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Information technology — Multimedia framework (MPEG-21) —

Part 2: Digital Item Declaration

Technologies de l'information — Cadre multimédia (MPEG-21) — Partie 2: Déclaration d'article numérique

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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.

ISO/IEC 21000-2 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*

— *Part 2: Digital Item Declaration*

— *Part 3: Digital Item Identification*

— *Part 4: Intellectual Property Management and Protection (IPMP)*

— *Part 5: Rights Expression Language*

— *Part 6: Rights Data Dictionary*

— *Part 7: Digital Item Adaptation*

— *Part 8: Reference Software*

Executive Summary for MPEG-21

Today, many elements exist to build an infrastructure for the delivery and consumption of multimedia content. There is, however, no “big picture” to describe how these elements, either in existence or under development, relate to each other. The aim for MPEG-21 is to describe how these various elements fit together. Where gaps exist, MPEG-21 will recommend which new standards are required. ISO/IEC JTC 1/SC 29/WG 11 (MPEG) will then develop new standards as appropriate while other relevant standards may be developed by other bodies. These specifications will be integrated into the multimedia framework through collaboration between MPEG and these bodies.

The result is an open framework for multimedia delivery and consumption, with both the content creator and content consumer as focal points. This open framework provides content creators and service providers with equal opportunities in the MPEG-21 enabled open market. This will also be to the benefit of the content consumer providing them access to a large variety of content in an interoperable manner.

The vision for MPEG-21 is to define a multimedia framework *to enable transparent and augmented use of multimedia resources across a wide range of networks and devices* used by different communities.

This second part of MPEG-21 (ISO/IEC 21000-2) specifies the mechanism for declaring the structure and makeup of Digital Items.

Information technology — Multimedia framework (MPEG-21) —

Part 2:

Digital Item Declaration

1 Scope

This document describes the MPEG-21 Digital Item Declaration technology, which is part 2 of the MPEG-21 standard.

1.1 Organization of the document

This technology is described in three normative clauses:

- Model: The Digital Item Declaration Model (clause 6) describes a set of abstract terms and concepts to form a useful model for defining Digital Items. Within this model, a Digital Item is the digital representation of "a work", and as such, it is the thing that is acted upon (managed, described, exchanged, collected, etc.) within the model.

- Representation: Clause 7 contains the normative description of the syntax and semantics of each of the Digital Item Declaration elements, as represented in XML. This clause also contains some non-normative examples for illustrative purposes.

- Schema: Clause 8 contains the normative XML schema comprising the entire grammar of the Digital Item Declaration representation in XML.

In addition, illustrative (non-normative) examples are provided.

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.

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

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

Canonical XML Version 1.0, W3C Recommendation, 15 March 2001

Uniform Resource Identifiers (URI): Generic Syntax, IETF RFC 2396, 1998

Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies. IETF RFC 2045, 1996

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Digital Item

In ISO/IEC 21000-1:2001 (part 1 of MPEG-21: Vision, Technologies and Strategy), Digital Items are defined as structured digital objects, including a standard representation and identification, and meta-data. This entity is the fundamental unit of distribution and transaction within the MPEG-21 framework as a whole; it has, however, no further technical meaning. Within this document (part 2 of MPEG-21: Digital Item Declaration), an *item* is a grouping of sub-*items* and/or *components* that are bound to relevant *descriptors*, as defined within the Digital Item Declaration Model. The term *item* is a technical term, and is, as such, a narrower term than Digital Item. In conclusion, the use of the two different terms Digital Item and *item* within MPEG-21 is consistent and intended.

4 Conventions

4.1 Naming convention

It should be noted that the Digital Item Declaration Model (clause 6) contains the concept names that are used throughout the MPEG-21 standard. As such, this model should be considered to be the “ultimate arbiter” of these MPEG-21 concept names.

4.2 Documentation convention

The semantics of each element in the Digital Item Declaration Model is specified using the constructs provided by EBNF [4], and is shown in this document using a specific font and background:


```
element ::= (part1 | part2)+ part3*
```

The syntax of each element in the Digital Item Declaration Representation is specified using the constructs provided by XML Schema [2].

Element names and attribute names in the representation are in SMALL CAPS. Throughout the document, *italics* are used when referring to elements defined in the Digital Item Declaration Model (see clause 4), hereafter known as the Model.

The syntax of each element in the Digital Item Declaration representation is specified using the following format.

