 consists of the following parts, under the general title *Information technology — Multimedia framework (MPEG-21)*:

— *Part 1: Vision, Technologies and Strategy* [Technical Report]

— *Part 2: Digital Item Declaration*

— *Part 3: Digital Item Identification*

— *Part 4: Intellectual Property Management and Protection Components*

— *Part 5: Rights Expression Language*

— *Part 6: Rights Data Dictionary*

— *Part 7: Digital Item Adaptation*

— *Part 8: Reference Software*

— *Part 9: File Format*

— *Part 10: Digital Item Processing*

— *Part 11: Evaluation Tools for Persistent Association Technologies* [Technical Report]

— *Part 12: Test Bed for MPEG-21 Resource Delivery* [Technical Report]

— *Part 14: Conformance Testing*

— *Part 15: Event Reporting*

— *Part 16: Binary Format*

— *Part 17: Fragment Identification of MPEG Resources*

— *Part 18: Digital Item Streaming*

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Information technology — Multimedia framework (MPEG-21) —

Part 14:
Conformance Testing

1 Scope

This International Standard specifies conformance points and conformance tests for different parts of ISO/IEC 21000. Based on the various conformance points, it is identified which requirements defined in ISO/IEC 21000 apply to those conformance points. The tests are developed to ascertain whether a particular artifact (such as a piece of software or hardware or a document) meets all the requirements for a specific conformance point or not.

ISO/IEC 21000-14:2007 specifies conformance points and tests for ISO/IEC 21000-2:2005, ISO/IEC 21000-3:2003, ISO/IEC 21000-4:2006, ISO/IEC 21000-4:2006/Amd.1:2007, ISO/IEC 21000-5:2004, ISO/IEC 21000-5:2004/Amd.1:2007, ISO/IEC 21000-5:2004/Amd.2:2007, ISO/IEC 21000-7:2004, ISO/IEC 21000-7:2004/Amd.1:2006, ISO/IEC 21000-7:2004/Amd.2:2007, ISO/IEC 21000-9:2005, ISO/IEC 21000-10:2006, ISO/IEC 21000-10:2006/Amd.1:2006, ISO/IEC 21000-15:2006, ISO/IEC 21000-16:2005, and ISO/IEC 21000-17:2006.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 21000 (all parts), *Information technology – Multimedia framework (MPEG-21)*

Namespaces in XML, W3C Recommendation, 14 January 1999

Extensible Markup Language (XML) 1.0 (Second Edition), W3C Recommendation, 6 October, 2000

XML Schema Part 1: Structures, W3C Recommendation, May 2, 2001

XML Schema Part 2: Datatypes, W3C Recommendation, May 2, 2001

XML Information Set, W3C Recommendation, 24 October 2001

XML Base, W3C Recommendation, 27 June 2001

Canonical XML, Version 1.0, W3C Recommendation, 15 March 2001

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3 DID Conformance

3.1 DIDL Document Conformance

A DIDL Document is conformant only if

1) It is a well-formed XML document that validates against the Digital Item Declaration Language Schema as specified in ISO/IEC 21000-2:2005, and

2) All validation rules that are normatively defined in ISO/IEC 21000-2:2005 are met.

NOTE 1 Conformance of DIDL Documents can be checked by using the normative Digital Item Declaration parser that is part of the ISO/IEC 21000 Reference Software.

NOTE 2 A DID may contain descriptions defined in other parts of ISO/IEC 21000, such as a DIA description (ISO/IEC 21000-7:2004). The conformance of a DID does not imply the conformance of these included descriptions.

3.2 DIDL Parser Conformance

A DIDL Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant DIDL Document) or 0 (if the input file is not a conformant DIDL Document).

A DIDL Parser is conformant only if, given the inputs given in Annex A it produces the corresponding outputs from Annex A.

4 DII Conformance

4.1 Digital Item Identification Document Conformance

A Digital Item Identification Document is conformant only if it is a well-formed XML document that validates against the Digital Item Identification Schema as specified in ISO/IEC 21000-3:2003.

4.2 Digital Item Identification Parser Conformance

A Digital Item Identification Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant Digital Item Identification Document) or 0 (if the input file is not a conformant Digital Item Identification Document).

A Digital Item Identification Parser is conformant only if, given the inputs given in Annex B it produces the corresponding outputs from Annex B.

5 IPMP Components Conformance

5.1 Digital Item Declaration Document Conformance

A DIDL document with IPMP DIDL elements is conformant only if

1) It is a well-formed XML document that validates against the DIDL Schema, IPMP DIDL Schema, IPMP Information Schema and IPMP General Information Schema as specified in ISO/IEC 21000-4:2006, and

2) All validation rules that are normatively defined in ISO/IEC 21000-4:2006 are met, and

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3) Once unprotected the DIDL document shall be DID Conformant as specified in clause 3.

5.2 IPMP Parser Conformance

An IPMP Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant DIDL document with IPMP DIDL elements) or 0 (if the input file is not a conformant DIDL document with IPMP DIDL elements).

An IPMP Parser is conformant only if, given the inputs given in Annex C, it produces the corresponding outputs from Annex C.

6 IPMP Amd.1 Conformance

6.1 IPMP DIDL

The conformance of IPMP DIDL of ISO/IEC 21000-4:2006/Amd.1:2007 is as defined in ISO/IEC 21000-14 subclause 5.1 and additional rule:

All restrictions that are normatively defined in ISO/IEC 21000-4:2006/Amd.1:2007 subclauses 9.3.3, 9.3.4, and 9.3.5 are met.

6.2 IPMP Conformance Parser

An IPMP Base Profile Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant DIDL document with IPMP DIDL elements) or 0 (if the input file is not a conformant DIDL document with IPMP DIDL elements).

An IPMP Parser is conformant only if, given the inputs given in Annex D, it produces the corresponding outputs from Annex D.

7 REL Conformance

7.1 Rights Expression Conformance

7.1.1 General

A Rights Expression is conformant only if it meets all the Rights Expression constraints specified in ISO/IEC 21000-5:2004. Some of these constraints are specified in various clauses and subclauses throughout ISO/IEC 21000-5:2004 and many are specified in Annex A (REL Schemas) of ISO/IEC 21000-5:2004. The text in 4.1.2 through 4.1.5 was copied from ISO/IEC 21000-5:2004. The tables in 4.1.2 through 4.1.5 were tabulated from the information in ISO/IEC 21000-5:2004. In the event of discrepancy between 4.1.2 through 4.1.5 and ISO/IEC 21000-5:2004, ISO/IEC 21000-5:2004 is authoritative.

NOTE The License Validation Rules Checker Reference Software in ISO/IEC 21000-8:—[1)] checks if an expression that only uses terms from ISO/IEC 21000-5:2004 satisfies all the expression constraints given in ISO/IEC 21000-5:2004.

7.1.2 Rules extracted from subclause 6.3 of ISO/IEC 21000-5:2004

The following provisions apply to `r:License` elements that contain `r:LicensePart` elements having the `r:licensePartId` or `r:licensePartIdRef` attributes.

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a) **R-REL-2100:** An `r:LicensePart` shall not have both the `r:licensePartId` attribute and the `r:licensePartIdRef` attribute.

b) **R-REL-2200:** For a given `r:LicensePartId` value v and `r:License` l, l shall not contain more than one `r:LicensePart` having an `r:licensePartId` attribute with the value v.

c) **R-REL-2300:** If an `r:LicensePart` has an `r:licensePartIdRef` attribute, then it shall have empty content. As a corollary, types that are derivations of the type `r:LicensePart` should allow their content to be empty (for otherwise their `r:licensePartIdRef` attribute shall not be used).

d) If an `r:LicensePart` a has an `r:licensePartIdRef` attribute with a certain value v, then there shall exist some (other) `r:LicensePart` b in the same `r:License` as a such that all of the following are true:

   1) **R-REL-2401:** b has an `r:licensePartId` attribute with value v,

   2) **R-REL-2402:** the expanded element name of b exactly matches that of a, and

   3) **R-REL-2403:** b is not an ancestor of a.

e) With the exception of signature verification and License issuer resolution (see 6.4), the following two processing steps shall be carried out before the other License processing steps defined in this part of ISO/IEC 21000. In particular, they shall be carried out before the evaluation of Variable references or the testing of equality.

   1) If an `r:LicensePart` a has an `r:licensePartIdRef` attribute with a certain value v, and b is the `r:LicensePart` in the same `r:License` as a that has an `r:licensePartId` attribute with value v, then the semantics of the `r:License` containing a and b are as if

      i) a were removed from the `r:License` and replaced with an element α that is Equal to b,

      ii) the `r:licensePartId` attributes were removed from α and all of its descendants, and

      iii) any preserved attributes that α has were removed from α, and any preserved attributes that a has were added to α, where here a preserved attribute is

         I) any attribute of type `xsd:ID` or

         II) any attribute for which `id` is the local part of its Qualified Name.

   2) If an `r:License` contains no `r:LicensePart` elements with an `r:licensePartIdRef` attribute, then the semantics of that `r:License` are as if the `r:licensePartId` attribute were removed from all `r:LicensePart` elements in that `r:License` with an `r:licensePartId` attribute.

NOTE 1 It is the intent of e)II) to enable the useful definition and incorporation of other identification systems on `r:LicensePart` elements beyond the document-global `xsd:ID`-typed identifiers.

NOTE 2 Circular references such as that shown in the first example below are not allowed because, after one application of provision e), the semantics will be as shown in the second example below, which violates provision d)3).

```
<r:license>
   <r:grantGroup licensePartId="x">
      <r:grantGroup licensePartIdRef="y"/>
   </r:grantGroup>
   <r:grantGroup licensePartId="y">
      <r:grantGroup licensePartIdRef="x"/>
```


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```
   </r:grantGroup>
</r:license>
```

```
<r:license>
   <r:grantGroup licensePartId="x">
      <r:grantGroup>
         <r:grantGroup licensePartIdRef="x"/>
      </r:grantGroup>
   </r:grantGroup>
   <r:grantGroup licensePartId="y">
      <r:grantGroup>
         <r:grantGroup licensePartIdRef="y"/>
      </r:grantGroup>
   </r:grantGroup>
</r:license>
```

7.1.3 Rules extracted from subclauses 6.5.2 and 6.6 of ISO/IEC 21000-5:2004

Let *a* be an `r:LicensePart`. If *a*/@`r:varRef` exists, then **R-REL-3101:** *a* shall have empty content and **R-REL-3102:** the value of *a*/@`r:varRef` shall be the name of some Variable whose scope includes *a*.

R-REL-3200: If a conceptually abstract element appears in an `r:License`, it shall either have a type that is not conceptually abstract or appear in the form of a Variable reference, as described in 6.5.2.

R-REL-3200 (continued): If a conceptually abstract type appears in an `r:License`, it shall belong to an element that either is not conceptually abstract or appears in the form of a Variable reference, as described in 6.5.2.

The following is a list of the conceptually abstract elements and types.

Conceptually abstract elements	Conceptually abstract types
r:licensePart	r:LicensePart
r:principal	r:Principal
r:right	r:Right
r:resource	r:Resource
r:condition	r:Condition
r:anXmlPatternAbstract	r:AnXmlPatternAbstract
r:principalPatternAbstract	r:PrincipalPatternAbstract
r:rightPatternAbstract	r:RightPatternAbstract
r:resourcePatternAbstract	r:ResourcePatternAbstract
r:conditionPatternAbstract	r:ConditionPatternAbstract
r:dcConstraint	r:DcConstraint

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r:trustRoot	r:TrustRoot
r:serviceDescription	r:ServiceDescription
r:propertyAbstract	r:PropertyAbstract
sx:name	sx:Name
	sx:StatefulCondition

7.1.4 Rules extracted from subclause 7.4.1 of ISO/IEC 21000-5:2004

R-REL-4100: If the syntax of a particular derivation of the type `r:LicensePart` declares its content model as optional, the semantics of that optional content model, unless specified otherwise, is that it shall not be omitted in an `r:LicensePart` of that derivation unless that `r:LicensePart` has an `r:licensePartIdRef` or `r:varRef` attribute.

The following is a list of types that cannot be empty unless used with `r:licensePartIdRef` or `r:varRef`.

Types	Elements using those types directly
r:Datum	r:datum
r:DepthConstraint	r:depthConstraint
r:DigitalResource	r:digitalResource
	and sx:WsdlAddress/sx:kind/sx:wsdl
	and sx:WsdlComplete/sx:wsdl
r:ExerciseMechanism	r:exerciseMechanism
r:ExistsRight	r:existsRight
r:Fulfiller	r:fulfiller
r:Grant	r:grant
r:GrantGroup	r:grantGroup
r:GrantGroupPattern	r:grantGroupPattern
r:GrantPattern	r:grantPattern
r:KeyHolder	r:keyHolder
r:PatternFromLicensePart	r:patternFromLicensePart
r:PrerequisiteRight	r:prerequisiteRight
r:PropertyPossessor	r:propertyPossessor
r:Revocable	r:revocable
r:RevocationFreshness	r:revocationFreshness
r:ServiceReference	r:serviceReference

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r:TrustedRootGrants	r:trustedRootGrants
r:TrustedRootIssuers	r:trustedRootIssuers
sx:CallForCondition	sx:callForCondition
sx:FeeFlat	sx:feeFlat
sx:FeeMetered	sx:feeMetered
sx:FeePerInterval	sx:feePerInterval
sx:FeePerUse	sx:feePerUse
sx:FeePerUsePrePay	sx:feePerUsePrePay
sx:Rate	sx:rate
sx:StateReferenceValuePattern	sx:stateReferenceValuePattern
sx:Territory	sx:territory
sx:Uddi	sx:uddi
sx:ValidityIntervalDurationPattern	sx:validityIntervalDurationPattern
sx:ValidityIntervalStartsNow	sx:validityIntervalStartsNow
sx:ValidityTimePeriodic	sx:validityTimePeriodic
sx:WsdlAddress	sx:wsdlAddress
sx:WsdlComplete	sx:wsdlComplete
anonymous type defined in mx:complement	mx:complement
mx:Destination	mx:destination
mx:DiCriteria	mx:diCriteria
mx:DiItemReference	mx:diItemReference
mx:DiPartOf	mx:diPartOf
mx:DiReference	mx:diReference
mx:IsMarked	mx:isMarked
mx:Mark	mx:mark
mx:ResourceSignedBy	mx:resourceSignedBy
mx:Source	mx:source
mx:Transaction	mx:transaction

The following is a list of types that declare an optional content model but specify an *exception* to the rule of 7.4.1.

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Types	Elements using those types directly
anonymous type defined in `mx:union`	`mx:union`
anonymous type defined in `mx:intersection`	`mx:intersection`
`mx:RequiredAttributeChanges`	`mx:requiredAttributeChanges`
`mx:ProhibitedAttributeChanges`	`mx:prohibitedAttributeChanges`

7.1.5 Rules extracted from subclause 7.3.6 of ISO/IEC 21000-5:2004

R-REL-5100: An `r:EncryptedContent` shall have an `xenc:Type` attribute with a value of `http://www.w3.org/2001/04/xmlenc#Content`.

7.2 REL Parser Conformance

An REL Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant Rights Expression) or 0 (if the input file is not a conformant Rights Expression).

An REL Parser is conformant only if, given the inputs given in Annex E it produces the corresponding outputs from Annex E.

8 REL Amd.1 Conformance

8.1 Introduction

In Annex F, test streams are defined for ISO/IEC 21000-5:2004/Amd.1:2007.

8.2 Rules extracted from subclause 6.3 of ISO/IEC 21000-5:2004

The following provisions apply to `r:License` elements that contain `r:LicensePart` elements having the `r:licensePartId` or `r:licensePartIdRef` attributes.

a) **R-REL-2100:** An `r:LicensePart` shall not have both the `r:licensePartId` attribute and the `r:licensePartIdRef` attribute.

b) **R-REL-2200:** For a given `r:LicensePartId` value *v* and `r:License` *l*, *l* shall not contain more than one `r:LicensePart` having an `r:licensePartId` attribute with the value *v*.

c) **R-REL-2300:** If an `r:LicensePart` has an `r:licensePartIdRef` attribute, then it shall have empty content. As a corollary, types that are derivations of the type `r:LicensePart` should allow their content to be empty (for otherwise their `r:licensePartIdRef` attribute shall not be used).

d) If an `r:LicensePart` *a* has an `r:licensePartIdRef` attribute with a certain value *v*, then there shall exist some (other) `r:LicensePart` *b* in the same `r:License` as *a* such that all of the following are true:

   1. **R-REL-2401:** *b* has an `r:licensePartId` attribute with value *v*,
   2. **R-REL-2402:** the expanded element name of *b* exactly matches that of *a*, and
   3. **R-REL-2403:** *b* is not an ancestor of *a*.

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e) With the exception of signature verification and License issuer resolution (see 6.4), the following two processing steps shall be carried out before the other License processing steps defined in this part of ISO/IEC 21000. In particular, they shall be carried out before the evaluation of Variable references or the testing of equality.

1. If an `r:LicensePart` *a* has an `r:licensePartIdRef` attribute with a certain value *v*, and *b* is the `r:LicensePart` in the same `r:License` as *a* that has an `r:licensePartId` attribute with value *v*, then the semantics of the `r:License` containing *a* and *b* are as if

   i) *a* were removed from the `r:License` and replaced with an element α that is Equal to *b*,

   ii) the `r:licensePartId` attributes were removed from α and all of its descendants, and

   iii) any preserved attributes that α has were removed from α, and any preserved attributes that *a* has were added to α, where here a preserved attribute is

   I) any attribute of type `xsd:ID` or

   II) any attribute for which `id` is the local part of its Qualified Name.

2. If an `r:License` contains no `r:LicensePart` elements with an `r:licensePartIdRef` attribute, then the semantics of that `r:License` are as if the `r:licensePartId` attribute were removed from all `r:LicensePart` elements in that `r:License` with an `r:licensePartId` attribute.

NOTE 1 It is the intent to enable the useful definition and incorporation of other identification systems on `r:LicensePart` elements beyond the document-global `xsd:ID`-typed identifiers.

8.3 Rules extracted from subclauses 6.5.2 and 6.6 of ISO/IEC 21000-5:2004

Let *a* be an `r:LicensePart`. If *a*/@`r:varRef` exists, then **R-REL-3101:** *a* shall have empty content and **R-REL-3102:**the value of *a*/@`r:varRef` shall be the name of some Variable whose scope includes *a*.

R-REL-3200: If a conceptually abstract element appears in an `r:License`, it shall either have a type that is not conceptually abstract or appear in the form of a Variable reference, as described in 6.5.2.

R-REL-3200 (continued): If a conceptually abstract type appears in an `r:License`, it shall belong to an element that either is not conceptually abstract or appears in the form of a Variable reference, as described in 6.5.2.

The following is the list of the conceptually abstract elements and types.

Conceptually abstract elements	Conceptually abstract types
`r:licensePart`	`r:LicensePart`
`r:principal`	`r:Principal`
`r:right`	`r:Right`
`r:resource`	`r:Resource`
`r:condition`	`r:Condition`
`r:trustRoot`	`r:TrustRoot`
`r:serviceDescription`	`r:ServiceDescription`
`r:propertyAbstract`	`r:PropertyAbstract`

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8.4 Rules extracted from subclause 7.4.1 of ISO/IEC 21000-5:2004

R-REL-4100: If the syntax of a particular derivation of the type `r:LicensePart` declares its content model as optional, the semantics of that optional content model, unless specified otherwise, is that it shall not be omitted in an `r:LicensePart` of that derivation unless that `r:LicensePart` has an `r:licensePartIdRef` or `r:varRef attribute`.

The following is a list of types that cannot be empty unless used with `r:licensePartIdRef` or `r:varRef`.

Types	Elements using those types directly
r:DigitalResource	r:digitalResource
r:Grant	r:grant
r:KeyHolder	r:keyHolder
r:PropertyPossessor	r:propertyPossessor
r:ServiceReference	r:serviceReference
r:TrustedRootIssuers	r:trustedRootIssuers
sx:Territory	sx:territory

8.5 Rules for the DrmSystem condition

R-REL-5100: If a license has the `m1x:drmSystem` condition, then the right element of the license shall be `m1x:Governed` copy or `m1x:GovernedMove`.

9 REL Amd.2 Conformance

9.1 Introduction

The MPEG-21 REL DAC Profile validation rules defined for the elements of the MPEG-21 REL DAC Profile are a subset of the rules previously defined in MPEG-21 REL Validation Rules for the complete MPEG-21 REL standard specification.

For each of the rules, examples are provided to show how the rule can be violated.

In Annex G, test streams are defined for ISO/IEC 21000-5:2004/Amd.2:2007.

9.2 LicensePartId and LicensePartIdRef

The Rule

These rules are given in 6.3 of the REL. The following provisions apply to `r:License` elements that contain `r:LicensePart` elements having the `r:licensePartId` or `r:licensePartIdRef` attributes.

a) An `r:LicensePart` shall not have both the `r:licensePartId` attribute and the `r:licensePartIdRef` attribute.

b) For a given `r:LicensePartId` value v and `r:License` l, l shall not contain more than one `r:LicensePart` having an `r:licensePartId` attribute with the value v.

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c) If an r:LicensePart has an r:licensePartIdRef attribute, then it shall have empty content. As a corollary, types that are derivations of the type r:LicensePart should allow their content to be empty (for otherwise their r:licensePartIdRef attribute shall not be used).

d) If an r:LicensePart *a* has an r:licensePartIdRef attribute with a certain value *v*, then there shall exist some (other) r:LicensePart *b* in the same r:License as *a* such that all of the following are true:

   1) *b* has an r:licensePartId attribute with value *v*,

   2) the expanded element name of *b* exactly matches that of *a*, and

   3) *b* is not an ancestor of *a*.

e) With the exception of signature verification and License issuer resolution (see 6.4), the following two processing steps shall be carried out before the other License processing steps defined in this part of ISO/IEC 21000. In particular, they shall be carried out before the evaluation of Variable references or the testing of equality.

   1) If an r:LicensePart *a* has an r:licensePartIdRef attribute with a certain value *v*, and *b* is the r:LicensePart in the same r:License as *a* that has an r:licensePartId attribute with value *v*, then the semantics of the r:License containing *a* and *b* are as if

      i) *a* were removed from the r:License and replaced with an element α that is Equal to *b*,

      ii) the r:licensePartId attributes were removed from α and all of its descendants, and

      iii) any preserved attributes that α has were removed from α, and any preserved attributes that *a* has were added to α, where here a preserved attribute is

         I) any attribute of type xsd:ID or

         II) any attribute for which id is the local part of its Qualified Name.

   2) If an r:License contains no r:LicensePart elements with an r:licensePartIdRef attribute, then the semantics of that r:License are as if the r:licensePartId attribute were removed from all r:LicensePart elements in that r:License with an r:licensePartId attribute.

NOTE 1 It is the intent to enable the useful definition and incorporation of other identification systems on r:LicensePart elements beyond the document-global xsd:ID-typed identifiers.

Examples that Violate the Rules

a) An r:LicensePart shall not have both the r:licensePartId attribute and the r:licensePartIdRef attribute.

```
<r:license>
   <r:grant>
      <r:keyHolder licensePartId="Eva">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
```

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```
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        <r:keyHolder licensePartId="Silvia" licensePartIdRef="Eva"/>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

b) For a given `r:LicensePartId` value *v* and `r:License` *l*, *l* shall not contain more than one `r:LicensePart` having an `r:licensePartId` attribute with the value *v*.