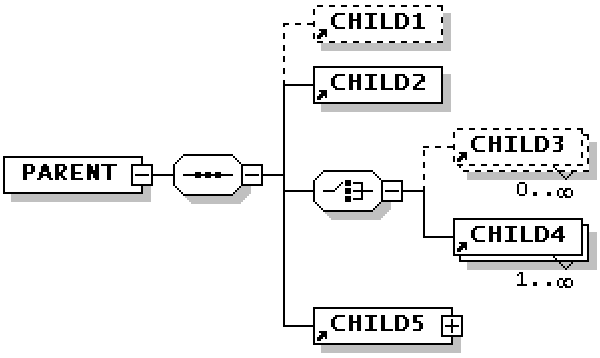
<table>
<tr><td>Diagram</td><td colspan="3"> 
</td></tr>
<tr><td>Children</td><td colspan="3"><CHILD1> <CHILD2> <CHILD3> <CHILD4> <CHILD5></td></tr>
<tr><td>Used by</td><td colspan="3"><GRANDPARENT1> <GRANDPARENT2></td></tr>
<tr><td rowspan="2">Attributes</td><td>Name</td><td>Type</td><td>Description</td></tr>
<tr><td>ID</td><td>ID</td><td>A unique ID value, which can be referenced by another element.</td></tr>
<tr><td>Source</td><td colspan="3"><xsd:element name="PARENT">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element ref="CHILD1" minOccurs="0"/>
            <xsd:element ref="CHILD2"/>
            <xsd:choice>
                <xsd:element ref="CHILD3" minOccurs="0" maxOccurs="unbounded"/>
                <xsd:element ref="CHILD4" minOccurs="1" maxOccurs="unbounded"/>
            </xsd:choice>
            <xsd:element ref="CHILD5"/>
        </xsd:sequence>
        <xsd:attribute name="ID" type="xsd:id"/>
    </xsd:complexType>
</xsd:element></td></tr>
</table>

Table 1 — Example element specification

The Language Definition clause contains syntax diagrams for each element. Here is an example syntax diagram with annotations:

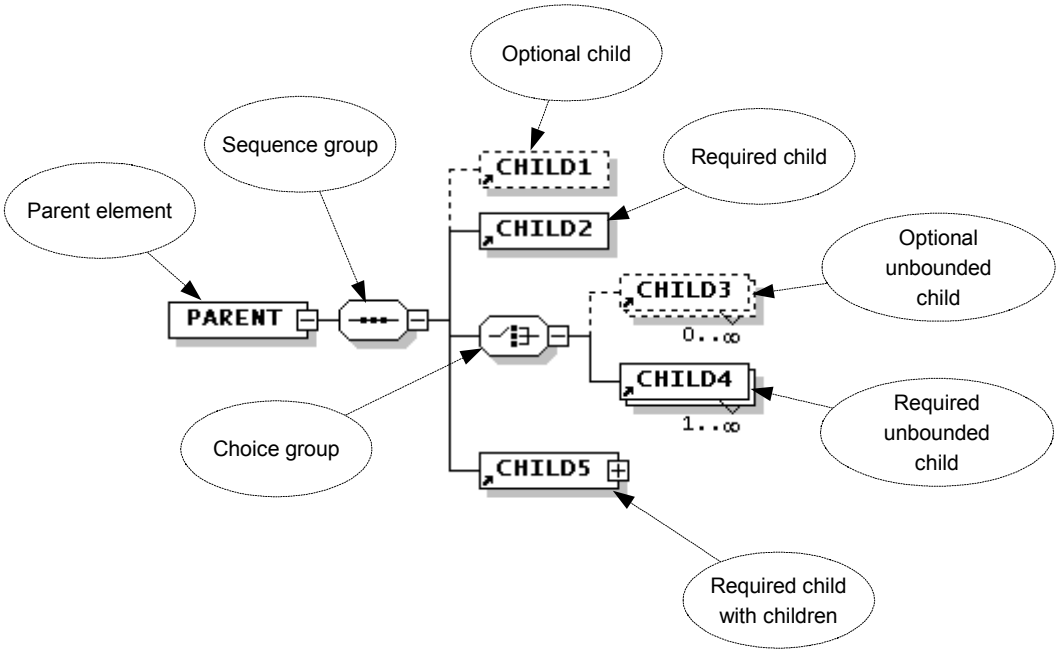


Figure 1 — Example element syntax diagram

Non-normative examples are included in separate clauses, and are shown in this document using a separate font and background:

```
<Example attribute1="example attribute value">
    <Element1>example element content</Element1>
</Example>
```


5 Symbols and abbreviated terms

For the purposes of this document, the following abbreviations apply.

DID: Digital Item Declaration

DIDL: Digital Item Declaration Language

EBNF: Extended Backus-Naur Form

IANA: Internet Assigned Numbers Authority

IPMP: Intellectual Property Management and Protection

JPEG: Joint Photographic Experts Group

MPEG: Moving Picture Experts Group

MPEG-21: ISO/IEC 21000 (all parts)

MP3: MPEG-1/2 layer III (audio coding)

URI: Uniform Resource Identifier (IETF Standard is RFC 2396)

URL: Uniform Resource Locator (IETF Standard is RFC 1738)

URN: Uniform Resource Name (IETF Standard is RFC 2396)

XML: Extensible Markup Language (W3C Recommendation)

6 Digital Item Declaration Model

6.1 Purpose and Overview

The purpose of this clause is to describe a set of abstract terms and concepts to form a useful model for defining Digital Items. Within this model, a Digital Item is the digital representation of "a work", and as such, it is the thing that is acted upon (managed, described, exchanged, collected, etc.) within the model. The goal of this model is to be as flexible and general as possible, while providing for the "hooks" that enable higher level functionality and interoperability. This, in turn, will allow the model to serve as a key foundation in the building of higher level models in other MPEG-21 elements (such as Identification or IPMP). This model specifically does not define a language in and of itself. Instead, the model helps to provide a common set of abstract concepts and terms that can be used to define such a scheme, or to perform mappings between existing schemes capable of Digital Item Declaration, for comparison purposes.