```
<r:license>
    <r:grant>
        <r:keyHolder licensePartId="Alice">
            <r:info>
                <dsig:KeyValue>
                    <dsig:RSAKeyValue>
                        <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                        <dsig:Exponent>AQABAA==</dsig:Exponent>
                    </dsig:RSAKeyValue>
                </dsig:KeyValue>
            </r:info>
        </r:keyHolder>
        <mx:play/>
        <r:digitalResource licensePartId="Alice">
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

c) If an `r:LicensePart` has an `r:licensePartIdRef` attribute, then it shall have empty content.

```
<r:license>
    <r:grant>
        <r:keyHolder licensePartId="Alice">
            <r:info>
                <dsig:KeyValue>
                    <dsig:RSAKeyValue>
                        <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                        <dsig:Exponent>AQABAA==</dsig:Exponent>
                    </dsig:RSAKeyValue>
                </dsig:KeyValue>
            </r:info>
        </r:keyHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
```


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```
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        <r:keyHolder licensePartIdRef="Alice">
            <r:info>
                <dsig:KeyValue>
                    <dsig:RSAKeyValue>
                        <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                        <dsig:Exponent>AQABAA==</dsig:Exponent>
                    </dsig:RSAKeyValue>
                </dsig:KeyValue>
            </r:info>
        </r:keyHolder>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

d) If an `r:LicensePart` *a* has an `r:licensePartIdRef` attribute with a certain value *v*, then there shall exist some (other) `r:LicensePart` *b* in the same `r:License` as *a* such that all of the following are true:

1) *b* has an `r:licensePartId` attribute with value *v*,

```
<r:license>
    <r:grant>
        <r:keyHolder licensePartId="Alice">
            <r:info>
                <dsig:KeyValue>
                    <dsig:RSAKeyValue>
                        <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                        <dsig:Exponent>AQABAA==</dsig:Exponent>
                    </dsig:RSAKeyValue>
                </dsig:KeyValue>
            </r:info>
        </r:keyHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        <r:keyHolder licensePartIdRef="Lora"/>
        <mx:enlarge/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

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2) the expanded element name of *b* exactly matches that of *a*

```
<r:license>
   <r:grant>
       <r:keyHolder licensePartId="Alice">
           <r:info>
               <dsig:KeyValue>
                   <dsig:RSAKeyValue>
                       <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                       <dsig:Exponent>AQABAA==</dsig:Exponent>
                   </dsig:RSAKeyValue>
               </dsig:KeyValue>
           </r:info>
       </r:keyHolder>
       <mx:play/>
       <r:digitalResource licensePartIdRef="Alice"/>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

3) *b* is not an ancestor of *a*.

A direct example:

```
<r:license>
   <r:grant licensePartId="x">
        <r:issue/>
        <r:grant licensePartIdRef="x"/>
    </r:grant>
</r:license>
```

9.3 Variable reference and conceptually abstract elements and types

The Rules

6.5.2 and 6.6 of the REL specify the following rules:

> Let *a* be an `r:LicensePart`. If *a*/@`r:varRef` exists, then *a* shall have empty content and the value of *a*/@`r:varRef` shall be the name of some Variable whose scope includes *a*.
>
> If a conceptually abstract element appears in an `r:License`, it shall either have a type that is not conceptually abstract or appear in the form of a Variable reference, as described in 6.5.2.
>
> If a conceptually abstract type appears in an `r:License`, it shall belong to an element that either is not conceptually abstract or appears in the form of a Variable reference, as described in 6.5.2.

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The following is a list of the conceptually abstract elements and types.

Conceptually abstract elements	Conceptually abstract types
r:licensePart	r:LicensePart
r:principal	r:Principal
r:right	r:Right
r:resource	r:Resource
r:condition	r:Condition
r:trustRoot	r:TrustRoot
r:serviceDescription	r:ServiceDescription
r:propertyAbstract	r:PropertyAbstract

Examples that Violate the Rules

Let *a* be an r:LicensePart. If *a*/@r:varRef exists, then *a* shall have empty content

```
<r:license>
   <r:grant>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub">
            <r:keyHolder/>
       </r:principal>
       <mx:print/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

and the value of *a*/@r:varRef shall be the name of some Variable whose scope includes *a*.

```
<r:license>
   <r:grant>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub1"/>
       <mx:print/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
```

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```
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

If a conceptually abstract element appears in an `r:License`, it shall either have a type that is not conceptually abstract or appear in the form of a Variable reference, as described in 6.5.2.

An example of an element of a conceptually abstract type but with no variable reference:

```
<r:license>
   <r:grant>
       <r:keyHolder>
           <r:info>
               <dsig:KeyValue>
                   <dsig:RSAKeyValue>
                       <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                       <dsig:Exponent>AQABAA==</dsig:Exponent>
                   </dsig:RSAKeyValue>
               </dsig:KeyValue>
           </r:info>
       </r:keyHolder>
       <r:right xsi:type="r:Right"/>
       <mx:diReference>
           <mx:identifier>someResourceUri</mx:identifier>
       </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

Another example of an element of a conceptually abstract type but with no variable reference:

```
<r:license>
   <r:grant>
       <r:keyHolder>
           <r:info>
               <dsig:KeyValue>
                   <dsig:RSAKeyValue>
                       <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                       <dsig:Exponent>AQABAA==</dsig:Exponent>
                   </dsig:RSAKeyValue>
               </dsig:KeyValue>
           </r:info>
       </r:keyHolder>
       <r:right/>
       <mx:diReference>
           <mx:identifier>someResourceUri</mx:identifier>
       </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

9.4 LicensePart optional content model

The Rules

7.4.1 of the REL specifies the following rule:

> If the syntax of a particular derivation of the type `r:LicensePart` declares its content model as optional, the semantics of that optional content model, unless specified otherwise, is that it shall not be omitted in an `r:LicensePart` of that derivation unless that `r:LicensePart` has an `r:licensePartIdRef` or `r:varRef attribute`.

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The following is a list of types that cannot be empty unless used with `r:licensePartIdRef` or `r:varRef`.

Types	Elements using those types directly
r:DigitalResource	r:digitalResource
r:Grant	r:grant
r:KeyHolder	r:keyHolder
r:PropertyPossessor	r:propertyPossessor
r:ServiceReference	r:serviceReference
r:TrustedRootIssuers	r:trustedRootIssuers
sx:Territory	sx:territory

Examples that Violate the Rules

```
<r:license>
   <r:grant>
       <r:keyHolder/>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
   </r:grant>
   <r:issuer/>
</r:license>
```

10 RDD Conformance

RDD Conformance is not defined at this time because there is no syntax.

11 DIA Conformance

11.1 DIA Description Conformance

A DIA Description is conformant only if it is well-formed XML and meets all the description constraints specified in ISO/IEC 21000-7:2004. These constraints are specified in text and schemas in various clauses and subclauses throughout ISO/IEC 21000-7:2004.

In particular, when the DIA Description is a Bitstream Syntax Description (BSD), the following additional constraint applies: a BSD is conformant only if it is BSDL-1 valid, as specified in subclause 8.3.1.5 of ISO/IEC 21000-7:2004.

11.2 Bitstream Syntax Schema Conformance

A Bitstream Syntax Schema (BS Schema) is conformant only if it is BSDL-2 valid, as specified in subclause 8.4.6 of ISO/IEC 21000-7:2004.

11.3 DIA Parser Conformance

A DIA Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant DIA Description) or 0 (if the input file is not a conformant DIA Description).

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A DIA Parser is conformant only if, given the inputs given in Annex H it produces the corresponding outputs from Annex H.

11.4 DIA BintoBSD Parser Conformance

A **BintoBSD Parser** is defined as a processor that takes a BS Schema and a Bitstream as inputs and generates a BS Description describing the Bitstream.

The conformance testing of a BintoBSD Parser involves the comparison of the result of generating a BS Description using the reference BintoBSD Parser against the result using the test BintoBSD. The conformance testing checks whether the generated BS Descriptions are canonically equal. Canonical is understood as in the "Canonical XML" Recommendation.

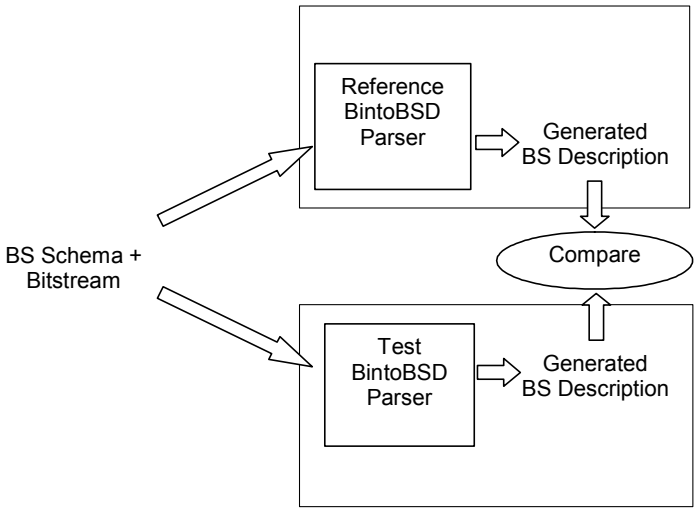

Figure 1 — Conformance testing of the BintoBSD Parser

11.5 DIA BSDtoBin Parser Conformance

A **BSDtoBin Parser** is defined as a processor that takes a BS Description, the corresponding BS Schema and the described Bitstream as inputs and generates a new Bitstream.

The conformance testing of a BSDtoBin Parser involves the comparison of the result of generating a Bitstream using the reference BSDtoBin Parser against the result using the test BSDtoBin. The conformance testing checks whether the generated Bitstreams are equal bit-to-bit.

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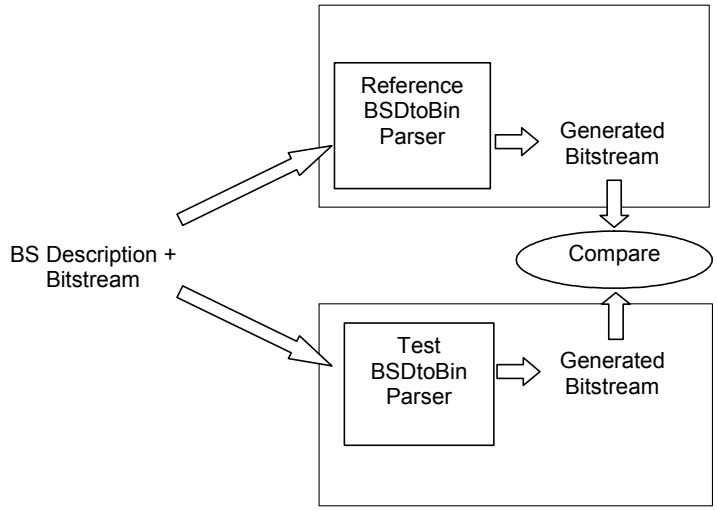

Figure 2 — Conformance testing of the BSDtoBin Parser

11.6 DIA gBSDtoBin Parser Conformance

A g**BSDtoBin Parser** is defined as a processor that takes a gBS Description and the described Bitstream as inputs and generates a new Bitstream.

The conformance testing of a gBSDtoBin Parser involves the comparison of the result of generating a Bitstream using the reference gBSDtoBin Parser against the result using the test gBSDtoBin. The conformance testing checks whether the generated Bitstreams are equal bit-to-bit.

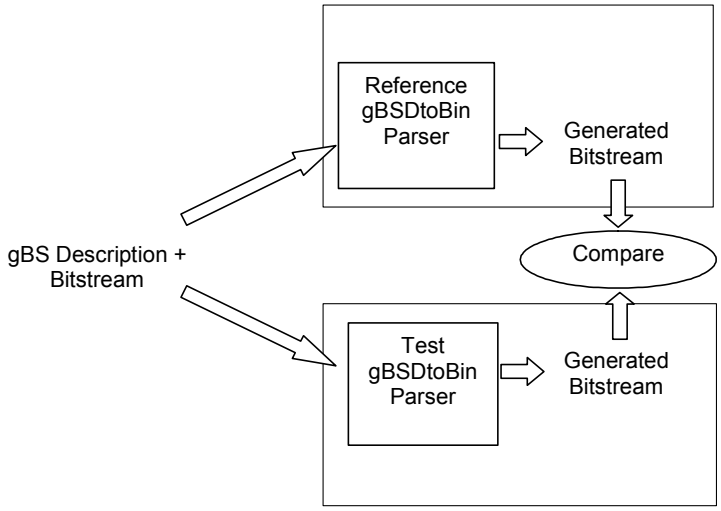

Figure 3 — Conformance testing of the gBSDtoBin Parser

11.7 DIA gBSDtoAU Conformance

Annex H describes four XML bitstreams to be used for conformance testing of DIA gBSDtoAU.

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12 DIA Amd.1 Conformance

Annex I comprises conformance bitstreams for ISO/IEC 21000-7:2004/Amd.1:2006 DIA conversions and permissions including appropriate descriptions.

13 DIA Amd.2 Conformance

13.1 Simple_Mode_XML_Fragmenter

Annex J describes conformance streams consisting of gBSDs for different types of media which are enriched by XML streaming instructions properties (as XML attributes). Given as input to the fragmenter process, they shall be fragmented into PUs according to ISO/IEC 21000-7:2004/Amd.2:2007.

14 File Format Conformance

14.1 Introduction

This section describes the conformance suite for the file format standard in ISO/IEC 21000-9:2005.

The purpose of the conformance suite is to cover the set of valid features that may be exercised in the file format. Media conformance is not covered, though of course in order to exercise the file format features, media has to be stored.

In order to assure coverage of features, the associated spreadsheet is used to list the features in groups, and to document which files exercise each feature. (Features not currently covered by any file are marked with the sign "---".)

Note that 'multi-function' files that include both MPEG-21 elements and elements from other standards (including MPEG-4) can be created; this conformance suite does not cover such 'hybrid' files.

14.2 Process

Those wishing to check the conformance of their implementation should perform the following checks. First, all conformance should check the "basic box handling" section of the tests, as this is common to all specifications. Then, the mandatory features of the selected specification should be checked, and finally, of course, those optional features that the implementation being checked also covers.

The suite of conformance tests does not currently cover deliberately errored files. However, such files do occur in practice and implementations should be written to be resilient.

There is no tool provided to check the conformance of files. However, such tools do exist; the reference software can be used to open files in 'debug' mode and provide a listing of what it finds, and other trade associations and standards bodies may have validation tools tailored to their areas.

14.3 Areas tested

Annex K specifies an Excel document that has two spreadsheets. The first briefly lists the areas and features covered and then has a column for each proposed file. The second sheet provides a brief description of each area and feature, by line.

14.4 File Documentation

Annex K specifies the file documentation.

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15 DIP Conformance

15.1 Introduction

For ISO/IEC 21000-10:2006 the following general conformance points are defined:

— DIP schema conformance;

— DIP engine conformance;

— DIML syntax conformance;

— DIM engine conformance; and

— J-DIXO language conformance.

The remaining subclauses of this clause provide further detail on these conformance points.

15.2 DIP schema conformance

15.2.1 Introduction

ISO/IEC 21000-10:2006 specifies several W3C XML Schema based definitions for XML elements (referred to as DIP elements in this clause) and types that enable

— construction of an Object Map;

— declaration of Digital Item Methods (DIMs) in a Digital Item; and

— declaration of Java classes implementing J-DIXOs.

DIP schema conformance refers to the validity of any such DIP element against the XML Schema definitions specified in ISO/IEC 21000-10:2006.

15.2.2 Testing DIP schema conformance

A DIP element is DIP schema conformant if it is valid against the XML schema definition of that element as specified in ISO/IEC 21000-10:2006.

Such conformance can be tested by parsing an XML document containing as document element the DIP element with the reference DIP Schema Parser. This parser takes as input such an XML document and outputs either 1 (the document is conformant to the DIP schema) or 0 (the document is not conformant to the DIP schema).

NOTE Typically DIP elements will not appear on their own in an XML document but will be included within a DIDL document. In this case the DIP elements would need to be extracted first and then tested. However, for convenience, the reference DIP Schema Parser also provides the capability of accepting a DIDL document and testing all contained DIP elements for conformance to the DIP schema.

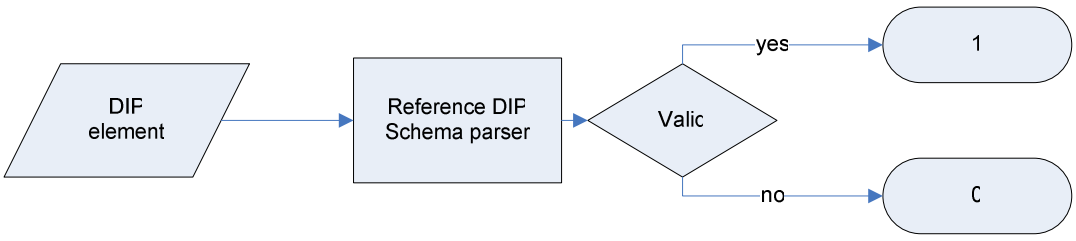

Figure 4 — Testing DIP schema conformance of a DIP element

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EXAMPLE 1 Example of a valid DIP MethodInfo element

```
<MethodInfo xmlns="urn:mpeg:mpeg21:2005:01-DIP-NS">
    <Argument>http://www.foo.com/objecttype</Argument>
</MethodInfo>
```

NOTE 1 The value `http://www.foo.com/objecttype` in the above example is an example value only.

EXAMPLE 2 Example of a valid DIP Label element

```
<Label xmlns="urn:mpeg:mpeg21:2005:01-DIP-NS">urn:mpeg:mpeg21:2005:01-DIP-NS:DIM</Label>
```

EXAMPLE 3 Example of a valid DIP ObjectType element

```
<ObjectType xmlns="urn:mpeg:mpeg21:2005:01-DIP-NS">
    http://www.foo.com/objecttype
</ObjectType>
```

NOTE 2 The value `http://www.foo.com/objecttype` in the above example is an example value only.

EXAMPLE 4 Example of a valid DIP JDIXOClasses element

```
<JDIXOClasses xmlns="urn:mpeg:mpeg21:2005:01-DIP-NS">
    <Class>com.foo.TestJDIXO</Class>
</JDIXOClasses>
```

NOTE 3 The value `com.foo.TestJDIXO` in the above example is an example value only.

15.2.3 DIP engine conformance

In Annex L, test DIDs are defined for the different DIP conformance points.

15.2.4 Introduction

The DIP elements are not intended to be used in isolation but to be contained within a DIDL document to enable the DIP processing of a Digital Item. Such processing includes actions such as recognizing processable DIM declarations, recognizing Object Map related information, and making DIP related information (e.g. the available DIMs that can be executed, and/or the available Objects that can be operated on) available to the User and DIM author (within the DIM definitions via calls to certain DIBOs).

15.2.5 Testing DIP engine conformance

Such processing can be tested by appropriately authored DIDL documents and DIMs and checking the results of a DIP engine against the expected results.

The reference DIP engine in conjunction with the test cases specified in L.1 can be used to test a DIP engine for such DIP engine conformance.

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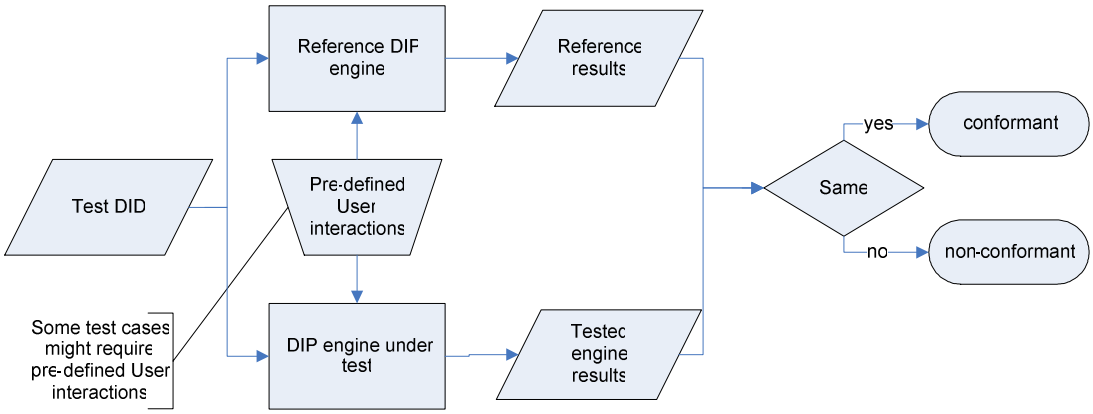

Figure 5 — Testing DIP engine conformance

The DIP elements in all Test DIDs shall be checked for DIP schema conformance prior to release for use in DIP engine conformance testing.

15.3 DIML syntax conformance

15.3.1 Introduction

DIM definitions are authored in DIML which is an extension of ECMAScript including the DIML global and local objects, and the normative set of DIBOs as specified in ISO/IEC 21000-10:2006.

DIML syntax conformance refers to the syntactic correctness of a DIM definition against the syntax of DIML as specified in ISO/IEC 21000-10:2006.

15.3.2 Testing DIML syntax conformance

A DIM definition is DIML syntax conformant if it is syntactically valid according to the DIML as specified in ISO/IEC 21000-10:2006.

Such conformance can be tested by running the DIM definition with the reference DIP engine, which includes parsing the DIML of the DIM definition as part of the execution of the DIM. If the DIM definition is not DIML syntax conformant, the reference DIP engine will indicate a syntax error in the DIML.

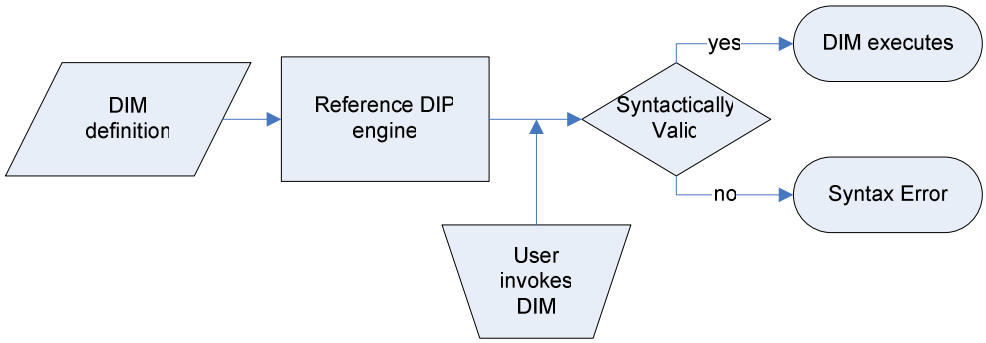

Figure 6 — Testing DIML syntax conformance of a DIM definition

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NOTE In practice a valid DIDL containing a DIM declaration for the DIM definition is passed as input to the reference DIP engine.

EXAMPLE Example of a valid DIM definition

```
function helloWorld()
{

    DIP.alert( "Hello world", MSG_INFO);

}
```

15.4 DIM engine conformance

15.4.1 Introduction

The DIM definitions are intended to provide suggested User interactions with the Digital Item as suggested by the DIM author. Such interactions are the result of processing the DIML of the DIM definition. Such processing includes execution of the DIBOs called by the DIM, and hence implementation of the normative semantics of the DIBOs. That is, DIBO implementation conformance can be subsumed into DIM engine conformance.

15.4.2 DIBOs with non-deterministic results

15.4.2.1 Introduction

For some DIBOs, the results of the implementation of the normative semantics of the DIBO can result in non-deterministic results due to the nature of the semantics of the DIBO. DIBOs related to RDD verbs are an example of such DIBOs (e.g. DIP.play), as are DIBOs requiring direct interaction with the User (e.g. DIP.alert).

In such cases conformance points will be stated in terms that will be to some extent subjective in nature.

The DIBOs in this category are discussed in the following subclauses.

15.4.2.2 DIA.adapt

The theoretical number of adaptations that could be invoked by calling DIA.adapt is unbounded. In addition, according to the semantics, an implementation can return a null if it does not support the requested adaptation. Further, DIP itself does not specify any requirements in regards to the adaptation process itself, the results of the adaptation, or about information used to drive the adaptation. From this perspective, the functionality of the DIA.adapt DIBO is to provide the normative interface by which a DIM author can request an adaptation (that might or might not be supported) by the underlying MPEG-21 environment.

Thus for DIA.adapt, test cases for a finite set of example DIA based adaptations are provided where the adaptation results generated by two DIM engines can be compared.

NOTE While the adaptation results can be compared, the equivalence of the adaptation results is not actually part of the DIP conformance, since that is outside the scope of DIP.

In the actual conformance testing process, a DIM engine that does not support a particular adaptation from the example set shall return a null value, as per the semantics of DIA.adapt. A DIM engine that does support a particular adaptation shall return the adapted element.

Since the actual adapted element could be implementation dependent (for example one implementation might create a temporary file storing the associated adapted resource, another implementation might have a reference to a pre-adapted resource on a server, etc) the confirmation of the adaptation result is determined by the tester.

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15.4.2.3 DID.configureChoice

The DID.configureChoice DIBO allows a User to configure a given Choice. The results of such configuration are dependent on the selections made by the User. Thus test cases for DID.configureChoie will also specify the pre-defied User interactions to configure a Choice in order to produce known results.

In addition, the implementer of DID.configureChoice may allow the User configuration of the Choice to be done in a manner appropriate to the MPEG-21 environment in which the DIM engine is executing. The conformance testing is testing only the correct configuration of the Choice according to the User interactions, not the manner of such configuration.

15.4.2.4 DIP.alert

The DIP.alert DIBO provides simple textual feedback to the User. The implementer of the DIBO may provide this feedback in a way that is appropriate to the MPEG-21 environment in which the DIM engine is executing.

EXAMPLE A server based process might log the message to a file, while a desktop application might pop-up a window in a GUI.

Thus the manner of providing the textual feedback to the User may vary between implementations. The core semantics of the DIBO is that the feedback is provided.

In the reference DIM engine a pop-up alert window is provided. For other DIM engines being tested, a subjective decision by the tester could be required as to whether the semantics of the DIP.alert DIBO have been implemented.

15.4.2.5 DIP.execute

The DIP.execute DIBO allows a DIM author to request an executable resource to be executed. If the implementation is able to initiate the execution of the resource it returns true, otherwise it returns false. DIP itself does not place any requirements on the executable resource or its execution. From this perspective, the functionality of the DIP.execute DIBO is to provide the normative interface by which a DIM author can request the execution of an executable resource (that might or might note be initiated) by the underlying MPEG-21 environment.

NOTE The execution of the executable resource might not be initiated for a variety of reasons. For example the type of executable resource might not be executable on a given platform. Or the execution might not be allowed due to some security restrictions.

For DIP.execute a test case with a pre-compiled executable for Windows platform is provided.

In the actual conformance testing process, a DIM engine that does not support or allow execution of such an executable resource shall return a false value, as per the semantics of DIP.execute. A DIM engine that does support and allow execution of such an executable resource shall return a true value and the output of the executable resource can be observed.

NOTE 1 While the executable results can be observed, the equivalence of the executable results is not actually part of the DIP conformance, since that is outside the scope of DIP.

NOTE 2 The actual mechanisms for the execution of the executable resource are outside the scope of DIP and DIP conformance testing.

NOTE 3 The source code in standard ANSI C for the executable resource is also provided. This could be used to adapt the test case for other platforms.

15.4.2.6 DIP.getExternalData

The DIP.getExternalData DIBO allows a User to select resources located external to the DI. The result is dependent on the selection made by the User. Thus test cases for DIP.getExternalData will also specify the pre-defined resources (provided as part of the test case data) to be selected in order to produce known results.

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In addition, the implementer of DIP.getExternalData may allow the User selection of the resource to be done in a manner appropriate to the MPEG-21 environment in which the DIM engine is executing. The conformance testing is testing only the correct selection of the DIP Objects according to the User interactions, not the manner of such selection.

15.4.2.7 DIP.getObjects

The DIP.getObjects DIBO allows a User to select one or more DIP Objects of given Object Types. The result is dependent on the selection made by the User. Thus test cases for DIP.getObjects will also specify the pre-defined Objects to be selected in order to produce known results.

In addition, the implementer of DIP.getObjects may allow the User selection of the resource to be done in a manner appropriate to the MPEG-21 environment in which the DIM engine is executing. The conformance testing is testing only the correct entering of values according to the User interactions, not the manner of such data entry.

15.4.2.8 DIP.getValues

The DIP.getValues DIBO allows a User to enter one or more values of given data types. The result is dependent on the values entered by the User. Thus test cases for DIP.getValues will also specify the pre-defined data values to be entered in order to produce known results.

In addition, the implementer of DIP.getValues may allow the User entry of values to be done in a manner appropriate to the MPEG-21 environment in which the DIM engine is executing. The conformance testing is testing only the correct selection of the resource according to the User interactions, not the manner of such selection.

15.4.2.9 DIP.play

The DIP.play semantics are to render into a transient and directly perceivable representation a given Component or Descriptor. The manner of playing the Component or Descriptor may be implemented as appropriate to the MPEG-21 environment in which the DIM engine is executing. DIP itself does not specify any requirements in regards to support for associated resource types or how to render associated resource types. From this perspective the functionality of the DIP.play DIBO is to provide the normative interface by which a DIM author can request a Component or Descriptor to be played (that might or might not be supported) by the underlying MPEG-21 environment.

For DIP.play test cases for a finite set of resource types are provided.

Confirming that the Component or Descriptor has been rendered into a transient and directly perceivable representation will be somewhat subjective on the part of the tester and dependent on the particular specifications of the DIM engine implementation.

15.4.2.10 DIP.print

The DIP.print semantics are to render into a fixed and directly perceivable representation a Component or Descriptor. DIP.print is thus similar to DIP.play (15.4.2.9) except that the representation is fixed rather than transient.

15.4.3 Testing DIM engine conformance

Such processing, that is DIM execution, can be tested by appropriately authored DIDL documents and DIMs and checking the results of a DIM engine against the expected results.

The reference DIP engine is linked to a DIM engine as part of its processing of a DIDL document containing DIP. Hence the reference DIP engine in conjunction with the test cases specified in L.2 can be used to test a DIM engine for DIM engine conformance. The general procedure for testing DIM engine conformance is thus the same as that for testing DIP engine conformance (see Figure 5 — Testing DIP engine conformance).

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NOTE Conformance for processing of standard ECMAScript language elements and the DOM APIs is defined by those specifications.

15.5 J-DIXO conformance

15.5.1 Introduction

The following subclauses outline how to check conformance for MPEG-21 DIDs that include J-DIXOs as well as compliance of MPEG-21 implementations that support J-DIXOs.

15.5.2 J-DIXO inclusion in DID Conformance

DIDs that include J-DIXOs shall follow all the rules outlined in subclause C.3 of ISO/IEC 21000-10:2006. This conformance is covered in 15.2.

15.5.3 J-DIXO conformance

There are two parts to J-DIXO conformance. The conformance of the terminal that supports J-DIXO execution and the conformance of what constitutes J-DIXO data.

15.5.3.1 Terminal Conformance

15.5.3.1.1 J-DIXO Invocation

The invocation rules of J-DIXOs are covered in subclause C.2 of ISO/IEC 21000-10:2006. All implementations that support J-DIXOs shall adhere to these rules to be conformant.

15.5.3.1.1.1 Testing

J-DIXO processing functionality of implementations are tested using appropriately authored reference DIDs that include J-DIXOs. This is a necessary but not a sufficient condition. All the rules that are outlined in subclauses C.2 and C.3 of ISO/IEC 21000-10:2006 shall be adhered to.

15.5.3.1.2 Java Platform Compliance

The Java Platform compliance is out of scope of this document. The MPEG-J based model for calling J-DIXOs is in Annex D of ISO/IEC 21000-10:2006.

15.5.3.1.3 J-DIBO Implementation

For full conformance all the J-DIBOs (Java data type bindings for DIML object types, Java interface bindings for DIBOs, and J-DIBO factory) as specified in Annex B (Java bindings for Digital Item Operations) of ISO/IEC 21000-10:2006 shall be implemented. The behaviour, return values and the methods signatures as specified in Annex B of ISO/IEC 21000-10:2006 shall be adhered to. For conformance to a DIP profile all the J-DIBOs as specified in the profile shall be implemented.

15.5.3.1.3.1 Testing

J-DIBO implementations can be tested using appropriately authored DIDs that include J-DIXOs which use various J-DIBOs. This is a necessary but not a sufficient condition.

15.5.3.2 J-DIXO language Conformance

A J-DIXO Java program (that implements the J-DIXO Java interface) or a J-DIXO helper class shall be compliant with the Java language specification that is supported by the Java Platform for which it is intended. Additionally, J-DIXOs can call the Java APIs (J-DIBOs) specified in Annex B of ISO/IEC 21000-10:2006 (org.iso.mpeg.mpeg-21.mpegj package).

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15.5.3.2.1.1 Testing

J-DIXOs can be run through reference DIP implementation to test compliance. This is a necessary but not a sufficient condition.

16 DIP Amd.1 Conformance

ISO/IEC 21000-10:2006/Amd.1:2006 Conformance is two-fold: conformance of the terminal that support C++ bindings and conformance of what constitutes C++ executable data that makes use of C++ bindings.

16.1 Terminal conformance: C++ binding implementation

The C++ data type bindings for DIML object types, the C++ DIBO factory interface, the C++ global environment interface and the C++ interface bindings for DIBOs, as specified in ISO/IEC 21000-10:2006/Amd.1:2006, shall be implemented (i.e., the behavior, the return values and the methods signatures shall be adhered to).

16.2 C++ executable conformance

A C++ executable (that interacts with the DIP environment) shall be compliant with the C++ language specification that is supported by the C++ platform for which it is intended. Additionally, such C++ executables shall be able to use data type bindings for DIML object types and call C++ bindings for DIBOs as specified in ISO/IEC 21000-10:2006/Amd.1:2006.

In Annex M, test DIDs and C++ functions are defined for the following identified DIP Amd.1 conformance points:

— C++ data type bindings for DIML object types.

— C++ DIBO factory interface.

— C++ global environment interface.

— C++ interface bindings for DIBOs.

17 Event Reporting Conformance

17.1 Event Report Request Description Conformance

An Event Report Request description is conformant only if it is well-formed XML and meets all the description constraints specified in clause 7 of ISO/IEC 21000-15:2006. These constraints are specified in text and schemas in various clauses and subclauses throughout ISO/IEC 21000-15:2006.

17.2 Event Report Description Conformance

An Event Report description is conformant only if it is well-formed XML and meets all the description constraints specified in clause 8 of ISO/IEC 21000-15:2006. These constraints are specified in text and schemas in various clauses and subclauses throughout ISO/IEC 21000-15:2006.

17.3 Event Report Request Parser Conformance

An Event Report Request Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant Event Report Request Description) or 0 (if the input file is not a conformant Event Report Request Description).

An Event Report Request Parser is conformant only if, given the inputs given in Annex N it produces the corresponding outputs from Annex N.

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17.4 Event Report Parser Conformance

An Event Report Parser is defined as a module that takes a file as input and produces as output either 1 (if the input file is a conformant Event Report Request Description) or 0 (if the input file is not a conformant Event Report Description).

An Event Report Parser is conformant only if, given the inputs given in Annex N it produces the corresponding outputs from Annex N.

17.5 Draft List of Conformance Tests

Embedding an ER-R within a Digital Item

Embedding an ER within a Digital Item

An ER-R with some mandatory elements missing:

- no recipient
- no conditions
- no reportable data items
- etc..

An ER-R that is compliant with the schema and has the absolute bare minimum of elements.

An ER-R that is compliant with the schema and contains all possible elements – this should include:

1) An example of each condition type
2) An embedded ER-R in the ER Specification
3) Custom reportable data
4) DI Metadata reportable data
5) Selecting a DI
    i) From Metadata elements
    ii) Using XPATH
    iii) using DII

Given an ER-R, give the resulting ER (need to indicate that the conditions stated are all fulfilled before the ER is created).

18 Binary Format Conformance

MPEG-21 Binary Format ISO/IEC 21000-16:2005 is based on the generic BiM Format (MPEG-B Part 1), whose conformance can be found in [ISO/IEC 23001-1 clause 9].

The list of reference bitstreams for MPEG-21 Binary Format is given in Annex N.

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19 Fragment Identification Conformance

19.1 Introduction

The following subclauses describe conformance points and test suites for ISO/IEC 21000-17:2006.

19.2 Syntax Conformance

A URI fragment identifier is conformant only if:

a) it is conformant to IETF RFC 3986

b) All syntactic rules that are normatively defined in ISO/IEC 21000-17:2006 are met.

19.3 FID Parser conformance

An FID parser is defined as a module that takes the following inputs:

— one or more Logical Models or an Internet Media Type

— a fragment identifier,

and produces as output either 1 (if the input fragment identifier is syntactically conformant to ISO/IEC 21000-17:2006) or 0 (if the input fragment identifier is not syntactically conformant to ISO/IEC 21000-17:2006).

An FID Parser is not conformant if for any of the input specified in the tests provided in Annex P, it does not produce the corresponding outputs from Annex P.

19.4 Logical Model conformance

A Logical Model Schema is conformant only if it is a well-formed XML document that validates against the schema for Logical Model representation specified in ISO/IEC 21000-17:2006.

19.5 Logical Model Parser conformance

A Logical Model Schema parser is defined as a module that takes a Logical Model Schema as an input and produces as output either 1 (if the input Logical Model Schema is conformant to ISO/IEC 21000-17:2006) or 0 (if the input Logical Model Schema is not a conformant to ISO/IEC 21000-17:2006).

A Logical Model Schema Parser is not conformant if for any of the inputs given in Annex P, it does not produce the corresponding outputs from Annex P.

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Annex A
(normative)

Tests for DIDL Documents

A.1 Introduction

See attached 21000-2 DID zip file.

A.2 Test 1

A.2.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-DIA-NS http://127.0.0.1/21000-07-UE.xsd">
    <Declarations>
        <Item id="track04">
            <Condition except="choice_01_select_id_01"/>
            <Component>
                <Resource ref="track02.mp3" mimeType="audio/mp3"/>
            </Component>
        </Item>
        <Descriptor>
            <Statement mimeType="text/plain">My music album</Statement>
        </Descriptor>
        <Component>
            <Resource mimeType="text/xml">FunkyTest <dia:DIA
                    xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
                    <dia:Description xsi:type="dia:UsageEnvironmentType">
                        <dia:UsageEnvironment xsi:type="dia:TerminalCapabilitiesType">
                            <dia:TerminalCapabilities
xsi:type="dia:InputOutputCapabilitiesType">
                                <dia:Display>
                                    <dia:Resolution horizontal="176" vertical="144"/>
                                </dia:Display>
                            </dia:TerminalCapabilities>
                        </dia:UsageEnvironment>
                        <dia:UsageEnvironment xsi:type="dia:NetworkCharacteristicsType">
                            <dia:NetworkCharacteristics
xsi:type="dia:NetworkCapabilityType" maxCapacity="64000"/>
                        </dia:UsageEnvironment>
                    </dia:Description>
                    <dia:Description xsi:type="dia:UsageEnvironmentType">
                        <dia:UsageEnvironment xsi:type="dia:NetworkCharacteristicsType">
                            <dia:NetworkCharacteristics
xsi:type="dia:NetworkCapabilityType"
                                maxCapacity="384000" minGuaranteed="32000"/>
                            <dia:NetworkCharacteristics
xsi:type="dia:NetworkConditionType">
                                <dia:AvailableBandwidth maximum="256000" average="80000"
interval="330"/>
                                <dia:Delay packetTwoWay="330" delayVariation="66"/>
                                <dia:Error packetLossRate="0.05"/>
                            </dia:NetworkCharacteristics>
                        </dia:UsageEnvironment>
                    </dia:Description>
```

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```
                </dia:DIA>
            </Resource>
        </Component>
        <Anchor>
            <Fragment>test</Fragment>
        </Anchor>
    </Declarations>
    <Container id="test">
        <Item id="myitem">
            <Descriptor>
                <Statement mimeType="text/xml">
                    <XML>before XML2<XML2>My music album</XML2>after XML2</XML>
                </Statement>
            </Descriptor>
            <Choice choice_id="choice_01" minSelections="1" maxSelections="3">
                <Selection select_id="choice_01_select_id_01"/>
            </Choice>
            <Item id="track01">
                <Condition require="choice_01_select_id_01"/>
                <Component id="mycomp">
                    <Resource ref="track01.mp3" mimeType="audio/mp3"/>
                </Component>
            </Item>
            <Item id="track02">
                <Condition except="choice_01_select_id_01"/>
                <Component>
                    <Resource ref="track02.mp3" mimeType="audio/mp3"/>
                </Component>
            </Item>
            <Item id="track03">
                <Component>
                    <Resource ref="track03.mp3" mimeType="audio/mp3"/>
                    <Anchor>
                        <Fragment>test</Fragment>
                    </Anchor>
                </Component>
            </Item>
            <Annotation target="#track02">
                <Descriptor>
                    <Statement mimeType="text/plain">My music album</Statement>
                </Descriptor>
            </Annotation>
            <Annotation target="#mycomp">
                <Anchor>
                    <Fragment>test</Fragment>
                </Anchor>
            </Annotation>
            <Annotation target="#myitem">
                <Assertion target="#choice_01" false="choice_01_select_id_01"/>
            </Annotation>
        </Item>
    </Container>
</DIDL>
```

A.2.2 Validation result

Output: 0.

Error occurred in the line 94 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Assertion>: The total number of select_id values defined in the associated Choice, minus the number of select_id values listed in the false attribute, must be greater than or equal to the minSelections attribute value in the associated Choice.

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Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Assertion>: The total number of select_id values defined in the associated Choice,
minus the number of select_id values listed in the false attribute, must be greater than
or equal to the minSelections attribute value in the associated Choice.

<?xml version='1.0' ?>
    <didl:Assertion target="#choice_01" except="choice_01_select_id_01"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

A.3 Test 2

A.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Declarations>
    <Item id="track_01">
      <Component>
        <Resource ref="track02.mp3" mimeType="audio/mp3"/>
      </Component>
    </Item>
  </Declarations>
  <Item>
    <Item>
      <Reference target="#track_011"/>
    </Item>
  </Item>
</DIDL>
```

A.3.2 Validation result

Output: 0.

Error occurred in the line 12 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Reference>: The target attribute must evaluate to a single XML node. <Reference>: The target attribute must evaluate to DIDL element.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Reference>: The target attribute must evaluate to a single XML node.
<Reference>: The target attribute must evaluate to DIDL element.

<?xml version='1.0' ?>
    <didl:Reference target="#track_011" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

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A.4 Test 3

A.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Declarations>
    <Descriptor id="track_01">
      <Component>
        <Resource ref="track02.mp3" mimeType="audio/mp3"/>
      </Component>
    </Descriptor>
  </Declarations>
  <Item>
    <Item>
      <Reference target="#track_01"/>
    </Item>
  </Item>
</DIDL>
```

A.4.2 Validation result

Output: 0.

Error occurred in the line 12 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Reference>: The fully qualified name of the referent element must match the fully qualified name of the referring element.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Reference>: The fully qualified name of the referent element must match the fully
qualified name of the referring element.

 <?xml version='1.0' ?>
    <didl:Reference target="#track_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
 ****************************
```

A.5 Test 4

A.5.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:dip="urn:mpeg:mpeg21:2003:01-DIP-NS">
  <Declarations>
    <Item id="track_01">
      <Descriptor id="descriptor_01">
        <Statement mimeType="text/xml">
          <dii:Identifier>urn:grid:a1-abcde-9873216540-f</dii:Identifier>
        </Statement>
      </Descriptor>
      <Descriptor id="descriptor_02">
        <Statement mimeType="text/xml">
          <dii:Identifier>urn:grid:a1-abcde-9873216540-f</dii:Identifier>
        </Statement>
```


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```
      </Descriptor>
      <Descriptor id="descriptor_03">
        <Statement mimeType="text/xml">
          <dii:Type>urn:foo:MusicTrack</dii:Type>
        </Statement>
      </Descriptor>
      <Descriptor id="descriptor_04">
        <Statement mimeType="text/xml">
          <dip:ObjectType>urn:foo:MusicTrack</dip:ObjectType>
        </Statement>
      </Descriptor>
      <Component id="component_01">
        <Descriptor id="descriptor_05">
          <Statement mimeType="text/xml">
            <dip:Arguments>
              <dip:Argument>urn:foo:MusicTrack</dip:Argument>
            </dip:Arguments>
          </Statement>
        </Descriptor>
        <Resource mimeType="application/DIM"><![CDATA[
          function dim_02( arg1, arg2 )
          {
          <>
            /* rest of method definition goes here */
          }
      ]]></Resource>
        <Resource mimeType="text/xml">
          <XML>before XML2<XML2>My music album</XML2>after XML2</XML>
        </Resource>
      </Component>
      <Component>
        <Resource ref="track02.mp3" mimeType="audio/mp3"/>
      </Component>
    </Item>
  </Declarations>
  <Item>
    <Item>
      <Descriptor id="descriptor_06">
        <Statement mimeType="text/plain">This is another Item</Statement>
      </Descriptor>
      <Reference target="#track_01"/>
    </Item>
    <Item>
      <Descriptor id="descriptor_07">
        <Statement mimeType="text/plain">This is yet another Item</Statement>
      </Descriptor>
      <Reference target="#track_01"/>
    </Item>
  </Item>
</DIDL>
```

A.5.2 Validation result

Output: 1.

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A.6 Test 5

A.6.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-
NS">
  <Declarations>
    <Item id="item_01">
      <Descriptor id="descriptor_01">
        <Statement mimeType="text/plain">This is an Item.</Statement>
      </Descriptor>
      <Descriptor id="descriptor_02">
        <Statement mimeType="text/xml">
          <dii:Identifier>urn:grid:a1-abcde-9873216540-f</dii:Identifier>
        </Statement>
      </Descriptor>
      <Item id="item_02">
        <Component id="component_01">
          <Resource ref="track02.mp3" mimeType="audio/mp3"/>
        </Component>
      </Item>
      <Component id="component_02">
        <Resource ref="track02.mp3" mimeType="audio/mp3"/>
      </Component>
    </Item>
  </Declarations>
  <Item>
    <Item>
      <Descriptor id="descriptor_03">
        <Statement mimeType="text/plain">This is another Item.</Statement>
      </Descriptor>
      <Reference target="#item_01"/>
    </Item>
    <Item>
      <Descriptor id="descriptor_04">
        <Statement mimeType="text/plain">This is yet another Item.</Statement>
      </Descriptor>
      <Reference target="#item_01"/>
    </Item>
  </Item>
</DIDL>
```

A.6.2 Validation result

Output: 1.

A.7 Test 6

A.7.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" >
  <Declarations>
    <Item id="item_01">
      <Reference target="#item_02"/>
    </Item>
    <Item id="item_02">
      <Component id="component_01">
        <Resource ref="track1.mp3" mimeType="audio/mp3"/>
      </Component>
    </Item>
```


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```
  </Declarations>
  <Item>
    <Item>
      <Reference target="#item_01"/>
    </Item>
    <Item>
      <Reference target="#item_01"/>
    </Item>
  </Item>
</DIDL>
```

A.7.2 Validation result

Output: 1.

A.8 Test 7

A.8.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
    <Item id="item_01">
        <Component id="component_01">
            <Resource ref="track1.mp3" mimeType="audio/mp3"/>
            <Anchor id="anchor_01">
                <Descriptor id="descriptor_01">
                    <Statement mimeType="text/plain">This is a cool solo.</Statement>
                </Descriptor>
                <Fragment>media_time(1:10)</Fragment>
            </Anchor>
        </Component>
        <Component id="component_02">
            <Resource ref="track1.mp3" mimeType="audio/mp3"/>
            <Anchor>
                <Reference target="#anchor_01"/>
            </Anchor>
        </Component>
    </Item>
</DIDL>
```

A.8.2 Validation result

Output: 1.