6.2 Abstract Model

Please note that in the descriptions below, the defined elements in *italics* are intended to be unambiguous terms within this model. The prose descriptions define the semantic "meaning" of the terms, and the EBNF representations define the precise intended relationship or structure between terms within the model.

6.2.1 Container

A *container* is a structure that allows *items* and/or *containers* to be grouped. These groupings of *items* and/or *containers* can be used to form logical packages (for transport or exchange) or logical shelves (for organization). *Descriptors* allow for the "labelling" of *containers* with information that is appropriate for the purpose of the grouping (e.g. delivery instructions for a package, or category information for a shelf).

It should be noted that a *container* itself is not an *item*; *containers* are groupings of *items* and/or *containers*.

```
container ::= container* item* descriptor*
```

6.2.2 Item

An *item* is a grouping of sub-*items* and/or *components* that are bound to relevant *descriptors*. *Descriptors* contain information about the *item*, as a representation of a work. *Items* may contain *choices*, which allow them to be customized or configured. *Items* may be conditional (on *predicates* asserted by *selections* defined in the *choices*). An *item* that contains no sub-*items* can be considered an entity -- a logically indivisible work. An *item* that does contain sub-*items* can be considered a compilation -- a work composed of potentially independent sub-parts. *Items* may also contain *annotations* to their sub-parts.

The relationship between *items* and Digital Items (as defined in ISO/IEC 21000-1:2001, MPEG-21 Vision, Technologies and Strategy) could be stated as follows: *items* are declarative representations of Digital Items.

```
item ::= (item | component)* choice* descriptor* condition* annotation*
```

6.2.3 Component

A *component* is the binding of a *resource* to a set of *descriptors*. These *descriptors* are information related to all or part of the specific *resource* instance. Such *descriptors* will typically contain control or structural information about the *resource* (such as bit rate, character set, start points or encryption information) but not information describing the "content" within.

It should be noted that a *component* itself is not an *item*; *components* are building blocks of *items*.

```
component ::= resource descriptor* anchor* condition*
```

6.2.4 Anchor

An *anchor* binds *descriptors* to a *fragment,* which corresponds to a specific location or part of a *resource*.

```
anchor ::= fragment descriptor* condition*
```

6.2.5 Descriptor

A *descriptor* associates information with the enclosing element. This information may be a *component* (such as a thumbnail of an image, or a text *component*), or a textual *statement*.


```
descriptor ::= descriptor* (component | statement) condition*
```


6.2.6 Condition

A *condition* describes the enclosing element as being optional, and links it to the *selection*(s) that affect its inclusion. Multiple *predicates* within a *condition* are combined as a conjunction (an AND relationship). Any *predicate* can be negated within a *condition*. Multiple *conditions* associated with a given element are combined as a disjunction (an OR relationship) when determining whether to include the element.

```
condition ::= predicate+
```

6.2.7 Choice

A *choice* describes a set of related *selections* that can affect the configuration of an *item*. The *selections* within a *choice* are either exclusive (choose exactly one) or inclusive (choose any number, including all or none).

```
choice ::= selection+ descriptor* condition*
```

6.2.8 Selection

A *selection* describes a specific decision that will affect one or more *conditions* somewhere within an *item*. If the *selection* is chosen, its predicate becomes true; if it is not chosen, its *predicate* becomes false; if it is left unresolved, its *predicate* is undecided.

```
selection ::= predicate descriptor* condition*
```

6.2.9 Annotation

An *annotation* describes a set of information about another identified element of the model without altering or adding to that element. The information can take the form of *assertions*, *descriptors*, and *anchors*.

```
annotation ::= assertion* descriptor* anchor*
```

6.2.10 Assertion

An *assertion* defines a full or partially configured state of a *choice* by asserting true, false or undecided values for some number of *predicates* associated with the *selections* for that *choice*.

```
assertion ::= predicate*
```

6.2.11 Resource

A *resource* is an individually identifiable asset such as a video or audio clip, an image, or a textual asset. A *resource* may also potentially be a physical object. All *resources* must be locatable via an unambiguous address.

6.2.12 Fragment

A *fragment* unambiguously designates a specific point or range within a *resource*. *Fragment* may be *resource* type specific.

6.2.13 Statement

A *statement* is a literal textual value that contains information, but not an asset. Examples of likely *statements* include descriptive, control, revision tracking or identifying information (such as an identifier as described in any other normative part of ISO/IEC 21000).

6.2.14 Predicate

A *predicate* is an unambiguously identifiable declaration that can be true, false or undecided.