A.9 Test 8

A.9.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Condition require="selection_01"/>
    <Choice>
      <Selection select_id="selection_01"/>
    </Choice>
  </Item>
</DIDL>
```

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A.9.2 Validation result

Output: 0.

Error occurred in the line 3 to 8 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Item>: An Item element cannot be conditional on any of its descendant Selection elements. In other words, an Item cannot contain a Condition element specifying a select_id value that identifies any descendant Selection element within the Item.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Item>: An Item element cannot be conditional on any of its descendant
Selection elements. In other words, an Item cannot contain a Condition element
specifying a select_id value that identifies any descendant Selection element within the
Item.

<?xml version='1.0' ?>
    <didl:Item id="item_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
    <didl:Condition require="selection_01" />
    <didl:Choice>
         <didl:Selection select_id="selection_01" />
    </didl:Choice>
    </didl:Item>
*****************************
```

A.10 Test 9

A.10.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item>
    <Component>
      <Resource mimeType="text/plain" ref="http://myhost.com">This is a text.</Resource>
    </Component>
  </Item>
</DIDL>
```

A.10.2 Validation result

Output: 0.

Error occurred in the line 5 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Resource>: If the ref attribute is specified, then the Resource cannot contain character data, and vice versa.

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

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Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Resource>: If the ref attribute is specified, then the Resource
cannot contain character data, and vice versa.

<?xml version='1.0' ?>
    <didl:Resource mimeType="text/plain" ref="http://myhost.com"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

A.11 Test 10

A.11.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item>
    <Choice minSelections="3" maxSelections="1">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
      <Selection select_id="selection_03"/>
    </Choice>
  </Item>
</DIDL>
```

A.11.2 Validation result

Output: 0.

Error occurred in the line 4 to 8 of the XML declaration.

Validation rule number R-DID-xxxxx

Explanation: <Choice>: The value of the maxselections attribute must be no less than the value of the minselections attribute.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Choice>: The value of the maxselections attribute must be no less
than the value of the minselections attribute.

<?xml version='1.0' ?>
   <didl:Choice minSelections="3" maxSelections="1"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
       <didl:Selection select_id="selection_01" />
       <didl:Selection select_id="selection_02" />
       <didl:Selection select_id="selection_03" />
   </didl:Choice>
*****************************
```

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A.12 Test 11

A.12.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item>
    <Choice minSelections="3">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.12.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Choice>: The value of the minSelections attribute must be no larger
than the number of Selection children.

<?xml version='1.0' ?>
   <didl:Choice minSelections="3" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Selection select_id="selection_01" />
      <didl:Selection select_id="selection_02" />
   </didl:Choice>
*****************************
```

A.13 Test 12

A.13.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice minSelections="2" default="selection_02">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.13.2 Validation result

Output: 0.

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Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Choice>: The values specified in the default attribute must each
match the select_id value of one of the Selections within this Choice.  The number of
individual values in the default attribute may not be less than the value of the
minSelections attribute, nor more than the value of the maxSelections attribute.

<?xml version='1.0' ?>
   <didl:Choice minSelections="2" default="selection_02"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Selection select_id="selection_01" />
      <didl:Selection select_id="selection_02" />
   </didl:Choice>
*****************************
```

A.14 Test 13

A.14.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice maxSelections="1" default="selection_01 selection_02">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.14.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Choice>: The values specified in the default attribute must each
match the select_id value of one of the Selections within this Choice. The number of
individual values in the default attribute may not be less than the value of the
minSelections attribute, nor more than the value of the maxSelections attribute.

<?xml version='1.0' ?>
   <didl:Choice maxSelections="1" default="selection_01 selection_02"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Selection select_id="selection_01" />
      <didl:Selection select_id="selection_02" />
   </didl:Choice>
*****************************
```

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A.15 Test 14

A.15.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice maxSelections="1" default="item_01">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.15.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Choice>: The values specified in the default attribute must each
match the select_id value of one of the Selections within this Choice. The number of
individual values in the default attribute may not be less than the value of the
minSelections attribute, nor more than the value of the maxSelections attribute.

<?xml version='1.0' ?>
   <didl:Choice maxSelections="1" default="item_01"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
       <didl:Selection select_id="selection_01" />
       <didl:Selection select_id="selection_02" />
   </didl:Choice>
```

A.16 Test 15

A.16.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item>
    <Descriptor>
      <Condition/>
      <Statement mimeType="text/plain">This is a test.</Statement>
    </Descriptor>
    <Choice>
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.16.2 Validation result

Output: 0.

--`,,```,,,,````-`-`,,`,,`,`,,`---
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Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Condition>: Empty Conditions are not permitted. Therefore, it is not
valid for a Condition element to have neither a require attribute nor an except
attribute.

<?xml version='1.0' ?>
   <didl:Condition xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
******************************
```

A.17 Test 16

A.17.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item>
    <Item>
      <Condition require="selection_01"/>
    </Item>
    <Item>
      <Descriptor>
        <Statement mimeType="text/plain">This is a test.</Statement>
      </Descriptor>
      <Choice>
        <Selection select_id="selection_01"/>
        <Selection select_id="selection_02"/>
      </Choice>
    </Item>
  </Item>
</DIDL>
```

A.17.2 Validation result

Output: 0.

Output from the reference software:

```
****** Validation Error ******
Validation rule:  <Condition>: Each id value specified in the require and except
attributes must match a select_id attribute value defined in a Selection element located
somewhere within an Item element that is an ancestor of the Condition.

<?xml version='1.0' ?>
   <didl:Condition require="selection_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS"
/>
******************************
```

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A.18 Test 17

A.18.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Descriptor>
      <Condition except="item_01"/>
      <Statement mimeType="text/plain">This is a test.</Statement>
    </Descriptor>
    <Choice>
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
  </Item>
</DIDL>
```

A.18.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Condition>: Each id value specified in the require and except
attributes must match a select_id attribute value defined in a Selection element located
somewhere within an Item element that is an ancestor of the Condition.

<?xml version='1.0' ?>
   <didl:Condition except="item_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

A.19 Test 18

A.19.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Item>
      <Descriptor>
        <Statement mimeType="text/plain">My music album</Statement>
      </Descriptor>
    </Item>
    <Annotation target="#item_01">
      <Descriptor>
        <Statement mimeType="text/plain"
encoding="base64">VGhpcyBhbm5vdGF0aW9uIGlzIG1hZGUgYnk6DQpGcmVkZXJpayBEZSBLZXVrZWxhZXJlDQ
pNdWx0aW1lZGlhIExhYiAtIEdoZW50IFVuaXZlcnNpdHk=</Statement>
      </Descriptor>
    </Annotation>
  </Item>
</DIDL>
```


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A.19.2 Validation result

Output: 1.

A.20 Test 19

A.20.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item >
    <Item id="item_01">
      <Descriptor>
        <Statement mimeType="text/plain">My music album</Statement>
      </Descriptor>
    </Item>
    <Item>
      <Annotation target="#item_01">
        <Descriptor>
          <Statement mimeType="text/plain">This is a nice album</Statement>
        </Descriptor>
      </Annotation>
    </Item>
  </Item>
</DIDL>
```

A.20.2 Validation result

Output: 0.

Output from the reference software:

```
****** Validation Error ******
Validation rule:  <Annotation>: For internal annotation, the values given in the target
attribute must each correspond to some descendant element of the parent element, or that
of the parent element itself.

<?xml version='1.0' ?>
   <didl:Annotation target="#item_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Descriptor>
         <didl:Statement mimeType="text/plain">This is a nice album</didl:Statement>
      </didl:Descriptor>
   </didl:Annotation>
*****************************
```

A.21 Test 20

A.21.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice choice_id="choice_01">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
    <Annotation target="#choice_01">
      <Assertion target="#choice_01" true="selection_01"/>
    </Annotation>
  </Item>
</DIDL>
```

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A.21.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Annotation>: If an Annotation contains an Assertion, then its target
attribute values must each match the id attribute value of an Item.

<?xml version='1.0' ?>
   <didl:Annotation target="#choice_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Assertion target="#choice_01" true="selection_01" />
   </didl:Annotation>
*****************************
```

A.22 Test 21

A.22.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice choice_id="choice_01">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
    <Annotation target="#item_01">
      <Assertion target="#choice_01" true="selection_01"/>
    </Annotation>
  </Item>
</DIDL>
```

A.22.2 Validation result

Output: 1.

A.23 Test 22

A.23.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
    <Item id="item_01">
        <Annotation target="#item_01">
            <Anchor id="anchor_01">
                <Descriptor>
                    <Statement mimeType="text/plain">This is a cool solo.</Statement>
                </Descriptor>
                <Fragment>media_time(1:10)</Fragment>
            </Anchor>
        </Annotation>
    </Item>
</DIDL
```


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A.23.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:  <Annotation>: The contents of an Annotation must conform to the
content model of the targeted element(s).

<?xml version='1.0' ?>
   <didl:Annotation target="#item_01" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Anchor fragment="media_time(1:10)" id="anchor_01">
         <didl:Descriptor>
            <didl:Statement mimeType="text/plain">This is a cool
solo.</didl:Statement>
         </didl:Descriptor>
      </didl:Anchor>
   </didl:Annotation>
*****************************
```

A.24 Test 23

A.24.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Annotation>
      <Descriptor>
        <Statement mimeType="text/plain">This is a nice album</Statement>
      </Descriptor>
    </Annotation>
  </Item>
</DIDL>
```

A.24.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
<Annotation>: An Annotation that does not contain a Reference child element must have a
target attribute.

<?xml version='1.0' ?>
   <didl:Annotation xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS">
      <didl:Descriptor>
         <didl:Statement mimeType="text/plain">This is a nice album</didl:Statement>
      </didl:Descriptor>
   </didl:Annotation>
*****************************
```

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A.25 Test 24

A.25.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice>
      <Selection select_id="selection_01"/>
    </Choice>
    <Annotation target="#item_01">
      <Assertion target="#item_01" true="selection_01"/>
    </Annotation>
  </Item>
</DIDL>
```

A.25.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Assertion>: The target of an Assertion element must be a Choice element.

<?xml version='1.0' ?>
   <didl:Assertion target="#item_01" true="selection_01"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

A.26 Test 25

A.26.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice choice_id="choice_01">
      <Selection select_id="selection_01"/>
    </Choice>
    <Item id="item_02">
      <Annotation target="#item_02">
        <Assertion target="#choice_01" true="selection_01"/>
      </Annotation>
    </Item>
  </Item>
</DIDL>
```

A.26.2 Validation result

Output: 0.

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Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Assertion>: The associated Choice element must be a descendant of the Item whose id
attribute value matches the parent Annotation’s target attribute value.

<?xml version='1.0' ?>
   <didl:Assertion target="#choice_01" true="selection_01"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

A.27 Test 26

A.27.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice choice_id="choice_01" maxSelections="1">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
    </Choice>
    <Annotation target="#item_01">
      <Assertion target="#choice_01" true="selection_01 selection_02"/>
    </Annotation>
  </Item>
</DIDL>
```

A.27.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Assertion>: The number of true predicates (i.e. the number of select_id values listed
in the true attribute) must be less than or equal to the maxSelections attribute value
in the associated Choice.

<?xml version='1.0' ?>
   <didl:Assertion target="#choice_01" true="selection_01 selection_02"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
*****************************
```

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A.28 Test 27

A.28.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
  <Item id="item_01">
    <Choice choice_id="choice_01" minSelections="2">
      <Selection select_id="selection_01"/>
      <Selection select_id="selection_02"/>
      <Selection select_id="selection_03"/>
    </Choice>
    <Annotation target="#item_01">
      <Assertion target="#choice_01" false="selection_01 selection_02"/>
    </Annotation>
  </Item>
</DIDL>
```

A.28.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Assertion>: The total number of select_id values defined in the associated Choice,
minus the number of select_id values listed in the false attribute, must be greater than
or equal to the minSelections attribute value in the associated Choice.

<?xml version='1.0' ?>
   <didl:Assertion target="#choice_01" except="selection_01 selection_02"
xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-NS" />
******************************
```

A.29 Test 28

A.29.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS">
    <Item id="item_01">
        <Component id="component_01">
            <Resource mimeType="audio/mp3" ref="http://somewhere.com/track01.mp3"/>
            <Anchor>
                <Descriptor>
                    <Statement mimeType="text/plain">John's longest trumpet
solo</Statement>
                </Descriptor>
                <Fragment>media_time(15:10)%</Fragment>
            </Anchor>
        </Component>
    </Item>
</DIDL>
```


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A.29.2 Validation result

Output: 0.

Output from the reference software:

```
org.iso.mpeg.mpeg21.did.validation.DIDValidationException:
****** Validation Error ******
Validation rule:
<Anchor> If the Resource URI is a URL, a URL-compliant fragment identifier is required.

<?xml version='1.0' ?>
   <didl:Anchor fragment="media_time(15:10)%" xmlns:didl="urn:mpeg:mpeg21:2002:02-DIDL-
NS">
      <didl:Descriptor>
         <didl:Statement mimeType="text/plain">John's longest trumpet
solo</didl:Statement>
      </didl:Descriptor>
   </didl:Anchor>
*****************************
```

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Annex B
(normative)

Tests for Digital Item Identification Documents

B.1 Test 1

B.1.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dii:Identifier
xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2002:01-DII-NS schemas\dii.xsd"
>urn:test:123</dii:Identifier>
```

B.1.2 Validation result

Output: 1.

B.2 Test 2

B.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dii:RelatedIdentifier
xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2002:01-DII-NS schemas\dii.xsd"
>urn:test:456</dii:RelatedIdentifier>
```

B.2.2 Validation result

Output: 1.

B.3 Test 3

B.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dii:Type
xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2002:01-DII-NS schemas\dii.xsd"
>urn:test:789</dii:Type>
```

B.3.2 Validation result

Output: 1.

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B.4 Test 4

B.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dii:Identifier
xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2002:01-DII-NS schemas\dii.xsd"
>
<dii:junkElement>urn:test:123</dii:junkElement>
</dii:Identifier>
```

B.4.2 Validation result

Output: 0.

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Annex C
(normative)

Tests for DIDL Documents with protected elements

C.1 Introduction

See attached 21000-4 IPMP zip file.

C.2 Test 1

C.2.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-NS">
  <Container>
    <Descriptor>
      <Statement mimeType="text/xml">
        <ipmpinfo:IPMPGeneralInfoDescriptor>
          <ipmpinfo:ToolList>
            <ipmpinfo:ToolDescription localID="Tool1">
              <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
              <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
            </ipmpinfo:ToolDescription>
            <ipmpinfo:ToolDescription localID="Tool2">
              <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC003:77:29</ipmpinfo:IPMPToolID>
              <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc003-3484"/>
            </ipmpinfo:ToolDescription>
          </ipmpinfo:ToolList>
        </ipmpinfo:IPMPGeneralInfoDescriptor>
      </Statement>
    </Descriptor>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0001</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                 <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS1SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>0df9j3rgkljsdfgjidjfFjfFgDJiJERW...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
            </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
```


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```
      </ipmpdidl:Info>
      <ipmpdidl:Contents>3E674F632A56BD56...</ipmpdidl:Contents>
    </ipmpdidl:Item>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0002</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
             <ipmpinfo:ToolRef localidref="Tool2"/>
           </ipmpinfo:Tool>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool3"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                  <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS2SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>SDfkDWEje90whg...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
           <ipmpdidl:Contents>A56BD5A63E6654F632...</ipmpdidl:Contents>
        </ipmpdidl:Item>
    </Container>
</DIDL>
```

C.2.2 Validation result

Output: 0.

Error occurred in the line 59 of the XML declaration.

Validation rule number R-IPMP-02

Explanation: <ipmpinfo:ToolRef>: Exists an ipmpinfo:IPMPInfoDescriptor element has a ipmpinfo:Tool element with a ipmpinfo:ToolRef child element that has the attribute localidref with value Tool3, but don't exist in the same DIDL document within the ipmpinfo:IPMPGeneralInfoDescriptor a ipmpinfo:ToolList that has a ipmpinfo:ToolDescription element with the attribute localID with this value (Tool3).

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C.3 Test 2

C.3.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS" xmlns:ipmp="urn:mpeg:mpeg21:2004:01-
IPMP-NS">
  <Container>
    <Descriptor>
      <Statement mimeType="text/xml">
        <ipmpinfo:IPMPGeneralInfoDescriptor>
          <ipmpinfo:ToolList>
       <ipmpinfo:ToolDescription localID="Tool1">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="50"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
       </ipmpinfo:ToolDescription>
       <ipmpinfo:ToolDescription localID="Tool2">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC003:77:29</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="50"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc003-3484"/>
       </ipmpinfo:ToolDescription>
       <ipmpinfo:ToolDescription localID="Tool1">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC004:56:79</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="50"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolPartEnc004-9090"/>
       </ipmpinfo:ToolDescription>
   </ipmpinfo:ToolList>
        </ipmpinfo:IPMPGeneralInfoDescriptor>
      </Statement>
    </Descriptor>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0001</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                 <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-cbc"/>
                 <dsig:KeyInfo>
                   <dsig:KeyName>OS1SymmetricKey</dsig:KeyName>
                 </dsig:KeyInfo>
                 <enc:CipherData>
                   <enc:CipherValue>0df9j3rgkljsdfgjidjfFjfFgDJiJERW...</enc:CipherValue>
                 </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
      <ipmpdidl:Contents>3E674F632A56BD56...</ipmpdidl:Contents>
    </ipmpdidl:Item>
   </Container>
</DIDL>
```


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C.3.2 Validation result

Output: 0.

Error occurred in the line 23 of the XML declaration.

Validation rule number R-IPMP- 03

Explanation: <ipmpinfo:ToolDescription>: The ipmpinfo:Tool list element contains more than one ipmpinfo:ToolDescription element that has attribute localID with the same value (Tool1).

C.4 Test 3

C.4.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS" xmlns:ipmp="urn:mpeg:mpeg21:2004:01-
IPMP-NS">
<Container>
    <Descriptor>
      <Statement mimeType="text/xml">
        <ipmpinfo:IPMPGeneralInfoDescriptor>
          <ipmpinfo:ToolList>
       <ipmpinfo:ToolDescription localID="Tool1">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="50"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
       </ipmpinfo:ToolDescription>
       <ipmpinfo:ToolDescription localID="Tool2">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC003:77:29</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="51"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc003-3484"/>
       </ipmpinfo:ToolDescription>
       <ipmpinfo:ToolDescription localID="Tool3">
           <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC004:56:79</ipmpinfo:IPMPToolID>
           <ipmpinfo:MemberOf>
               <ipmpinfo:AlternateGroup groupID="55"/>
           </ipmpinfo:MemberOf>
           <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolPartEnc004-9090"/>
       </ipmpinfo:ToolDescription>
     </ipmpinfo:ToolList>
        </ipmpinfo:IPMPGeneralInfoDescriptor>
      </Statement>
    </Descriptor>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0001</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                  <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-
cbc"/>
```

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```
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS1SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>0df9j3rgkljsdfgjidjfFjfFgDJiJERW...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
      <ipmpdidl:Contents>3E674F632A56BD56...</ipmpdidl:Contents>
    </ipmpdidl:Item>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0002</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
          </ipmpinfo:Tool>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool3"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                  <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-
cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS2SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>SDfkDWEje90whg...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
      <ipmpdidl:Contents>A56BD5A63E6654F632...</ipmpdidl:Contents>
    </ipmpdidl:Item>
  </Container>
</DIDL>
```

C.4.2 Validation result

Output: 0.

Error occurred in the lines 12, 19 and 26 of the XML declaration.

Validation rule number R-IPMP-04

Explanation: <ipmpinfo:AlternateGroup>: Exist an ipmpinfo:ToolDescription element that has an ipmpinfo:MemberOf element that has as child element an ipmpinfo:AlternateGroup with groupID with value 50, another with value 51 and another with value 53, but not exist an ipmpinfo:ToolDescription that has a child an ipmpinfo:MemberOf element with an ipmpinfo:AlternateGroup with the attribute groupID with the same value (50, 51 and 55, respectively).

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C.5 Test 4

C.5.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmp="urn:mpeg:mpeg21:2004:01-IPMP-NS">
  <ipmpdidl:Item>
    <ipmpdidl:Identifier>
      <dii:Identifier>IPMPid0001</dii:Identifier>
    </ipmpdidl:Identifier>
    <ipmpdidl:Info>
      <ipmpinfo:IPMPInfoDescriptor>
        <ipmpinfo:Tool>
          <ipmpinfo:ToolBaseDescription>

<ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC005:77:29</ipmpinfo:IPMPToolID>
            <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc005-3484"/>
          </ipmpinfo:ToolBaseDescription>
        </ipmpinfo:Tool>
        <ipmpinfo:Tool>
          <ipmpinfo:ToolBaseDescription>

<ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC064:55:86</ipmpinfo:IPMPToolID>
            <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolWat005-6393"/>
          </ipmpinfo:ToolBaseDescription>
        </ipmpinfo:Tool>
        <ipmpinfo:RightsDescriptor>
          <ipmpinfo:License>
            <r:license>
              <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-
cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>Ktd63SDfkDWEjeSdkj39872A5ToQ...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
    <ipmpdidl:Contents>3E674F632A56BD56...</ipmpdidl:Contents>
  </ipmpdidl:Item>
</DIDL>
```

C.5.2 Validation result

Output: 1.

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C.6 Test 5

C.6.1 XML declaration

```
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-DII-NS"
xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS" xmlns:ipmp="urn:mpeg:mpeg21:2004:01-
IPMP-NS">
  <Container>
    <Descriptor>
      <Statement mimeType="text/xml">
        <ipmpinfo:IPMPGeneralInfoDescriptor>
          <ipmpinfo:ToolList>
            <ipmpinfo:ToolDescription localID="Tool1">
              <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC003:77:29</ipmpinfo:IPMPToolID>
              <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc003-3484"/>
            </ipmpinfo:ToolDescription>
            <ipmpinfo:ToolDescription localID="Tool2">
              <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC005:77:29</ipmpinfo:IPMPToolID>
              <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolEnc005-3484"/>
            </ipmpinfo:ToolDescription>
            <ipmpinfo:ToolDescription localID="Tool3">
              <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC064:55:86</ipmpinfo:IPMPToolID>
              <ipmpinfo:Remote ref="urn:IPMPToolsServer:ToolWat005-6393"/>
            </ipmpinfo:ToolDescription>
          </ipmpinfo:ToolList>
        </ipmpinfo:IPMPGeneralInfoDescriptor>
      </Statement>
    </Descriptor>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0001</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                  <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-
cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS1SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>

<enc:CipherValue>0df9j3rgkljsdfgjidjfFjfFgDJiJERW...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
      <ipmpdidl:Contents>3E674F632A56BD56...</ipmpdidl:Contents>
    </ipmpdidl:Item>
    <ipmpdidl:Item>
      <ipmpdidl:Identifier>
        <dii:Identifier>IPMPid0002</dii:Identifier>
      </ipmpdidl:Identifier>
      <ipmpdidl:Info>
        <ipmpinfo:IPMPInfoDescriptor>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool1"/>
```

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```
          </ipmpinfo:Tool>
          <ipmpinfo:Tool>
            <ipmpinfo:ToolRef localidref="Tool3"/>
          </ipmpinfo:Tool>
          <ipmpinfo:RightsDescriptor>
            <ipmpinfo:License>
              <r:license>
                <r:encryptedLicense Type="http://www.w3.org/2001/04/xmlenc#Content">
                  <enc:EncryptionMethod Algorithm="http://www.w3.org/2001/04/xmlenc#3des-
cbc"/>
                  <dsig:KeyInfo>
                    <dsig:KeyName>OS2SymmetricKey</dsig:KeyName>
                  </dsig:KeyInfo>
                  <enc:CipherData>
                    <enc:CipherValue>SDfkDWEje90whg...</enc:CipherValue>
                  </enc:CipherData>
                </r:encryptedLicense>
              </r:license>
            </ipmpinfo:License>
          </ipmpinfo:RightsDescriptor>
        </ipmpinfo:IPMPInfoDescriptor>
      </ipmpdidl:Info>
      <ipmpdidl:Contents>A56BD5A63E6654F632...</ipmpdidl:Contents>
    </ipmpdidl:Item>
  </Container>
</DIDL>
```

C.6.2 Validation result

Output: 1.

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Annex D
(normative)

Tests for IPMP Amd.1

D.1 Introduction

See attached 21000-4 IPMP Amd1 zip file (bitstreams).

D.2 Test 1

D.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
    <Container>
        <Descriptor>
            <Statement mimeType="text/xml">
                <ipmpinfo:IPMPGeneralInfoDescriptor>
                    <ipmpinfo:ToolList>
                        <ipmpinfo:ToolDescription localID="Tool1">
    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
                        </ipmpinfo:ToolDescription>
                        <ipmpinfo:ToolDescription localID="Tool2">
    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABWD001:01:01</ipmpinfo:IPMPToolID>
                        </ipmpinfo:ToolDescription>
                    </ipmpinfo:ToolList>
                </ipmpinfo:IPMPGeneralInfoDescriptor>
            </Statement>
        </Descriptor>
        <Item>
            <Component>
                <ipmpdidl:Resource>
                    <ipmpdidl:Identifier>
                        <dii:Identifier>IPMPid0001</dii:Identifier>
                    </ipmpdidl:Identifier>
                    <ipmpdidl:Info>
                        <ipmpinfo:IPMPInfoDescriptor>
                            <ipmpinfo:Tool>
                                <ipmpinfo:ToolRef localidref="Tool1"/>
                            </ipmpinfo:Tool>
                        </ipmpinfo:IPMPInfoDescriptor>
                    </ipmpdidl:Info>
                    <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
                </ipmpdidl:Resource>
            </Component>
        </Item>
    </Container>
</DIDL>
```


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D.2.2 Validation result

Output: 0

Error occurs in line 17

Reason: According to guideline 2.a, Base Profile shall carry at most one ToolDescription.

D.3 Test 2

D.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
    <Container>
        <Descriptor>
            <Statement mimeType="text/xml">
                <ipmpinfo:IPMPGeneralInfoDescriptor>
                    <ipmpinfo:ToolList>
                        <ipmpinfo:ToolDescription localID="Tool1">
    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
                            <ipmpinfo:Remote
ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
                        </ipmpinfo:ToolDescription>
                    </ipmpinfo:ToolList>
                </ipmpinfo:IPMPGeneralInfoDescriptor>
            </Statement>
        </Descriptor>
        <Item>
            <Component>
                <ipmpdidl:Resource>
                    <ipmpdidl:Identifier>
                        <dii:Identifier>IPMPid0001</dii:Identifier>
                    </ipmpdidl:Identifier>
                    <ipmpdidl:Info>
                        <ipmpinfo:IPMPInfoDescriptor>
                            <ipmpinfo:Tool>
                                <ipmpinfo:ToolRef localidref="Tool1"/>
                                <ipmpinfo:InitializationSettings>
                                    <ipmpdidl:Info>
                                        <ipmpinfo:IPMPInfoDescriptor>
                                            <ipmpinfo:Tool>
                                                <ipmpinfo:ToolRef
localidref="Tool1"/>
                                            </ipmpinfo:Tool>
                                        </ipmpinfo:IPMPInfoDescriptor>
                                    </ipmpdidl:Info>
                                    <ipmpinfo:InitializationData>
                                        <key_length>128</key_length>
                                        <operating_mode>PBE</operating_mode>
                                        <encrypt_format>Based64</encrypt_format>
                    <initialization_vector>Adrad%daf&fa;</initialization_vector>
                                        <padding_scheme>PCK#5</padding_scheme>
                                    </ipmpinfo:InitializationData>
                                </ipmpinfo:InitializationSettings>
```

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```
                        </ipmpinfo:Tool>
                    </ipmpinfo:IPMPInfoDescriptor>
                </ipmpdidl:Info>
                <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
            </ipmpdidl:Resource>
        </Component>
    </Item>
</Container>
</DIDL>
```

D.3.2 Validation result

Output: 0

Error occurs in line 33

Reason: According to guideline 2.b, Base Profile shall have no protection recursion.

D.4 Test 3

D.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
    <Container>
        <Descriptor>
            <Statement mimeType="text/xml">
                <ipmpinfo:IPMPGeneralInfoDescriptor>
                    <ipmpinfo:ToolList>
                        <ipmpinfo:ToolDescription localID="Tool1">
    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
                            <ipmpinfo:Remote
ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
                            <ipmpinfo:RightsDescriptor>
                                <ipmpinfo:License>
                                    <r:license>
                                        <r:grant>
                                            <mx:execute/>
                                        </r:grant>
                                    </r:license>
                                </ipmpinfo:License>
                            </ipmpinfo:RightsDescriptor>
                        </ipmpinfo:ToolDescription>
                    </ipmpinfo:ToolList>
                    <ipmpinfo:LicenseCollection>
                        <ipmpinfo:RightsDescriptor>
                            <ipmpinfo:License>
                                <r:license>
                                    <r:grant>
                                        <mx:play/>
                                        <mx:diReference>

    <mx:identifier>IPMPid0001</mx:identifier>
```


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```
                                    </mx:diReference>
                                    <r:allConditions>
                                        <r:validityInterval>
                                            <r:notBefore>2007-04-
01T00:00:00</r:notBefore>
                                            <r:notAfter>2008-03-
31T12:59:59</r:notAfter>
                                        </r:validityInterval>
                                    </r:allConditions>
                                </r:grant>
                            </r:license>
                        </ipmpinfo:License>
                    </ipmpinfo:RightsDescriptor>
                </ipmpinfo:LicenseCollection>
            </ipmpinfo:IPMPGeneralInfoDescriptor>
        </Statement>
    </Descriptor>
    <Item>
        <Component>
            <ipmpdidl:Resource>
                <ipmpdidl:Identifier>
                    <dii:Identifier>IPMPid0001</dii:Identifier>
                </ipmpdidl:Identifier>
                <ipmpdidl:Info>
                    <ipmpinfo:IPMPInfoDescriptor>
                        <ipmpinfo:Tool>
                            <ipmpinfo:ToolRef localidref="Tool1"/>
                        </ipmpinfo:Tool>
                    </ipmpinfo:IPMPInfoDescriptor>
                </ipmpdidl:Info>
                <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
            </ipmpdidl:Resource>
        </Component>
    </Item>
  </Container>
</DIDL>
```

D.4.2 Validation result

Output: 0

Error occurs in line 17

Reason: According to guideline 2.c, Base Profile shall have no duplicated elements.

- RightsDescriptor is located only under IPMPGeneralInfoDescriptor/LicenseCollection.
- Signature element is located only under IPMPGeneralInfoDescriptor and/or IPMPInfoTest 4.

D.5 Test 4

D.5.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
```

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```
    <Container>
        <Descriptor>
            <Statement mimeType="text/xml">
                <ipmpinfo:IPMPGeneralInfoDescriptor>
                    <ipmpinfo:ToolList>
                        <ipmpinfo:ToolDescription localID="Tool1">

    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>

    <ipmpinfo:Inline>A56BD5A63E6654F632...</ipmpinfo:Inline>
                        </ipmpinfo:ToolDescription>
                    </ipmpinfo:ToolList>
                </ipmpinfo:IPMPGeneralInfoDescriptor>
            </Statement>
        </Descriptor>
        <Item>
            <Component>
                <ipmpdidl:Resource>
                    <ipmpdidl:Identifier>
                        <dii:Identifier>IPMPid0001</dii:Identifier>
                    </ipmpdidl:Identifier>
                    <ipmpdidl:Info>
                        <ipmpinfo:IPMPInfoDescriptor>
                            <ipmpinfo:Tool>
                                <ipmpinfo:ToolRef localidref="Tool1"/>
                            </ipmpinfo:Tool>
                        </ipmpinfo:IPMPInfoDescriptor>
                    </ipmpdidl:Info>
                    <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
                </ipmpdidl:Resource>
            </Component>
        </Item>
    </Container>
</DIDL>
```

D.5.2 Validation result

Output: 0

Error occurs in line 16

Reason: According to guideline 4, Base Profile shall not carry binary representation of a Tool.

D.6 Test 5

D.6.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
    <Container>
        <Descriptor>
            <Statement mimeType="text/xml">
                <ipmpinfo:IPMPGeneralInfoDescriptor>
```

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```
                    <ipmpinfo:ToolList>
                        <ipmpinfo:ToolDescription localID="Tool1">

    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
                            <ipmpinfo:MemberOf>
                                <ipmpinfo:AlternateGroup groupID="50"/>
                            </ipmpinfo:MemberOf>
                            <ipmpinfo:ConfigurationSettings/>
                        </ipmpinfo:ToolDescription>
                    </ipmpinfo:ToolList>
                </ipmpinfo:IPMPGeneralInfoDescriptor>
            </Statement>
        </Descriptor>
        <Item>
            <Component>
                <ipmpdidl:Resource>
                    <ipmpdidl:Identifier>
                        <dii:Identifier>IPMPid0001</dii:Identifier>
                    </ipmpdidl:Identifier>
                    <ipmpdidl:Info>
                        <ipmpinfo:IPMPInfoDescriptor>
                            <ipmpinfo:Tool>
                                <ipmpinfo:ToolRef localidref="Tool1"/>
                            </ipmpinfo:Tool>
                        </ipmpinfo:IPMPInfoDescriptor>
                    </ipmpdidl:Info>
                    <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
                </ipmpdidl:Resource>
            </Component>
        </Item>
    </Container>
</DIDL>
```

D.6.2 Validation result

Output: 0

Errors occur in line 16 and line 19

Reason: According to guideline 2.a and 3, Base Profile shall not carry MemberOf and ConfigurationSettings elements.

D.7 Test 6

D.7.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<DIDL xmlns="urn:mpeg:mpeg21:2002:02-DIDL-NS" xmlns:dii="urn:mpeg:mpeg21:2002:01-
DII-NS" xmlns:ipmpdidl="urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS"
xmlns:ipmpinfo="urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS"
xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS rel-mx.xsd
urn:mpeg:mpeg21:2004:01-IPMPINFO-BASE-NS IPMPGeneralInfo-AMD1.xsd
urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS IPMPDIDL.xsd
urn:mpeg:mpeg21:2002:01-DII-NS dii.xsd
urn:mpeg:mpeg21:2002:02-DIDL-NS DIDL.xsd ">
    <Container>
        <Item>
            <Component>
                <ipmpdidl:Resource>
                    <ipmpdidl:Identifier>
```

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```
                        <dii:Identifier>IPMPid0001</dii:Identifier>
                    </ipmpdidl:Identifier>
                    <ipmpdidl:Info>
                        <ipmpinfo:IPMPInfoDescriptor>
                            <ipmpinfo:Tool>
                                <ipmpinfo:ToolBaseDescription>
    <ipmpinfo:IPMPToolID>urn:mpegRA:mpeg21:IPMP:ABC002:56:79</ipmpinfo:IPMPToolID>
                                    <ipmpinfo:Remote
ref="urn:IPMPToolsServer:ToolPartEnc002-9090"/>
                                </ipmpinfo:ToolBaseDescription>
                            </ipmpinfo:Tool>
                        </ipmpinfo:IPMPInfoDescriptor>
                    </ipmpdidl:Info>
                    <ipmpdidl:Contents
ref="http://xxx.com/ProtectedAsset.resource"/>
                </ipmpdidl:Resource>
            </Component>
        </Item>
    </Container>
</DIDL>
```

D.7.2 Validation result

Output: 0

Errors occur in line 16 and line 19

Reason: According to guideline 2.c, Base Profile shall have no support for ToolBaseDescription. All Tool definition shall be carried in the ToolList element.

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Annex E
(normative)

Tests for Rights Expressions

E.1 Test 1

E.1.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Eva">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:grant>
      <r:keyHolder licensePartIdRef="Eva"/>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.1.2 Validation result

Output: 1.

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E.2 Test 2

E.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:keyHolder licensePartId="Eva">
           <r:info>
               <dsig:KeyValue>
                   <dsig:RSAKeyValue>
                       <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                       <dsig:Exponent>AQABAA==</dsig:Exponent>
                   </dsig:RSAKeyValue>
               </dsig:KeyValue>
           </r:info>
       </r:keyHolder>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:grant>
       <r:keyHolder licensePartId="Silvia" licensePartIdRef="Eva"/>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.2.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license.A LicensePart has both attributes, the licensePartId and licensePartIdRef
```


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E.3 Test 3

E.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.3.2 Validation result

Output: 1.

E.4 Test 4

E.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource licensePartId="Alice">
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
```

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```
          <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.4.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license, in the License there are more than one licensePartId with the same value.
```

E.5 Test 5

E.5.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:keyHolder licensePartId="Alice">
           <r:info>
               <dsig:KeyValue>
                   <dsig:RSAKeyValue>
                       <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                       <dsig:Exponent>AQABAA==</dsig:Exponent>
                   </dsig:RSAKeyValue>
               </dsig:KeyValue>
           </r:info>
       </r:keyHolder>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:grant>
       <r:keyHolder licensePartIdRef="Alice"/>
       <mx:enlarge/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.5.2 Validation result

Output: 1.

--`,,```,,,,````-`-`,,`,,`,`,,`---
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E.6 Test 6

E.6.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:grant>
      <r:keyHolder licensePartIdRef="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:enlarge/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.6.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. LicensePart with attribute licensePartIdRef not have empty content
```

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E.7 Test 7

E.7.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:grant>
      <r:keyHolder licensePartIdRef="Alice"/>
      <mx:enlarge/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.7.2 Validation result

Output: 1.

E.8 Test 8

E.8.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
```


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```
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:grant>
      <r:keyHolder licensePartIdRef="Lora"/>
      <mx:enlarge/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.8.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. License not have a licensePartId attribute with value Lora
```

E.9 Test 9

E.9.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource licensePartId="Music">
         <r:nonSecureIndirect URI="http://www.sony.com/music.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

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E.9.2 Validation result

Output: 1.

E.10 Test 10

E.10.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder licensePartId="Alice">
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource licensePartIdRef="Alice"/>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.10.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. The element name r:digitalResource not correspond any element with
attribute licensePartId.
```

E.11 Test 11

E.11.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant licensePartId="x">
      <r:issue/>
      <r:grant>
         <r:keyHolder licensePartId="Alice">
            <r:info>
               <dsig:KeyValue>
                  <dsig:RSAKeyValue>
                     <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
```


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```
                        <dsig:Exponent>AQABAA==</dsig:Exponent>
                    </dsig:RSAKeyValue>
                </dsig:KeyValue>
            </r:info>
        </r:keyHolder>
        <mx:play/>
        <r:digitalResource licensePartId="Music">
            <r:nonSecureIndirect URI="http://www.sony.com/music.mp3"/>
        </r:digitalResource>
    </r:grant>
  </r:grant>
  <r:issuer/>
</r:license>
```

E.11.2 Validation result

Output: 1.

E.12 Test 12

E.12.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
  <r:grant licensePartId="x">
      <r:issue/>
      <r:grant licensePartIdRef="x"/>
  </r:grant>
  <r:issuer/>
</r:license>
```

E.12.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. Element with attribute licensePartId is ancestor of the element with
attribute licensePartIdRef with the same value x
```

E.13 Test 13

E.13.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
  <r:grantGroup licensePartId="x">
      <r:grantGroup>
          <r:grant>
              <r:keyHolder licensePartId="Alice">
                  <r:info>
                      <dsig:KeyValue>
                          <dsig:RSAKeyValue>
```

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```
                            <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                            <dsig:Exponent>AQABAA==</dsig:Exponent>
                        </dsig:RSAKeyValue>
                    </dsig:KeyValue>
                </r:info>
            </r:keyHolder>
            <mx:play/>
            <r:digitalResource>
                <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
            </r:digitalResource>
            <r:validityInterval>
                <r:notBefore>2003-01-01T00:00:00</r:notBefore>
                <r:notAfter>2003-12-31T12:59:59</r:notAfter>
            </r:validityInterval>
        </r:grant>
        <r:grant>
            <r:keyHolder licensePartIdRef="Alice"/>
            <mx:enlarge/>
            <r:digitalResource>
                <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
            </r:digitalResource>
            <r:validityInterval>
                <r:notBefore>2003-01-01T00:00:00</r:notBefore>
                <r:notAfter>2003-12-31T12:59:59</r:notAfter>
            </r:validityInterval>
        </r:grant>
    </r:grantGroup>
</r:grantGroup>
<r:grantGroup licensePartId="y">
    <r:grantGroup licensePartIdRef="x"/>
</r:grantGroup>
<r:issuer/>
</r:license>
```

E.13.2 Validation result

Output: 1.

E.14 Test 14

E.14.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grantGroup licensePartId="x">
       <r:grantGroup licensePartIdRef="y"/>
   </r:grantGroup>
   <r:grantGroup licensePartId="y">
       <r:grantGroup licensePartIdRef="x"/>
   </r:grantGroup>
   <r:issuer/>
</r:license>
```

E.14.2 Validation result

Output: 0.

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Output from the reference software:

```
Invalid license. Element with attribute licensePartId is ancestor of the element with
attribute licensePartIdRef with the same value x
```

E.15 Test 15

E.15.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:forAll varName="content">
           <r:anXmlExpression/>
       </r:forAll>
       <mx:print/>
       <mx:diReference varRef="content"/>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.15.2 Validation result

Output: 1.

E.16 Test 16

E.16.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:forAll varName="content">
           <r:anXmlExpression/>
       </r:forAll>
       <mx:print/>
       <mx:diReference varRef="content">
           <mx:identifier>http://www.sony.com/music.mp3</mx:identifier>
       </mx:diReference>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.16.2 Validation result

Output: 0.

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Output from the reference software:

```
Invalid license. The element with atrribute varRef not have empty content
```

E.17 Test 17

E.17.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub"/>
       <mx:print/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.17.2 Validation result

Output: 1.

E.18 Test 18

E.18.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub1"/>
       <mx:print/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

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E.18.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. The element with atrribute varRef doesn't have any variable with the
same name
```

E.19 Test 19

E.19.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder>
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <r:right xsi:type="mx:Play"/>
      <mx:diReference>
         <mx:identifier>someResourceUri</mx:identifier>
      </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.19.2 Validation result

Output: 1.

E.20 Test 20

E.20.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder>
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
```

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```
      </r:keyHolder>
      <r:right xsi:type="r:Right"/>
      <mx:diReference>
          <mx:identifier>someResourceUri</mx:identifier>
      </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.20.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. A conceptually abstract element has a type that is conceptually
abstract and it not appears in the form of a variable reference.
```

E.21 Test 21

E.21.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder>
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <mx:diReference>
         <mx:identifier>someResourceUri</mx:identifier>
      </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.21.2 Validation result

Output: 1.

E.22 Test 22

E.22.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
```

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```
   <r:grant>
      <r:keyHolder>
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <r:right/>
      <mx:diReference>
         <mx:identifier>someResourceUri</mx:identifier>
      </mx:diReference>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.22.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. A conceptually abstract element has a type that is conceptually
abstract and it not appears in the form of a variable reference.
```

E.23 Test 23

E.23.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:keyHolder>
         <r:info>
            <dsig:KeyValue>
               <dsig:RSAKeyValue>
                  <dsig:Modulus>KtdToQQyzA==</dsig:Modulus>
                  <dsig:Exponent>AQABAA==</dsig:Exponent>
               </dsig:RSAKeyValue>
            </dsig:KeyValue>
         </r:info>
      </r:keyHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
      </r:digitalResource>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.23.2 Validation result

Output: 1.

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E.24 Test 24

E.24.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:keyHolder/>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
       </r:digitalResource>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.24.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. The element r:keyHolder is empty and not have the attribute
licensePartIdRef or varRef
```

E.25 Test 25

E.25.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
       <r:encryptedGrant Type="http://www.w3.org/2001/04/xmlenc#Content">
           <xenc:CipherData>
               <xenc:CipherValue>KtdToQQyzA==</xenc:CipherValue>
           </xenc:CipherData>
       </r:encryptedGrant>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.25.2 Validation result

Output: 1.

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E.26 Test 26

E.26.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grant>
      <r:encryptedGrant>
         <xenc:CipherData>
            <xenc:CipherValue>KtdToQQyzA==</xenc:CipherValue>
         </xenc:CipherData>
      </r:encryptedGrant>
   </r:grant>
   <r:issuer/>
</r:license>
```

E.26.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid License. The EncryptedContent not have a xenc:Type attribute
```

E.27 Test 27

E.27.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grantGroup>
      <r:forAll varName="AliceClub">
         <r:propertyPossessor>
            <sx:propertyUri definition="urn:edu:elibrary"/>
         </r:propertyPossessor>
      </r:forAll>
      <r:principal varRef="AliceClub"/>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
      <r:grant>
         <mx:print/>
         <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
         </r:digitalResource>
      </r:grant>
   </r:grantGroup>
   <r:issuer/>
</r:license>
```

E.27.2 Validation result

Output: 1.

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E.28 Test 28

E.28.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grantGroup>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub"/>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
       <r:grant>
           <r:digitalResource>
               <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
           </r:digitalResource>
       </r:grant>
   </r:grantGroup>
   <r:issuer/>
</r:license>
```

E.28.2 Validation result

Output: 0.

Output from the reference software:

```
Validation failed. Message=[Element 'urn:mpeg:mpeg21:2003:01-REL-R-NS:grant' has invalid
child element 'urn:mpeg:mpeg21:2003:01-REL-R-NS:digitalResource'. Expected
'urn:mpeg:mpeg21:2003:01-REL-R-NS:forAll urn:mpeg:mpeg21:2003:01-REL-R-
NS:delegationControl urn:mpeg:mpeg21:2003:01-REL-R-NS:allPrincipals
urn:mpeg:mpeg21:2003:01-REL-R-NS:keyHolder urn:mpeg:mpeg21:2003:01-REL-R-NS:principal
urn:mpeg:mpeg21:2003:01-REL-MX-NS:enhance urn:mpeg:mpeg21:2003:01-REL-MX-NS:reduce
urn:mpeg:mpeg21:2003:01-REL-MX-NS:move urn:mpeg:mpeg21:2003:01-REL-MX-NS:print
urn:mpeg:mpeg21:2003:01-REL-MX-NS:execute urn:mpeg:mpeg21:2003:01-REL-MX-NS:play
urn:mpeg:mpeg21:2003:01-REL-R-NS:revoke urn:mpeg:mpeg21:2003:01-REL-MX-NS:uninstall
urn:mpeg:mpeg21:2003:01-REL-MX-NS:adapt urn:mpeg:mpeg21:2003:01-REL-MX-NS:modify
urn:mpeg:mpeg21:2003:01-REL-R-NS:issue urn:mpeg:mpeg21:2003:01-REL-MX-NS:diminish
urn:mpeg:mpeg21:2003:01-REL-MX-NS:embed urn:mpeg:mpeg21:2003:01-REL-MX-NS:install
urn:mpeg:mpeg21:2003:01-REL-R-NS:possessProperty urn:mpeg:mpeg21:2003:01-REL-MX-NS:enlarge
urn:mpeg:mpeg21:2003:01-REL-R-NS:obtain urn:mpeg:mpeg21:2003:01-REL-MX-NS:delete
urn:mpeg:mpeg21:2003:01-REL-SX-NS:rightUri urn:mpeg:mpeg21:2003:01-REL-R-NS:right
urn:mpeg:mpeg21:2003:01-REL-R-NS:encryptedGrant'. An error occurred at rel28.xml(15, 5).]
```


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E.29 Test 29

E.29.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:mx="urn:mpeg:mpeg21:2003:01-
REL-MX-NS" xmlns:xenc="http://www.w3.org/2001/04/xmlenc#"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-MX-NS schemas/rel-mx.xsd">
   <r:grantGroup>
       <r:forAll varName="AliceClub">
           <r:propertyPossessor>
               <sx:propertyUri definition="urn:edu:elibrary"/>
           </r:propertyPossessor>
       </r:forAll>
       <r:principal varRef="AliceClub"/>
       <mx:print/>
       <r:validityInterval>
           <r:notBefore>2003-01-01T00:00:00</r:notBefore>
           <r:notAfter>2003-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
       <r:grant>
           <mx:print/>
           <r:digitalResource>
               <r:nonSecureIndirect URI="http://www.onlinemusic.com/mySong.mp3"/>
           </r:digitalResource>
       </r:grant>
   </r:grantGroup>
   <r:issuer/>
</r:license>
```

E.29.2 Validation result

Output: 0.

Output from the reference software:

```
Validation failed. Message=[Element 'urn:mpeg:mpeg21:2003:01-REL-R-NS:grantGroup' has
invalid child element 'urn:mpeg:mpeg21:2003:01-REL-MX-NS:print'. Expected
'urn:mpeg:mpeg21:2003:01-REL-SX-NS:validityTimePeriodic urn:mpeg:mpeg21:2003:01-REL-MX-
NS:resourceSignedBy urn:mpeg:mpeg21:2003:01-REL-SX-NS:trackQuery urn:mpeg:mpeg21:2003:01-
REL-MX-NS:isMarked urn:mpeg:mpeg21:2003:01-REL-R-NS:exerciseMechanism
urn:mpeg:mpeg21:2003:01-REL-SX-NS:validityIntervalFloating urn:mpeg:mpeg21:2003:01-REL-
MX-NS:diCriteria urn:mpeg:mpeg21:2003:01-REL-SX-NS:feePerInterval
urn:mpeg:mpeg21:2003:01-REL-MX-NS:destination urn:mpeg:mpeg21:2003:01-REL-SX-
NS:feeMetered urn:mpeg:mpeg21:2003:01-REL-MX-NS:transaction urn:mpeg:mpeg21:2003:01-REL-
R-NS:fulfiller urn:mpeg:mpeg21:2003:01-REL-MX-NS:helper urn:mpeg:mpeg21:2003:01-REL-SX-
NS:exerciseLimit urn:mpeg:mpeg21:2003:01-REL-SX-NS:feePerUsePrePay
urn:mpeg:mpeg21:2003:01-REL-R-NS:validityInterval urn:mpeg:mpeg21:2003:01-REL-SX-
NS:feePerUse urn:mpeg:mpeg21:2003:01-REL-SX-NS:callForCondition urn:mpeg:mpeg21:2003:01-
REL-MX-NS:source urn:mpeg:mpeg21:2003:01-REL-SX-NS:feeFlat urn:mpeg:mpeg21:2003:01-REL-
MX-NS:prohibitedAttributeChanges urn:mpeg:mpeg21:2003:01-REL-MX-NS:mark
urn:mpeg:mpeg21:2003:01-REL-R-NS:revocationFreshness urn:mpeg:mpeg21:2003:01-REL-SX-
NS:transferControl urn:mpeg:mpeg21:2003:01-REL-SX-NS:territory urn:mpeg:mpeg21:2003:01-
REL-SX-NS:validityIntervalStartsNow urn:mpeg:mpeg21:2003:01-REL-R-NS:existsRight
urn:mpeg:mpeg21:2003:01-REL-SX-NS:trackReport urn:mpeg:mpeg21:2003:01-REL-SX-
NS:seekApproval urn:mpeg:mpeg21:2003:01-REL-MX-NS:diPartOf urn:mpeg:mpeg21:2003:01-REL-R-
NS:allConditions urn:mpeg:mpeg21:2003:01-REL-R-NS:prerequisiteRight
urn:mpeg:mpeg21:2003:01-REL-SX-NS:validityTimeMetered urn:mpeg:mpeg21:2003:01-REL-MX-
NS:requiredAttributeChanges urn:mpeg:mpeg21:2003:01-REL-MX-NS:renderer
urn:mpeg:mpeg21:2003:01-REL-R-NS:condition urn:mpeg:mpeg21:2003:01-REL-R-NS:grant
urn:mpeg:mpeg21:2003:01-REL-R-NS:grantGroup'. An error occurred at rel29.xml(10, 4).]
```

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Annex F
(normative)

Tests for REL Amd.1

F.1 Test 1

F.1.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
       <m1x:identityHolder licensePartId="MobSysAcme">
           <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
           <m1x:idValue>IMSI:2232111123</m1x:idValue>
       </m1x:identityHolder>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="urn:movie:clips:hero_trailer.mpeg"/>
       </r:digitalResource>
       <r:allConditions>
           <r:validityInterval>
               <r:notAfter>2007-02-13T15:30:00</r:notAfter>
           </r:validityInterval>
           <sx:validityTimeMetered>
               <sx:duration>P14D</sx:duration>
           </sx:validityTimeMetered>
       </r:allConditions>
   </r:grant>
   <r:issuer>
       <r:keyHolder>
           <r:info>
               <dsig:KeyName>Rights Issuer Public Key Name</dsig:KeyName>
           </r:info>
       </r:keyHolder>
   </r:issuer>
</r:license>
```

F.1.2 Validation result

Output: 1.

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F.2 Test 2

F.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
      <m1x:identityHolder licensePartId="MobSysAcme" licensePartIdRef="MobSysOMA">
         <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
         <m1x:idValue>IMSI:2232111123</m1x:idValue>
      </m1x:identityHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="urn:movie:clips:hero_trailer.mpeg"/>
      </r:digitalResource>
      <r:allConditions>
         <r:validityInterval>
            <r:notAfter>2007-02-13T15:30:00</r:notAfter>
         </r:validityInterval>
         <sx:validityTimeMetered>
            <sx:duration>P14D</sx:duration>
         </sx:validityTimeMetered>
      </r:allConditions>
   </r:grant>
   <r:issuer>
      <r:keyHolder>
         <r:info>
            <dsig:KeyName>Rights Issuer Public Key Name</dsig:KeyName>
         </r:info>
      </r:keyHolder>
   </r:issuer>
</r:license>
```

F.2.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license.A LicensePart has both attributes, the licensePartId and licensePartIdRef
```

F.3 Test 3

F.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
```

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```
    <r:grant>
        <m1x:identityHolder licensePartId="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

F.3.2 Validation result

Output: 1.

F.4 Test 4

F.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
    <r:grant licensePartId="MobSys">
        <m1x:identityHolder licensePartId="MobSys">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

F.4.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license, in the License there are more than one licensePartId with the same
value.
```


--`,,```,,,,````-`-`,,`,,`,`,,`---
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F.5 Test 5

F.5.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
      <m1x:identityHolder licensePartId="MobSysAcme">
         <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
         <m1x:idValue>IMSI:2232111123</m1x:idValue>
      </m1x:identityHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2003-01-01T00:00:00</r:notBefore>
         <r:notAfter>2003-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:grant>
      <m1x:identityHolder licensePartId="MobSysCC">
         <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
         <m1x:idValue>IMSI:223SERDGGAGF</m1x:idValue>
      </m1x:identityHolder>
      <mx:play/>
      <r:digitalResource>
         <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
      </r:digitalResource>
      <r:validityInterval>
         <r:notBefore>2007-01-01T00:00:00</r:notBefore>
         <r:notAfter>2007-12-31T12:59:59</r:notAfter>
      </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

F.5.2 Validation result

Output: 1.

F.6 Test 6

F.6.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
```

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```
    <r:grant>
        <m1x:identityHolder licensePartId="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="hurn:movie:clips:hero_trailer.mpeg"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        <m1x:identityHolder licensePartIdRef="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:execute/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="urn:movie:clips:hero_trailer.mpeg"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

F.6.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. LicensePart with attribute licensePartIdRef not have empty content
```

F.7 Test 7

F.7.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
    <r:grant>
        <m1x:identityHolder licensePartId="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="urn:song:traks:song2.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
```


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```
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        < m1x:identityHolder licensePartIdRef="MobSysAcme"/>
        <mx:execute/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="http://www.onlinemusic.com/song.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2003-01-01T00:00:00</r:notBefore>
            <r:notAfter>2003-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

F.7.2 Validation result

Output: 1.

F.8 Test 8

F.8.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
    <r:grant>
        <m1x:identityHolder licensePartId="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="urn:song:traks:song2.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:grant>
        <m1x:identityHolder licensePartIdRef="Lora"/>
        <mx:execute/>
        <r:digitalResource>
            <r:nonSecureIndirect URI="urn:song:traks:song2.mp3"/>
        </r:digitalResource>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

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F.8.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. License not have a licensePartId attribute with value Lora
```

F.9 Test 9

F.9.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
       <m1x:identityHolder licensePartId="MobSysAcme">
           <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
           <m1x:idValue>IMSI:2232111123</m1x:idValue>
       </m1x:identityHolder>
       <mx:play/>
       <r:digitalResource licensePartId="Music">
           <r:nonSecureIndirect URI="http://www.sony.com/music.mp3"/>
       </r:digitalResource>
       <r:validityInterval>
           <r:notBefore>2007-01-01T00:00:00</r:notBefore>
           <r:notAfter>2007-12-31T12:59:59</r:notAfter>
       </r:validityInterval>
   </r:grant>
   <r:issuer/>
</r:license>
```

F.9.2 Validation result

Output: 1.

F.10 Test 10

F.10.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
       <m1x:identityHolder licensePartId="MobSysAcme">
           <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
```


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```
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <mx:play/>
        <r:digitalResource licensePartIdRef="MobSysAcme"/>
        <r:validityInterval>
            <r:notBefore>2007-01-01T00:00:00</r:notBefore>
            <r:notAfter>2007-12-31T12:59:59</r:notAfter>
        </r:validityInterval>
    </r:grant>
    <r:issuer/>
</r:license>
```

F.10.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. The element name r:digitalResource not correspond any element with
attribute licensePartId.
```

F.11 Test 11

F.11.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
    <r:grant licensePartId="x">
        <m1x:identityHolder licensePartId="MobSysAcme">
            <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
            <m1x:idValue>IMSI:2232111123</m1x:idValue>
        </m1x:identityHolder>
        <r:issue/>
        <r:grant>
            <r:keyHolder licensePartIdRef="Alice"/>
            <mx:play/>
            <r:digitalResource licensePartId="Music">
                <r:nonSecureIndirect URI="http://www.sony.com/music.mp3"/>
            </r:digitalResource>
        </r:grant>
    </r:grant>
</r:license>
```

F.11.2 Validation result

Output: 1.

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F.12 Test 12

F.12.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant licensePartId="x">
       <r:issue/>
       <r:grant licensePartIdRef="x"/>
   </r:grant>
   <r:issuer/>
</r:license>
```

F.12.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. Element with attribute licensePartId is ancestor of the element with
attribute licensePartIdRef with the same value x
```

F.13 Test 13

F.13.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
       <m1x:identityHolder>
           <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
           <m1x:idValue>IMSI:2232111123</m1x:idValue>
       </m1x:identityHolder>
       <m1x:governedCopy/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="urn:movie:clips:hero_trailer.mpeg"/>
       </r:digitalResource>
       <m1x:drmSystem>
                  <m1x:identifier>urn:ACME_STORAGEMEDIA_SYSTEM:Version10</m1x:identifier>
       </m1x:drmSystem>
      </r:grant>
</r:license>
```

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F.13.2 Validation result

Output: 1.

F.14 Test 14

F.14.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<r:license xmlns:r="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:sx="urn:mpeg:mpeg21:2003:01-
REL-SX-NS" xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS"
xmlns:m1x="urn:mpeg:mpeg21:2005:01-REL-M1X-NS"
xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
xmlns:enc="http://www.w3.org/2001/04/xmlenc#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-REL-R-NS ../schemas/rel-r-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-SX-NS ../schemas/rel-sx-mam-v1.xsd
urn:mpeg:mpeg21:2003:01-REL-MX-NS ../schemas/rel-mx-mam-v1.xsd
urn:mpeg:mpeg21:2005:01-REL-M1X-NS ../schemas/rel-m1x.xsd">
   <r:grant>
       <m1x:identityHolder>
           <m1x:idSystem>urn:acme:imsi</m1x:idSystem>
           <m1x:idValue>IMSI:2232111123</m1x:idValue>
       </m1x:identityHolder>
       <mx:play/>
       <r:digitalResource>
           <r:nonSecureIndirect URI="urn:movie:clips:hero_trailer.mpeg"/>
       </r:digitalResource>
       <m1x:drmSystem>
           <m1x:identifier>urn:ACME_STORAGEMEDIA_SYSTEM:Version10</m1x:identifier>
       </m1x:drmSystem>
   </r:grant>
   <r:issuer>
       <r:keyHolder>
           <r:info>
               <dsig:KeyName>Rights Issuer Public Key Name</dsig:KeyName>
           </r:info>
       </r:keyHolder>
   </r:issuer>
</r:license>
```

F.14.2 Validation result

Output: 0.

Output from the reference software:

```
Invalid license. The right element for a license with drmSystem condition must be
governedCopy or governedMove.
```

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Annex G
(normative)

Tests for REL Amd.2

G.1.1 Introduction

See attached 21000-5 REL Amd2 zip file.

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Annex H
(normative)

Tests for DIA Descriptions

H.1.1 gBSD test streams

This section describes the gBSD test streams as well as the results when processed with the reference software implementation of the gBSDtoBin process from the gBSDtoBin Reference Software. For each test stream we provide “highlights” from the gBSD and the output of the gBSDtoBin reference software.

See also attached 21000-7 DIA zip file (gBSD folder).

H.1.1.1 Example 1

This example demonstrates how the absolute address mode is handled. When using absolute address mode the exact start position in the original bitstream and the length have to be specified.

H.1.1.1.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="J2K"
      href="urn:jpeg:jpeg2000:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="data.bin">
    <gBSDUnit length="10">
      <gBSDUnit start="0" length="4"></gBSDUnit>
      <gBSDUnit start="8" length="2"></gBSDUnit>
      <gBSDUnit start="10" length="4"></gBSDUnit>
    </gBSDUnit>
  </dia:Description>
```

H.1.1.2 gBSDtoBin result

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="J2K"
      href="urn:jpeg:jpeg2000:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="data.bin">
    <gBSDUnit length="10">
      <gBSDUnit start="0" length="4"></gBSDUnit>
      <gBSDUnit start="4" length="2"></gBSDUnit>
      <gBSDUnit start="6" length="4"></gBSDUnit>
```

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```
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

The result shows that the start value of the third gBSDUnit was set to 4 bytes, because in the adapted bitstream the third gBSDUnit starts directly after the second.

H.1.2 Example 2

This example demonstrates how the consecutive address mode is handled. When using consecutive address mode, only the length value has to be specified, if no start value is set the gBSDNode starts directly after the previous. If there is also no start value specified for the first node, the start value is set to 0 bytes. In this example there is no start value set and the address unit changes to bit.

H.1.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="J2K"
      href="urn:jpeg:jpeg2000:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Consecutive" bs1:bitstreamURI="data.bin">
    <gBSDUnit length="10">
      <gBSDUnit length="18" addressUnit="bit"></gBSDUnit>
      <gBSDUnit length="47" addressUnit="bit"></gBSDUnit>
      <gBSDUnit length="15" addressUnit="bit"></gBSDUnit>
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

H.1.2.1.1 gBSDtoBin result

In this case the result is equal to the input gBSD, as there is nothing to update. Nevertheless, this example demonstrates how the start value is calculated for the creation of the adapted bitstream. The second gBSDUnit starts at the position 0 and has a length of 18 bit. Therefore the third gBSDUnit starts at the position 18 bit, and has length of 47 bit, which makes up a start value of 65 bit for the last unit.

H.1.2.2 Example 3

This example demonstrates how the offset address mode is handled. When using offset address mode, the start value specifies the offset to the parent.

H.1.2.2.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="J2K"
      href="urn:jpeg:jpeg2000:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
```


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```
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Offset" bs1:bitstreamURI="data.bin">
    <gBSDUnit start="0" length="10">
      <gBSDUnit start="0" length="4"></gBSDUnit>
      <gBSDUnit start="4" length="2"></gBSDUnit>
      <gBSDUnit start="8" length="4"></gBSDUnit>
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

H.1.2.2.2 gBSDtoBin result

For this example the result is equal to the input gBSD, but it demonstrates how to calculate the start value in the original bitstream when using offset address mode. The start value of the fourth gBSDUnit specifies an offset of 8 byte to the parent. As the previous sibling has a start value of 4 byte and a length of 2 bytes, this specifies an offset of 2 bytes to the previous sibling.

H.1.2.3 Example 4

This example demonstrates how a start value is handled when using consecutive address mode. The start value specifies an offset to the previous sibling. This example shows also, how the start values are handled if there is a change concerning the address unit.

H.1.2.3.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Consecutive" bs1:bitstreamURI="data.bin">
    <gBSDUnit start="5" length="10">
      <gBSDUnit length="17" addressUnit="bit"></gBSDUnit>
      <gBSDUnit start="14" length="47" addressUnit="bit"></gBSDUnit>
      <gBSDUnit start="2" length="16" addressUnit="bit"></gBSDUnit>
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

H.1.2.3.2 gBSDtoBin result

Like in the examples before, the result is the same as in the input gBSD. However, it demonstrates the calculation of the start value when using consecutive address mode. The start value for the second gBSDUnit is 40 bit, as the parent specifies a start value of 5 bytes. The third unit has a start value of 71 bit, which consists of the previous siblings start value of 40 bit, and length value of 17 bit and its own start value of 14 bit. The start value for the last unit is 120 bit, which consists of the previous start value and length and its own start value of 2 bit.

H.1.2.4 Example 5

This example demonstrates how a start value of a gBSDUnit with address mode offset affects a sibling with a start value and address mode consecutive. Furthermore, it shows again the effect of a change in the address unit.

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H.1.2.4.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="data.bin">
    <gBSDUnit start="0" length="10">
      <gBSDUnit start="0" length="2" addressMode="Offset"></gBSDUnit>
      <gBSDUnit start="40" length="30" addressUnit="bit"
        addressMode="Offset"></gBSDUnit>
      <gBSDUnit start="5" length="18" addressUnit="bit"
        addressMode="Consecutive"></gBSDUnit>
      <gBSDUnit start="3" length="6" addressUnit="bit"
        addressMode="Consecutive"></gBSDUnit>
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

H.1.2.4.2 gBSDtoBin result

Once again, the result is the same as in the input gBSD, but the calculation of the start values is demonstrated. The start value of the third gBSDUnit is 40 bit, as it specifies a start value of 40 bit and the start value of the parent is 0 bit/byte. The fourth unit has a start value of 75 bit, which consists of the previous sibling's start and length value and its own start value of 5 bit. Finally, the start value for the last unit is 96 bits.

H.1.2.5 Example 6

This example demonstrates the transformation of an JPEG 2000 input file to an adapted file. The main parameters for the picture are specified in the unit with the label ":J2K:MainHeader". In this example the parameters for the picture size are shown, which can be found In the unit with the ":J2K:SIZ" label. The parameters are followed by the ":J2K:Packet" units, which contain the picture data.

H.1.2.5.1 XML declaration

```
<?xmlversion="1.0"encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="J2K"
      href="urn:jpeg:jpeg2000:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="content/shanghai.jp2">
    <gBSDUnit syntacticalLabel=":J2K:MainHeader" start="0"
      length="117">
      <gBSDUnit syntacticalLabel=":J2K:SOC" start="0"
        length="2"></gBSDUnit>
      <gBSDUnit syntacticalLabel=":J2K:SIZ" start="2" length="43">
        <gBSDUnit addressMode="Consecutive" length="43">
          <gBSDUnit length="2"></gBSDUnit>
          <!-- ... -->
          <Parameter name=":J2K:Xsiz" length="4">
            <Value xsi:type="xs:unsignedInt">256</Value>
          </Parameter>
          <Parameter name=":J2K:Ysiz" length="4">
            <Value xsi:type="xs:unsignedInt">192</Value>
          </Parameter>
```


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```
          <!-- ... -->
          <Parameter name=":J2K:XTsiz" length="4">
            <Value xsi:type="xs:unsignedInt">256</Value>
          </Parameter>
          <Parameter name=":J2K:YTsiz" length="4">
            <Value xsi:type="xs:unsignedInt">192</Value>
          </Parameter>
          <!-- ... -->
        </gBSDUnit>
      </gBSDUnit>
      <gBSDUnit syntacticalLabel=":J2K:Packet" start="149" length="267"
        marker="L0 R0 C0 P0">
        <gBSDUnit addressMode="Consecutive" length="267">
          <gBSDUnit length="2"></gBSDUnit>
          <Parameter name=":J2K:LMarker" length="2">
            <Value xsi:type="xs:unsignedShort">4</Value>
          </Parameter>
          <Parameter name=":J2K:Nsop" length="2">
            <Value xsi:type="xs:unsignedShort">0</Value>
          </Parameter>
          <gBSDUnit length="261"></gBSDUnit>
        </gBSDUnit>
      </gBSDUnit>
    <!-- ... -->
  </dia:Description>
</dia:DIA>
```

H.1.2.5.2 gBSDtoBinResult

The result is for the most part the same as the input gBSD, only some start values will be updated.

H.1.2.6 Example 7

This example demonstrates the transformation of an MPEG-4 Visual Elementary Stream to an adapted bitstream.

H.1.2.6.1 XML declaration

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="M4V"
      href="urn:mpeg:mpeg4:visual:cs:syntacticalLabels"/>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="content/foreman.cmp">
    <gBSDUnit syntacticalLabel=":M4V:VO" start="0" length="4"/>
    <gBSDUnit syntacticalLabel=":M4V:VOL" start="4" length="14"/>
    <gBSDUnit start="18" length="62803"
      marker="ICRAParentalRatingViolenceCS-6">
      <gBSDUnit syntacticalLabel=":M4V:I VOP" start="18"
        length="6445"/>
      <gBSDUnit syntacticalLabel=":M4V:P VOP" start="6463"
        length="1737"/>
      <gBSDUnit syntacticalLabel=":M4V:P VOP" start="8874"
        length="1948"/>
      <gBSDUnit syntacticalLabel=":M4V:P VOP" start="11621"
        length="1752"/>
    <!-- ... -->
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

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H.1.2.6.2 gBSDtoBinResult

```
<?xml version="1.0" encoding="UTF-8"?>
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <dia:DescriptionMetadata>
    <dia:ClassificationSchemeAlias alias="M4V"
      href="urn:mpeg:mpeg4:visual:cs:syntacticalLabels">
    </dia:ClassificationSchemeAlias>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="byte"
    addressMode="Absolute" bs1:bitstreamURI="content/foreman.cmp">
    <gBSDUnit syntacticalLabel=":M4V:VO" start="0"
      length="4"></gBSDUnit>
    <gBSDUnit syntacticalLabel=":M4V:VOL" start="4"
       length="14"></gBSDUnit>
    <gBSDUnit start="18" length="62803"
      marker="ICRAParentalRatingViolenceCS-6">
      <gBSDUnit syntacticalLabel=":M4V:I_VOP" start="18"
        length="6445"></gBSDUnit>
      <gBSDUnit syntacticalLabel=":M4V:P_VOP" start="6463"
        length="1737"></gBSDUnit>
      <gBSDUnit syntacticalLabel=":M4V:P_VOP" start="8200"
        length="1948"></gBSDUnit>
      <gBSDUnit syntacticalLabel=":M4V:P_VOP" start="10148"
        length="1752"></gBSDUnit>
    <!-- ... -->
    </gBSDUnit>
  </dia:Description>
</dia:DIA>
```

In the result some start values were updated.

H.1.2.7 Example 8

This example demonstrates the transformation of an MPEG-4 BSAC input bitstream to an adapted bitstream.

H.1.2.7.1 XML declaration

```
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <dia:Description xsi:type="gBSDType" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/jm_44k_mono.bsac">
    <gBSDUnit start="0" length="624">
      <gBSDUnit length="208" addressMode="Consecutive">
        <Parameter length="11">
          <Value xsi:type="b11">78</Value>
        </Parameter>
        <gBSDUnit length="5"/>
        <Parameter length="6">
          <Value xsi:type="b6">36</Value>
        </Parameter>
        <gBSDUnit length="186"/>
      </gBSDUnit>
      <gBSDUnit length="416" marker="el0-0el1-8el2-24el3-32el4-48el5-56el6-64el7-80el8-
88el9-104el10-112el11-128el12-136el13-152el14-160el15-168el16-184el17-192el18-208el19-
216el20-232el21-240el22-256el23-264el24-280el25-288el26-296el27-312el28-320el29-336el30-
```


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```
344el31-360el32-368el33-384el34-392el35-408el36-416el37-424el38-440el39-448el40-464el41-
472el42-488el43-496el44-512el45-520el46-528el47-544el48-2472e" addressMode="Consecutive"/>
    </gBSDUnit>
    <gBSDUnit start="2680" length="624">
      <gBSDUnit length="208" addressMode="Consecutive">
        <Parameter length="11">
          <Value xsi:type="b11">78</Value>
        </Parameter>
        <gBSDUnit length="5"/>
        <Parameter length="6">
          <Value xsi:type="b6">36</Value>
        </Parameter>
        <gBSDUnit length="186"/>
      </gBSDUnit>
      <gBSDUnit length="416" marker="el0-0el1-8el2-24el3-32el4-48el5-56el6-64el7-80el8-
88el9-104el10-112el11-128el12-136el13-152el14-160el15-168el16-184el17-192el18-208el19-
216el20-232el21-240el22-256el23-264el24-280el25-288el26-296el27-312el28-320el29-336el30-
344el31-360el32-368el33-384el34-392el35-408el36-416el37-424el38-440el39-448el40-464el41-
472el42-488el43-496el44-512el45-520el46-528el47-544el48-2344e" addressMode="Consecutive"/>
    </gBSDUnit>
    <!-- ... -->
  </dia:Description>
</dia:DIA>
```

H.1.2.7.2 gBSDtoBin Result

```
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
  xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
  xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <dia:Description xsi:type="gBSDType" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/jm_44k_mono.bsac">
    <gBSDUnit start="0" length="624">
      <gBSDUnit length="208" addressMode="Consecutive">
        <Parameter length="11">
          <Value xsi:type="b11">78</Value>
        </Parameter>
        <gBSDUnit length="5"></gBSDUnit>
        <Parameter length="6">
          <Value xsi:type="b6">36</Value>
        </Parameter>
        <gBSDUnit length="186"></gBSDUnit>
      </gBSDUnit>
      <gBSDUnit length="416" marker="el0-0el1-8el2-24el3-32el4-48el5-56el6-64el7-80el8-
88el9-104el10-112el11-128el12-136el13-152el14-160el15-168el16-184el17-192el18-208el19-
216el20-232el21-240el22-256el23-264el24-280el25-288el26-296el27-312el28-320el29-336el30-
344el31-360el32-368el33-384el34-392el35-408el36-416el37-424el38-440el39-448el40-464el41-
472el42-488el43-496el44-512el45-520el46-528el47-544el48-2472e"
addressMode="Consecutive"></gBSDUnit>
    </gBSDUnit>
    <gBSDUnit start="624" length="624">
      <gBSDUnit length="208" addressMode="Consecutive">
        <Parameter length="11">
          <Value xsi:type="b11">78</Value>
        </Parameter>
        <gBSDUnit length="5"></gBSDUnit>
        <Parameter length="6">
          <Value xsi:type="b6">36</Value>
        </Parameter>
        <gBSDUnit length="186"></gBSDUnit>
      </gBSDUnit>
      <gBSDUnit length="416" marker="el0-0el1-8el2-24el3-32el4-48el5-56el6-64el7-80el8-
88el9-104el10-112el11-128el12-136el13-152el14-160el15-168el16-184el17-192el18-208el19-
216el20-232el21-240el22-256el23-264el24-280el25-288el26-296el27-312el28-320el29-336el30-
344el31-360el32-368el33-384el34-392el35-408el36-416el37-424el38-440el39-448el40-464el41-
```

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```
472e142-488e143-496e144-512e145-520e146-528e147-544e148-2344e"
addressMode="Consecutive"></gBSDUnit>
    </gBSDUnit>
    <!-- ... -->
  </dia:Description>
</dia:DIA>
```

In the result some start values were updated.

H.1.3 gBSDtoAU test streams

See also attached 21000-7 DIA zip file (gBSDtoAU folder).

H.1.3.1 Example 1

This example (`bsac_22khz_gBSD_10_with_SI.xml`) demonstrates usage of the media streaming instructions using the `msi:au` property. The gBSD describes a MPEG-4 BSAC bitstream and each frame corresponds to an AU indicated by `msi:au="true"`.

H.1.3.1.1 XML declaration

```
<dia:DIA xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:xmlsi="urn:mpeg:mpeg21:2003:01-DIA-XSI-NS"
xmlns:msi="urn:mpeg:mpeg21:2003:01-DIA-MSI-NS"
xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS ../gBSSchema.xsd
urn:mpeg:mpeg21:2003:01-DIA-MSI-NS ../MSI.xsd urn:mpeg:mpeg21:2003:01-DIA-XSI-NS
../XSI.xsd">
  <dia:DescriptionMetadata xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <dia:ClassificationSchemeAlias alias="MA4"
href="urn:mpeg:mpeg4:audio:cs:syntacticalLabels"/>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" xmlsi:timeMode="relative"
xmlsi:timescale="1000" xmlsi:timeInterval="1280"
xmlsi:puMode="ancestorsDescendants" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/bsac_22khz.raw">
    <gBSDUnit xmlsi:anchorElement="true" msi:au="true" start="0" length="1576">
      <gBSDUnit syntacticalLabel=":MA4:BSAC:BSAC_frame_element" start="0"
length="1576">
        <Parameter start="0" length="11" marker="offset">
          <Value xsi:type="b11">197</Value>
        </Parameter>
        <gBSDUnit start="11" length="5"/>
        <Parameter start="16" length="6" marker="update">
          <Value xsi:type="b6">48</Value>
        </Parameter>
        <gBSDUnit start="22" length="370"/>
        <gBSDUnit start="392" length="1184" marker="bitrate">
          <gBSDUnit start="392" length="24" marker="L:1"/>
          <gBSDUnit start="416" length="24" marker="L:2"/>
          <gBSDUnit start="440" length="24" marker="L:3"/>
          <gBSDUnit start="464" length="24" marker="L:4"/>
          <gBSDUnit start="488" length="16" marker="L:5"/>
          <gBSDUnit start="504" length="24" marker="L:6"/>
          <gBSDUnit start="528" length="24" marker="L:7"/>
          <gBSDUnit start="552" length="24" marker="L:8"/>
```


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```
          <gBSDUnit start="576" length="24" marker="L:9"/>
        </gBSDUnit>
      </gBSDUnit>
    </gBSDUnit>
    <!-- ... and so on ... -->
  </dia:Description>
</dia:DIA>
```

H.1.3.1.2 gBSDtoAU result

The `gBSDtoAUDemo` which utilizes the `gBSDtoAU` reference software produces 1275 AUs, i.e., each gBSDUnit element containing an `msi:au` attribute set to true corresponds to an AU.

NOTE 1 The `AUsToFileConverter` can be used to restore the original media resource.

NOTE 2 The XML streaming instructions are ignored by `gBSDtoAU`.

H.1.3.2 Example 2

This example (`bsac_22khz_gBSD_MSI_absolute.xml`) demonstrates usage of the media streaming instructions using the `msi:au`, `msi:auMode`, `msi:timescale`, `msi:rap`, `msi:cts`, `msi:dts`, and `msi:auPart` properties. The gBSD describes a MPEG-4 BSAC bitstream and each frame corresponds to an AU indicated by `msi:au="true"`. Additionally, some gBSDUnit elements contain `msi:auPart="true"`. Furthermore, `msi:auMode="sequential"`.

H.1.3.2.1 XML declaration

```
<dia:DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
xmlns:msi="urn:mpeg:mpeg21:2003:01-DIA-MSI-NS" xmlns:mp4="MPEG4"
xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS ../gBSSchema.xsd
urn:mpeg:mpeg21:2003:01-DIA-MSI-NS ../MSI.xsd">
  <dia:DescriptionMetadata xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <dia:ClassificationSchemeAlias alias="MA4"
href="urn:mpeg:mpeg4:audio:cs:syntacticalLabels"/>
  </dia:DescriptionMetadata>
  <dia:Description msi:auMode="sequential" msi:timeScale="22050"
xsi:type="gBSDType" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/bsac_22khz.raw">
    <gBSDUnit msi:au="true" msi:rap="true" msi:cts="0" msi:dts="0" start="0"
length="1576">
      <gBSDUnit syntacticalLabel=":MA4:BSAC:BSAC_frame_element" start="0"
length="1576">
        <Parameter start="0" length="11" marker="offset">
          <Value xsi:type="b11">197</Value>
        </Parameter>
        <gBSDUnit start="11" length="5"/>
        <Parameter start="16" length="6" marker="update">
          <Value xsi:type="b6">48</Value>
        </Parameter>
        <gBSDUnit start="22" length="370"/>
        <gBSDUnit start="392" length="1184" marker="bitrate">
          <gBSDUnit start="392" length="24" marker="L:1"/>
          <gBSDUnit start="416" length="24" marker="L:2"/>
          <gBSDUnit start="440" length="24" marker="L:3"/>
```

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```
          <gBSDUnit start="464" length="24" marker="L:4"/>
          <gBSDUnit start="488" length="16" marker="L:5"/>
          <gBSDUnit start="504" length="24" marker="L:6"/>
          <gBSDUnit start="528" length="24" marker="L:7"/>
          <gBSDUnit start="552" length="24" marker="L:8"/>
          <gBSDUnit start="576" length="24" marker="L:9"/>
          <gBSDUnit start="600" length="24" marker="L:10" msi:auPart="true"/>
          <gBSDUnit start="624" length="24" marker="L:11"/>
          <gBSDUnit start="648" length="24" marker="L:12"/>
          <gBSDUnit start="672" length="24" marker="L:13"/>
          <gBSDUnit start="696" length="24" marker="L:14"/>
          <gBSDUnit start="720" length="16" marker="L:15"/>
          <gBSDUnit start="736" length="24" marker="L:16"/>
          <gBSDUnit start="760" length="24" marker="L:17"/>
          <gBSDUnit start="784" length="24" marker="L:18"/>
          <gBSDUnit start="808" length="24" marker="L:19"/>
          <gBSDUnit start="832" length="24" marker="L:20" msi:auPart="true"/>
          <gBSDUnit start="856" length="24" marker="L:21"/>
          <gBSDUnit start="880" length="24" marker="L:22"/>
          <gBSDUnit start="904" length="24" marker="L:23"/>
          <gBSDUnit start="928" length="24" marker="L:24"/>
          <gBSDUnit start="952" length="24" marker="L:25"/>
          <gBSDUnit start="976" length="16" marker="L:26"/>
          <gBSDUnit start="992" length="24" marker="L:27"/>
          <gBSDUnit start="1016" length="24" marker="L:28"/>
          <gBSDUnit start="1040" length="24" marker="L:29"/>
          <gBSDUnit start="1064" length="24" marker="L:30"/>
          <gBSDUnit start="1088" length="24" marker="L:31"/>
          <gBSDUnit start="1112" length="24" marker="L:32"/>
          <gBSDUnit start="1136" length="24" marker="L:33"/>
          <gBSDUnit start="1160" length="24" marker="L:34"/>
          <gBSDUnit start="1184" length="24" marker="L:35"/>
          <gBSDUnit start="1208" length="16" marker="L:36"/>
          <gBSDUnit start="1224" length="24" marker="L:37"/>
          <gBSDUnit start="1248" length="24" marker="L:38"/>
          <gBSDUnit start="1272" length="24" marker="L:39"/>
          <gBSDUnit start="1296" length="24" marker="L:40"/>
          <gBSDUnit start="1320" length="24" marker="L:41"/>
          <gBSDUnit start="1344" length="24" marker="L:42"/>
          <gBSDUnit start="1368" length="24" marker="L:43"/>
          <gBSDUnit start="1392" length="24" marker="L:44"/>
          <gBSDUnit start="1416" length="24" marker="L:45"/>
          <gBSDUnit start="1440" length="16" marker="L:46"/>
          <gBSDUnit start="1456" length="24" marker="L:47"/>
          <gBSDUnit start="1480" length="96" marker="L:48"/>
        </gBSDUnit>
      </gBSDUnit>
    </gBSDUnit>
    <!-- ... and so on ... -->
  </dia:Description>
</dia:DIA>
```

H.1.3.2.2 gBSDtoAU result

The `gBSDtoAUDemo` which utilizes the `gBSDtoAU` reference software produces 1275 AUs, i.e., each gBSDUnit element containing an `msi:au` attribute set to true corresponds to an AU.

NOTE 1 The `AUsToFileConverter` can be used to restore the original media resource.

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NOTE 2 The XML streaming instructions are ignored by `gBSDtoAU`.

H.1.3.3 Example 3

This example (`bsac_22khz_gBSD_MSI_relative.xml`) demonstrates usage of the media streaming instructions using the `msi:au`, `msi:auMode`, `msi:timescale`, `msi:rap`, `msi:dtsDelta`, and `msi:ctsOffset` properties. The gBSD describes a MPEG-4 BSAC bitstream and each frame corresponds to an AU indicated by `msi:au="true"`. Furthermore, `msi:auMode="tree"`.

H.1.3.3.1 XML declaration

```
<dia:DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
xmlns:msi="urn:mpeg:mpeg21:2003:01-DIA-MSI-NS" xmlns:mp4="MPEG4"
xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS ../gBSSchema.xsd
urn:mpeg:mpeg21:2003:01-DIA-MSI-NS ../MSI.xsd">
  <dia:DescriptionMetadata xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <dia:ClassificationSchemeAlias alias="MA4"
href="urn:mpeg:mpeg4:audio:cs:syntacticalLabels"/>
  </dia:DescriptionMetadata>
  <dia:Description msi:auMode="tree" msi:timeScale="22050" msi:dtsDelta="1024"
msi:ctsOffset="0" xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
xsi:type="gBSDType" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/bsac_22khz.raw">
    <gBSDUnit msi:au="true" msi:rap="true" start="0" length="1576">
      <gBSDUnit syntacticalLabel=":MA4:BSAC:BSAC_frame_element" start="0"
length="1576">
        <Parameter start="0" length="11" marker="offset">
          <Value xsi:type="b11">197</Value>
        </Parameter>
        <gBSDUnit start="11" length="5"/>
        <Parameter start="16" length="6" marker="update">
          <Value xsi:type="b6">48</Value>
        </Parameter>
        <gBSDUnit start="22" length="370"/>
        <gBSDUnit start="392" length="1184" marker="bitrate">
          <gBSDUnit start="392" length="24" marker="L:1"/>
          <gBSDUnit start="416" length="24" marker="L:2"/>
          <gBSDUnit start="440" length="24" marker="L:3"/>
          <gBSDUnit start="464" length="24" marker="L:4"/>
          <gBSDUnit start="488" length="16" marker="L:5"/>
          <gBSDUnit start="504" length="24" marker="L:6"/>
          <gBSDUnit start="528" length="24" marker="L:7"/>
          <gBSDUnit start="552" length="24" marker="L:8"/>
          <gBSDUnit start="576" length="24" marker="L:9"/>
          <gBSDUnit start="600" length="24" marker="L:10"/>
          <gBSDUnit start="624" length="24" marker="L:11"/>
          <gBSDUnit start="648" length="24" marker="L:12"/>
          <gBSDUnit start="672" length="24" marker="L:13"/>
          <gBSDUnit start="696" length="24" marker="L:14"/>
          <gBSDUnit start="720" length="16" marker="L:15"/>
          <gBSDUnit start="736" length="24" marker="L:16"/>
          <gBSDUnit start="760" length="24" marker="L:17"/>
          <gBSDUnit start="784" length="24" marker="L:18"/>
          <gBSDUnit start="808" length="24" marker="L:19"/>
          <gBSDUnit start="832" length="24" marker="L:20"/>
          <gBSDUnit start="856" length="24" marker="L:21"/>
```

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```
          <gBSDUnit start="880" length="24" marker="L:22"/>
          <gBSDUnit start="904" length="24" marker="L:23"/>
          <gBSDUnit start="928" length="24" marker="L:24"/>
          <gBSDUnit start="952" length="24" marker="L:25"/>
          <gBSDUnit start="976" length="16" marker="L:26"/>
          <gBSDUnit start="992" length="24" marker="L:27"/>
          <gBSDUnit start="1016" length="24" marker="L:28"/>
          <gBSDUnit start="1040" length="24" marker="L:29"/>
          <gBSDUnit start="1064" length="24" marker="L:30"/>
          <gBSDUnit start="1088" length="24" marker="L:31"/>
          <gBSDUnit start="1112" length="24" marker="L:32"/>
          <gBSDUnit start="1136" length="24" marker="L:33"/>
          <gBSDUnit start="1160" length="24" marker="L:34"/>
          <gBSDUnit start="1184" length="24" marker="L:35"/>
          <gBSDUnit start="1208" length="16" marker="L:36"/>
          <gBSDUnit start="1224" length="24" marker="L:37"/>
          <gBSDUnit start="1248" length="24" marker="L:38"/>
          <gBSDUnit start="1272" length="24" marker="L:39"/>
          <gBSDUnit start="1296" length="24" marker="L:40"/>
          <gBSDUnit start="1320" length="24" marker="L:41"/>
          <gBSDUnit start="1344" length="24" marker="L:42"/>
          <gBSDUnit start="1368" length="24" marker="L:43"/>
          <gBSDUnit start="1392" length="24" marker="L:44"/>
          <gBSDUnit start="1416" length="24" marker="L:45"/>
          <gBSDUnit start="1440" length="16" marker="L:46"/>
          <gBSDUnit start="1456" length="24" marker="L:47"/>
          <gBSDUnit start="1480" length="96" marker="L:48"/>
        </gBSDUnit>
      </gBSDUnit>
    </gBSDUnit>
    <!-- ... and so on ... -->
  </dia:Description>
</dia:DIA>
```

H.1.3.3.2 gBSDtoAU result

The `gBSDtoAUDemo` which utilizes the `gBSDtoAU` reference software produces 1275 AUs, i.e., each gBSDUnit element containing an `msi:au` attribute set to true corresponds to an.

NOTE 1 The `AUsToFileConverter` can be used to restore the original media resource.

NOTE 2 The XML streaming instructions are ignored by `gBSDtoAU`.

H.1.3.4 Example 4

This example (`qcif_125_PARLIER_svc_gBSD_with_SI.xml`) demonstrates usage of the media streaming instructions using the `msi:au` property. The gBSD describes a MPEG-4 SVC bitstream and each frame corresponds to an AU indicated by `msi:au="true"`.

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H.1.3.4.1 XML declaration

```
<?xml version="1.0" encoding="utf-8"?>
<dia:DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS"
xmlns:bs1="urn:mpeg:mpeg21:2003:01-DIA-BSDL1-NS"
xmlns:xmlsi="urn:mpeg:mpeg21:2003:01-DIA-MSI-NS"
xmlns:msi="urn:mpeg:mpeg21:2003:01-DIA-XSI-NS" xmlns:mp4="MPEG4"
xmlns:dia="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:mpeg:mpeg21:2003:01-DIA-gBSD-NS ../gBSSchema.xsd
urn:mpeg:mpeg21:2003:01-DIA-MSI-NS ../MSI.xsd urn:mpeg:mpeg21:2003:01-DIA-XSI-NS
../XSI.xsd">
  <dia:DescriptionMetadata xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <dia:ClassificationSchemeAlias alias="MA4"
href="urn:mpeg:mpeg4:audio:cs:syntacticalLabels"/>
  </dia:DescriptionMetadata>
  <dia:Description xsi:type="gBSDType" addressUnit="bit" addressMode="Absolute"
bs1:bitstreamURI="content/qcif_125_PARLIER_svc.raw" xmlsi:timeMode="relative"
xmlsi:timescale="1000" xmlsi:timeInterval="1280"
xmlsi:puMode="ancestorsDescendants">
    <gBSDUnit start="0" length="20632" xmlsi:anchorElement="true" msi:au="true"
xmlsi:absTimeInt="0">
      <gBSDUnit start="0" length="128" marker="T0:S0:F0:N6"/>
      <gBSDUnit start="128" length="104" marker="T0:S0:F0:N7"/>
      <gBSDUnit start="232" length="72" marker="T0:S0:F0:N8"/>
      <gBSDUnit start="304" length="72" marker="T0:S0:F0:N8"/>
      <gBSDUnit start="376" length="72" marker="T0:S0:F0:N6"/>
      <gBSDUnit start="448" length="4184" marker="T0:S0:F0:N5"/>
      <gBSDUnit start="4632" length="6320" marker="T0:S0:F1:N20"/>
      <gBSDUnit start="10952" length="11336" marker="T0:S0:F2:N20"/>
      <gBSDUnit start="22288" length="72" marker="T0:S0:F0:N6"/>
    </gBSDUnit>
    <!-- ... and so on ... -->
  </dia:Description>
</dia:DIA>
```

H.1.3.4.2 gBSDtoAU result

The `gBSDtoAUDemo` which utilizes the `gBSDtoAU` reference software produces 69 AUs, i.e., each gBSDUnit element containing an `msi:au` attribute set to true corresponds to an AU.

NOTE 1 The `AUsToFileConverter` can be used to restore the original media resource.

NOTE 2 The XML streaming instructions are ignored by `gBSDtoAU`.

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Annex I
(normative)

Tests for DIA Amd.1

I.1 Introduction

This section has four subsections

- providing a description of the conformance bitstream and conformance software package utilizing the DIA reference software for the Conversion Link tool.
- providing a description of the conformance bitstream and conformance software package utilizing the DIA reference software for the Composite Conversion tool.
- providing a description of the conformance bitstream and conformance software package utilizing the DIA reference software for the Cross Conversion Quality of Service (QoS) tool.
- providing a description of the conformance bitstream and conformance software package utilizing the DIA reference software for the Conversion URI tool.

See attached 21000-7 DIA Amd1 zip file (bitstreams and software).

I.2 Conformance for Conversion Link

The conformance bitstream for testing the Conversion Link references an image rescale and gray scale conversion act (identified by a specialized RDD term) which takes as conversion parameters the rescale factor and the number of colors (see below) possible conversion parameters values that can be applied to the akiyo.jpg image are determined through the resolution of the akiyo_AQoS AdaptationQoS description.

```
<?xml version="1.0" encoding="UTF-8"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="ConversionLinkType">
    <ConversionActUri
      uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescaleGrayScale"/>
    <Parameter xsi:type="IOPinRefType" name="rescale">
      <Value>SCALE</Value>
    </Parameter>
    <Parameter xsi:type="IOPinRefType" name="colors">
      <Value>NR_COLORS</Value>
    </Parameter>
    <SteeringDescriptionRef uri="#akiyo_AQoS"/>
    <BitstreamRef uri="akiyo.jpg"/>
  </Description>
</DIA>
```


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The attached conformance software package utilizes the DIA reference software and performs the following steps (see output below).

1) Parsing of the DIA description comprising the conversion link description into an internal memory structure. Additionally, the information contained within the conversion link description (i.e., the referenced conversion act uri, possibly the referenced AdaptationQoS, the referenced bitstream, the conversion parameters and the resource description) is displayed on the screen.

2) The conversion link description is modified, i.e., another constant conversion parameter is added, a new resource description reference is added and the referenced bitstream and AdaptationQoS are updated.

3) The modified internal memory structure is serialized, i.e., written to a file.

```
D:\DIA-Conformance-ConvPerm>ant clean
Buildfile: build.xml

clean:
   [delete] Deleting directory D:\DIA-Conformance-ConvPerm\bin

BUILD SUCCESSFUL
Total time: 1 second
D:\DIA-Conformance-ConvPerm>ant run-ConvLink-demo
Buildfile: build.xml

init:
    [mkdir] Created dir: D:\DIA-Conformance-ConvPerm\bin

compile:
    [javac] Compiling 2 source files to D:\DIA-Conformance-ConvPerm\bin

run-ConvLink-demo:
     [java] Parsing DIA description ... done
     [java] ... reading ConversionLinkType element!!!
     [java] ConversionActUri:
              urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescaleGrayScale
     [java] SteeringDescriptionRef: #akiyo_AQoS
     [java] BitStreamRef: akiyo.jpg
     [java] Parameter[type=IOPinRefType, name=rescale]: SCALE
     [java] Parameter[type=IOPinRefType, name=colors]: NR_COLORS
     [java] ... modifying ConversionLinkType element!!!
     [java] ... writing!!!

BUILD SUCCESSFUL
Total time: 3 seconds
D:\DIA-Conformance-ConvPerm>
```

The output of the above conformance testing package is shown below, containing the modified conversion suggestion.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="n0:ConversionLinkType"
      xmlns:n0="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <n0:ConversionActUri
      uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescaleGrayScale"/>
    <n0:Parameter xsi:type="n0:IOPinRefType" name="rescale">
      <n0:Value>SCALE</n0:Value>
    </n0:Parameter>
```

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```
    <n0:Parameter xsi:type="n0:IOPinRefType" name="colors">
      <n0:Value>NR_COLORS</n0:Value>
    </n0:Parameter>
    <n0:Parameter xsi:type="n0:ConstantType" name="test">
      <n0:Value>1234</n0:Value>
    </n0:Parameter>
    <n0:SteeringDescriptionRef uri="myAQoS.xml"/>
    <n0:BitstreamRef uri="akiyo_updated.jpg"/>
    <n0:ResourceDescriptionRef uri="myResourceDescription.xml"/>
  </Description>
</DIA>
```

I.3 Conformance for Composite Conversion

The conformance bitstream for testing the composite conversion comprises two conversion descriptions referencing two conversion acts that must be composed to achieve the complete suggested conversion (see below). The composite conversion references two conversion acts identified by two specialized RDD terms: ImageRescale and ImageGrayScale. Each conversion description suggests conversion parameters values through the resolution of an AdaptationQoS description.

```
<?xml version="1.0" encoding="UTF-8"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="ConversionCompositeType">
    <ConversionDescription xsi:type="ConversionLinkType">
      <ConversionActUri uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescale"/>
      <Parameter xsi:type="IOPinRefType" name="rescale">
        <Value>SCALE</Value>
      </Parameter>
      <SteeringDescriptionRef uri="#akiyo_AQoS"/>
      <BitstreamRef uri="akiyo.jpg"/>
    </ConversionDescription>
    <ConversionDescription xsi:type="ConversionLinkType">
      <ConversionActUri uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageGrayScale"/>
      <Parameter xsi:type="IOPinRefType" name="colors">
        <Value>NR_COLORS</Value>
      </Parameter>
      <SteeringDescriptionRef uri="#akiyo_AQoS"/>
    </ConversionDescription>
  </Description>
</DIA>
```

The attached conformance software package utilizes the DIA reference software and performs the following steps (see output below).

1) Parsing of the DIA description comprising the composite conversion description into an internal memory structure. Additionally, the information contained within the conversion descriptions is displayed on the screen.

2) The composite conversion description is modified, i.e., another conversion description is added to the composite conversion and the first conversion description is modified the same way the conversion link is modified in subclause I.2.

3) The internal memory structure comprising the already existing conversion description, the modified conversion description and including the newly added one is serialized, i.e., written to a file.

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```
D:\DIA-Conformance-ConvPerm>ant clean
Buildfile: build.xml

clean:
   [delete] Deleting directory D:\DIA-Conformance-ConvPerm\bin

BUILD SUCCESSFUL
Total time: 1 second
D:\DIA-Conformance-ConvPerm>ant run-ConvComposite-demo
Buildfile: build.xml

init:
    [mkdir] Created dir: D:\DIA-Conformance-ConvPerm\bin

compile:
    [javac] Compiling 2 source files to D:\DIA-Conformance-ConvPerm\bin

run-ConvComposite-demo:
     [java] Parsing DIA description ... done
     [java] ... reading ConversionCompositeType element!!!
     [java] ... reading ConversionDescription element!!!
     [java] ConversionActUri: urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescale
     [java] SteeringDescriptionRef: #akiyo_AQoS
     [java] BitStreamRef: akiyo.jpg
     [java] Parameter[type=IOPinRefType, name=rescale]: SCALE
     [java] ... reading ConversionDescription element!!!
     [java] ConversionActUri: urn:mpeg:mpeg21:2003:01-RDD-NS:ImageGrayScale
     [java] SteeringDescriptionRef: #akiyo_AQoS
     [java] Parameter[type=IOPinRefType, name=colors]: NR_COLORS
     [java] ... modifying ConversionCompositeType element!!!
     [java] ... modifying ConversionDescription element!!!
     [java] ... writing!!!

BUILD SUCCESSFUL
Total time: 3 seconds
D:\DIA-Conformance-ConvPerm>
```

The output of the above conformance testing package is shown below, containing the three `ConversionDescription` elements: the modified conversion description, the already existing one and the newly added conversion description.

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```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="n0:ConversionCompositeType"
      xmlns:n0="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <n0:ConversionDescription>
      <n0:ConversionActUri
        uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageRescale"/>
      <n0:Parameter xsi:type="n0:IOPinRefType" name="rescale">
        <n0:Value>SCALE</n0:Value>
      </n0:Parameter>
      <n0:Parameter xsi:type="n0:ConstantType" name="test">
        <n0:Value>1234</n0:Value>
      </n0:Parameter>
      <n0:SteeringDescriptionRef uri="myAQoS.xml"/>
      <n0:BitstreamRef uri="akiyo_updated.jpg"/>
      <n0:ResourceDescriptionRef uri="myResourceDescription.xml"/>
    </n0:ConversionDescription>
    <n0:ConversionDescription>
      <n0:ConversionActUri
        uri="urn:mpeg:mpeg21:2003:01-RDD-NS:ImageGrayScale"/>
      <n0:Parameter xsi:type="n0:IOPinRefType" name="colors">
        <n0:Value>NR_COLORS</n0:Value>
      </n0:Parameter>
      <n0:SteeringDescriptionRef uri="#akiyo_AQoS"/>
    </n0:ConversionDescription>
    <n0:ConversionDescription>
      <n0:ConversionActUri uri="urn:enst:ImageProcessing"/>
    </n0:ConversionDescription>
  </Description>
</DIA>
```

I.4 Conformance for Cross Conversion QoS

The conformance bitstream for testing the CrossConversionQoS comprises a description which shows two conversion options (see below). The first conversion option is converting to video modality with conversion parameters provided by `Video_ConvLink.xml`. The second conversion option is converting to image modality (slideshow) with conversion parameters provided by `Slideshow_ConvLink.xml`.

```
<?xml version="1.0" encoding="UTF-8"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001">
  <Description xsi:type="CrossConversionQoSType">
    <ConversionOption>
      <Modality href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.2">
        <mpeg7:Name>"Video"</mpeg7:Name>
      </Modality>
      <LinkRef uri="Video_ConvLink.xml"/>
      <QualityFunction scale="1.1">
        <Argument xsi:type="InternalIOPinRefType" iOPinRef="VIDEO_PSNR"/>
      </QualityFunction>
    </ConversionOption>
    <ConversionOption>
      <Modality href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.1">
        <mpeg7:Name>Image</mpeg7:Name>
      </Modality>
      <LinkRef uri="Slideshow_ConvLink.xml"/>
      <QualityFunction scale="1.9">
```


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```
        <Argument xsi:type="InternalIOPinRefType" iOPinRef="SLIDESHOW_PSNR"/>
      </QualityFunction>
    </ConversionOption>
  </Description>
</DIA>
```

The attached conformance software package utilizes the DIA reference software and performs the following steps (see output below):

1) Parsing of the DIA description comprising the conversion capabilities description into an internal memory structure. Additionally, the information contained within the CrossConversionQoS description is displayed on the screen.

2) The CrossConversionQoS description is modified, i.e. the LinkRef uri for the first conversion option is changed to a new value which is "`New_Video_ConvLink.xml`".

3) The internal memory structure comprising the modified description is serialized, i.e., written to a file.

```
D:\DIA-Conformance-CCQoS>ant clean
Buildfile: build.xml

clean:
   [delete] Deleting directory D:\DIA-Conformance-CCQoS\bin

BUILD SUCCESSFUL
Total time: 1 second
D:\DIA-Conformance-CCQoS>ant run-CrossConv-demo
Buildfile: build.xml

init:
    [mkdir] Created dir: D:\DIA-Conformance-CCQoS\bin

compile:
    [javac] Compiling 2 source files to D:\DIA-Conformance-CCQoS\bin

run-CrossConv-demo:
     [java] xmlns: urn:mpeg:mpeg21:2003:01-DIA-NS
     [java] Parsing DIA description...
     [java] <ConversionOption>
     [java]   <Modality>
     [java]     href: urn:mpeg:mpeg7:cs:ContentCS:2001:4.2
     [java]   </Modality>
     [java]   <LinkRef>
     [java]     uri: Video_ConvLink.xml
     [java]   </LinkRef>
     [java]   <QualityFunction>
     [java]     scale: 1.1
     [java]     <Argument>
     [java]       type: InternalIOPinRefType
     [java]       Attribute: delay not found!
     [java]       iOPinRef: VIDEO_PSNR
     [java]     </Argument>
     [java]   </QualityFunction>
     [java] </ConversionOption>
     [java] <ConversionOption>
     [java]   <Modality>
     [java]     href: urn:mpeg:mpeg7:cs:ContentCS:2001:4.1
     [java]   </Modality>
```

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```
     [java]   <LinkRef>
     [java]     uri: Slideshow_ConvLink.xml
     [java]   </LinkRef>
     [java]       Attribute: delay not found!
     [java]   <QualityFunction>
     [java]     scale: 1.9
     [java]     <Argument>
     [java]       type: InternalIOPinRefType
     [java]       iOPinRef: SLIDESHOW_PSNR
     [java]     </Argument>
     [java]   </QualityFunction>
     [java] </ConversionOption>
     [java] Modifying CrossConversionQoS description...
     [java]    changing first LinkRef Uri to New_Video_ConvLink.xml
     [java] Serializing CrossConversionQoS description
     [java] Prefix for NS: urn:mpeg:mpeg21:2003:01-DIA-NS = null
     [java] Prefix for NS: urn:mpeg:mpeg7:schema:2001 = mpeg7
     [java] Prefix for NS: http://www.w3.org/2001/XMLSchema-instance = xsi

BUILD SUCCESSFUL
Total time: 2 seconds
D:\DIA-Conformance-CCQoS>
```

The output of the above conformance testing package is shown below, containing the modified CrossConversionQoS description. The LinkRef element of the first conversion option is now referring to "New_Video_ConvLink.xml".

```
<?xml version='1.0' ?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="CrossConversionQoSType">
    <ConversionOption>
      <Modality href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.2" />
      <LinkRef uri="New_Video_ConvLink.xml" />
      <QualityFunction scale="1.1">
     <Argument xsi:type="InternalIOPinRefType" iOPinRef="VIDEO_PSNR"/>
      </QualityFunction>
    </ConversionOption>
    <ConversionOption>
      <Modality href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.1" />
      <LinkRef uri="Slideshow_ConvLink.xml" />
      <QualityFunction scale="1.9">
         <Argument xsi:type="InternalIOPinRefType" iOPinRef="SLIDESHOW_PSNR"/>
      </QualityFunction>
    </ConversionOption>
  </Description>
</DIA>
```

I.5 Conformance for Conversion URI

The conformance bitstream for testing the conversion URI comprises a conversion capabilities description which identifies two conversions the terminal is capable of performing by using the `ConversionActUri` element (see below). The first conversion act is identified through a reference to the RDD term 'dither'. The second conversion act is identified through a proprietary HTTP URI which references a scaling operation.

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```
<?xml version="1.0" encoding="UTF-8"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="UsageEnvironmentType">
    <UsageEnvironmentProperty xsi:type="TerminalsType">
      <Terminal>
        <TerminalCapability xsi:type="ConversionCapabilitiesType">
          <ConversionCapability>
            <ConversionActUri uri="urn:mpeg:mpeg21:2003:01-RDD-NS:dither"/>
          </ConversionCapability>
          <ConversionCapability>
            <ConversionActUri uri="http://www.adaptationRUs.com/scale"/>
          </ConversionCapability>
        </TerminalCapability>
      </Terminal>
    </UsageEnvironmentProperty>
  </Description>
</DIA>
```

The attached conformance software package utilizes the DIA reference software and performs the following steps (see output below):

1) Parsing of the DIA description comprising the conversion capabilities description into an internal memory structure. Additionally, the information contained within the conversion capabilities description (i.e., the supported conversions of the terminal) is displayed on the screen.

2) The conversion capabilities description is modified, i.e., another conversion act is added.

3) The internal memory structure comprising the already existing conversion capabilities including the newly added one is serialized, i.e., written to a file.

```
D:\DIA-Conformance-ConvPerm>ant clean
Buildfile: build.xml

clean:
   [delete] Deleting directory D:\DIA-Conformance-ConvPerm\bin

BUILD SUCCESSFUL
Total time: 1 second
D:\DIA-Conformance-ConvPerm>ant run-ConvCap-demo
Buildfile: build.xml

init:
    [mkdir] Created dir: D:\DIA-Conformance-ConvPerm\bin

compile:
    [javac] Compiling 2 source files to D:\DIA-Conformance-ConvPerm\bin

run-ConvCap-demo:
     [java] Parsing DIA description ... done
     [java] [demo] reading ConversionCapability description ...
     [java]     ConversionActUri: urn:mpeg:mpeg21:2003:01-RDD-NS:dither
     [java]     ConversionActUri: http://www.adaptationRUs.com/scale
     [java] [demo] modifying ConversionCapability description
     [java] [demo] Adding additional conversion capability
                      http://www.adaptationRUs.com/doSomethingFancy
     [java] [demo] serializing ConversionCapability description

BUILD SUCCESSFUL
Total time: 3 seconds
D:\DIA-Conformance-ConvPerm>
```

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The output of the above conformance testing package is shown below, containing the three `ConversionActUri` elements, the two already existing ones and the newly added conversion capability.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<DIA xmlns="urn:mpeg:mpeg21:2003:01-DIA-NS"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Description xsi:type="n0:UsageEnvironmentType"
    xmlns:n0="urn:mpeg:mpeg21:2003:01-DIA-NS">
    <n0:UsageEnvironmentProperty xsi:type="n0:TerminalsType">
      <n0:Terminal>
        <n0:TerminalCapability xsi:type="n0:ConversionCapabilitiesType">
          <n0:ConversionCapability>
            <n0:ConversionActUri uri="urn:mpeg:mpeg21:2003:01-RDD-NS:dither"/>
          </n0:ConversionCapability>
          <n0:ConversionCapability>
            <n0:ConversionActUri uri="http://www.adaptationRUs.com/scale"/>
          </n0:ConversionCapability>
          <n0:ConversionCapability>
            <n0:ConversionActUri
       uri="http://www.adaptationRUs.com/doSomethingFancy"/>
          </n0:ConversionCapability>
        </n0:TerminalCapability>
      </n0:Terminal>
    </n0:UsageEnvironmentProperty>
  </Description>
</DIA>
```


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Annex J
(normative)

Tests for DIA Amd.2

J.1 Simple_Mode_XML_Fragmenter

See attached 21000-7 DIA Amd2 zip file (bitstreams and results).

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Annex K
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Tests for File Format

K.1 Areas tested

See attached 21000-9 File Format zip file (M21conformance/m21ff-conformance.xls).

K.1.1 File Documentation

K.1.1.1 a12

See attached File Format zip file for the archive. There are two .m21 files in this archive; they both contain a simple MPEG-21 DID, which declares a photo album with two photos. One of the photos is included in the same file, and the other is via a data reference to an external file. Therefore both the relative URLs in the XML resolve 'locally' to items; however, one item is externally located.

One of the files has the MPEG-21 DID in an XML box; the other has it as a primary item, and in that one it and the included image are fragmented each into two extents and interleaved.

K.1.1.2 11-did.m21

MPEG-21 file without MP4 elements (no moov, no mdat) with

— a Primary XML box containing a sample DID.

— an Item containing an image, with item data outside the file (data referencing on items).

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Annex L
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Tests for DIP

L.1 Tests for DIP engine

See attached 21000-10 DIP zip file (DIP_Conformance.doc).

L.2 Tests for DIM engine

See attached 21000-10 DIP zip file (DIP_Conformance.doc).

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Annex M
(normative)

Tests for DIP Amd.1

M.1 C++ data type bindings for DIML object types

See attached 21000-10 DIP Amd1 zip file (DIP_Amd1_Conformance.doc).

M.2 C++ DIBO factory interface

See attached 21000-10 DIP Amd1 zip file (DIP_Amd1_Conformance.doc).

M.3 C++ global environment interface

See attached 21000-10 DIP Amd1 zip file (DIP_Amd1_Conformance.doc).

M.4 C++ interface bindings for DIBOs

See attached 21000-10 DIP Amd1 zip file (DIP_Amd1_Conformance.doc).

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Annex N
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Tests for ER

N.1 Introduction

See attached 21000-10 ER zip file.

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Annex O
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Tests for Binary Format

O.1 Introduction

See attached 21000-16 Binary Format zip file.

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Annex P
(normative)

Tests for FID

P.1 Test Fragment Identifiers

P.1.1 First test suite

P.1.1.1 Introduction

For all tests in this test suite, the FID parser receives as input an Internet Media type for which any of the pointer schemes used in the fragment identifier is defined in ISO/IEC 21000-17:2006.

The validation result for all fragment identifiers in this first test suite shall be one.

P.1.1.2 Test 1.1 Input fragment identifier

```
ffp(item_name=myBitstream)*mp(~time('npt','50'))
```

P.1.1.3 Test 1.2 Input fragment identifier

```
ffp(track_ID=1)mp(~time('npt','50'))
```

P.1.1.4 Test 1.3 Input fragment identifier

```
item_name=myBitstream*mp(~time('npt','50'))
```

P.1.1.5 Test 1.4 Input fragment identifier

```
ffp(item_name=file.mp4)
```

P.1.1.6 Test 1.5 Input fragment identifier

```
ffp(item_ID=1)
```

P.1.1.7 Test 1.6 Input fragment identifier

```
ffp(track_ID=101)
```

P.1.1.8 Test 1.7 Input fragment identifier

```
offset(10)
```

P.1.1.9 Test 1.8 Input fragment identifier

```
offset(10,100)
```

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P.1.1.10 Test 1.9 Input fragment identifier

```
mp(temporal::time('npt','30'))
```

P.1.1.11 Test 1.10 Input fragment identifier

```
mp(~time('npt','30'))
```

P.1.1.12 Test 1.11 Input fragment identifier

```
mp(~time('npt','0','60'))
```

P.1.1.13 Test 1.12 Input fragment identifier

```
mp(~time('mp7t','T17:30:45:2F10'))
```

P.1.1.14 Test 1.13 Input fragment identifier

```
mp(~time('clock','20011213T102501.25Z'))
```

P.1.1.15 Test 1.14 Input fragment identifier

```
mp(~time('smpte-25','10:07:33:06'))
```

P.1.1.16 Test 1.15 Input fragment identifier

```
mp(~time('frac','10,60'))
```

P.1.1.17 Test 1.16 Input fragment identifier

```
mp(spatial::region(rect(20,20,40,40)))
```

P.1.1.18 Test 1.17 Input fragment identifier

```
mp(~region(rect(20,20,40,40),range(800,600)))
```

P.1.1.19 Test 1.18 Input fragment identifier

```
mp(~region(polygon(200,200,20,40,60,15)))
```

P.1.1.20 Test 1.19 Input fragment identifier

```
mp(~region(ellipse(200,200,100,60,300,20)))
```

P.1.1.21 Test 1.20 Input fragment identifier

```
mp(~volume(ellipsoid(200,200,100,60,300,20,75,80),range(800,600,600)))
```

P.1.1.22 Test 1.21 Input fragment identifier

```
mp(~volume(object3D(200,200,20,60,75,80)))
```


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P.1.1.23 Test 1.22 Input fragment identifier

```
mp(~volume(box(200,200,400,0,25,300)))
```

P.1.1.24 Test 1.23 Input fragment identifier

```
mp(/~time('npt','0','30')/~moving-
region(rect(0,65,50,80),pt(20,45,0,2,t('npt','15'),tr(90)),pt(40,35,tr(20,30)),pt(80,75,
tr()),pt(60,10,tr(90,20,30)),pt(10,30,tr(90,40,10,2))))
```

P.1.1.25 Test 1.24 Input fragment identifier

```
mask(%23ffp(track_ID=1),mpeg)
```

P.1.1.26 Test 1.25 Input fragment identifier

```
mask(http://www.example.com/secondVideo.mp4%23ffp(track_ID=1))
```

P.1.2 Second test suite

P.1.2.1 Introduction

For all tests in this test suite, the FID parser receives as input the Internet Media type video/mp4.

The validation result for all fragment identifiers in this second test suite shall be one.

P.1.2.2 Test 2.1 Input fragment identifier

```
mp(/mp4/track)
```

P.1.2.3 Test 2.2 Input fragment identifier

```
mp(/mp4/track[2]/~time('npt','50'))
```

P.1.2.4 Test 2.3 Input fragment identifier

```
mp(/mp4/track[@track_ID='1'])
```

P.1.2.5 Test 2.4 Input fragment identifier

```
mp(/mp4/scene[1]/~region(rect(200,200,300,400)))
```

P.1.3 Third test suite

P.1.3.1 Introduction

For all tests in this test suite, the FID parser receives as input the Logical Model Schema for MPEG-4 files defined in ISO/IEC 21000-17:2006.

The validation result for all fragment identifiers in this second test suite shall be one.

P.1.3.2 Test 3.1 Input fragment identifier

```
xmlns(m=urn:mpeg:mpeg21:2006:01-LM-MP4-NS)mp(/m:mp4/m:track)
```

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P.2 Test Logical Model Schemas

P.2.1 Test 1

P.2.1.1 Logical Model Schema

```
<xs:schema
    targetNamespace="http://www.foo.org/test"
xmlns:lm="urn:mpeg:mpeg21:2006:01-LM-NS"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns="http://www.foo.org/test"
elementFormDefault="qualified"
attributeFormDefault="unqualified"
version="ISO/IEC 21000-17" id="ConformanceTestSchema.xsd">

   <!-- import schema for Logical Model descriptions -->
   <xs:import namespace="urn:mpeg:mpeg21:2006:01-LM-NS"
       schemaLocation="lm.xsd"/>

   <!-- ######################################## -->
   <!--       Top level Logical Unit 'ROOT'      -->
   <!-- ######################################## -->
   <xs:element name="ROOT">
      <xs:complexType>
         <xs:complexContent>
            <xs:extension base="lm:LogicalUnitType">
               <xs:sequence>
                  <xs:element name="testLU">
                     <xs:complexType>
                        <xs:complexContent>
                           <xs:extension
                              base="lm:LogicalUnitType">
                              <xs:attribute name="testAtt"
                                 type="xs:string"/>
                           </xs:extension>
                        </xs:complexContent>
                     </xs:complexType>
                  </xs:element>
                  <xs:element name="temporalLU"
                      type="lm:TemporalLogicalUnitType"/>
                  <xs:element name="spatialLU"
                      type="lm:SpatialLogicalUnitType"/>
                  <xs:element name="spatiotemporalLU"
                      type="lm:SpatiotemporalLogicalUnitType"/>
               </xs:sequence>
            </xs:extension>
         </xs:complexContent>
      </xs:complexType>
   </xs:element>
</xs:schema>
```

P.2.1.2 Validation result

Output: 1.

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