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Information technology — Multimedia content description interface —

Part 2: Description definition language

Technologies de l'information — Interface de description du contenu multimédia —

Partie 2: Langage de définition de description (DDL)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

ISO/IEC 15938-2 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 15938 consists of the following parts, under the general title *Information technology — Multimedia content description interface*:

— *Part 1: Systems*

— *Part 2: Description definition language*

— *Part 3: Visual*

— *Part 4: Audio*

— *Part 5: Multimedia description schemes*

— *Part 6: Reference software*

— *Part 7: Conformance testing*

— *Part 8: Extraction and use of MPEG-7 descriptions*

Annex C forms a normative part of this part of ISO/IEC 15938. Annexes A, B and D are for information only.

Introduction

This standard, also known as "Multimedia Content Description Interface", provides a standardized set of technologies for describing multimedia content. The standard addresses a broad spectrum of multimedia applications and requirements by providing a metadata system for describing the features of multimedia content.

The following are specified in this standard:

- **Description Schemes (DS)** describe entities or relationships pertaining to multimedia content. Description Schemes specify the structure and semantics of their components, which may be Description Schemes, Descriptors, or datatypes.

- **Descriptors (D)** describe features, attributes, or groups of attributes of multimedia content.

- **Datatypes** are the basic reusable datatypes employed by Description Schemes and Descriptors.

- **Description Definition Language (DDL)** defines Description Schemes, Descriptors, and Datatypes by specifying their syntax, and allows their extension.

- **Systems tools** support delivery of descriptions, multiplexing of descriptions with multimedia content, synchronization, file format, and so forth.

This standard is subdivided into eight parts:

Part 1 – Systems: specifies the tools for preparing descriptions for efficient transport and storage, compressing descriptions, and allowing synchronization between content and descriptions.

Part 2 – Description definition language: specifies the language for defining the standard set of description tools (DSs, Ds, and datatypes) and for defining new description tools.

Part 3 – Visual: specifies the description tools pertaining to visual content.

Part 4 – Audio: specifies the description tools pertaining to audio content.

Part 5 – Multimedia description schemes: specifies the generic description tools pertaining to multimedia including audio and visual content.

Part 6 – Reference software: provides a software implementation of the standard.

Part 7 – Conformance testing: specifies the guidelines and procedures for testing conformance of implementations of the standard.

Part 8 – Extraction and use of MPEG-7 descriptions: provides guidelines and examples of the extraction and use of descriptions.

This document specifies the Description Definition Language (DDL) part of the ISO/IEC 15938 standard. The DDL is the language (and syntax) for constraining the structure and content of MPEG-7 descriptions. This document also provides informative examples demonstrating the use of the DDL to constrain and instantiate MPEG-7 descriptions.

Information technology — Multimedia content description interface —

Part 2: Description definition language

1 Scope

1.1 Scope of this International Standard

This International Standard specifies a metadata system for describing multimedia content. It specifies the Description Definition Language (DDL) that comprises part 2 of the standard (ISO/IEC 15938-2).

The goal of this part of the MPEG-7 International Standard is to specify a language that will enable MPEG-7 users and developers to:

- create valid MPEG-7 description schemes and descriptors;
- develop tools such as editors and parsers for processing descriptions, description schemes and descriptors;
- generate refinements, extensions and modifications to the DDL.

This International Standard describes the features of the DDL. It defines the syntax of the DDL constructs and datatypes and provides optional (informative) examples that illustrate the application of the DDL to the specification and instantiation of MPEG-7 descriptions.

1.2 Overview of Description Definition Language

This International Standard, known as the "Multimedia Content Description Interface", aims at providing standardized core technologies allowing the description of audiovisual data content in multimedia environments. This is a challenging task given the broad spectrum of requirements and targeted multimedia applications, and the broad number of audiovisual features of importance in such a context. In order to achieve this broad goal, the standard specifies:

- Descriptors (D): representations of Features, that define the syntax and the semantics of each feature representation;
- Description Schemes (DS), that specify the structure and semantics of the relationships between their components, which may be both Ds and DSs;
- A Description Definition Language (DDL), to allow the creation of new DSs and, possibly, Ds and to allow the extension and modification of existing DSs;
- System tools, to support multiplexing of description, synchronization issues, transmission mechanisms, file format, etc.

The DDL forms a core part of the MPEG-7 standard. It provides the solid descriptive foundation through which users can create their own Description Schemes and Descriptors. The DDL defines the syntactic rules to express and combine Description Schemes and Descriptors. According to the definition in the MPEG-7 Requirements Document [1] the DDL is

> '...a language that allows the creation of new Description Schemes and, possibly, Descriptors. It also allows the extension and modification of existing Description Schemes.'

The DDL is not a modelling language such as Unified Modelling Language (UML) but a schema language to represent the results of modelling audiovisual data, i.e., DSs and Ds.

The DDL must satisfy the MPEG-7 DDL requirements. It has to be able to express spatial, temporal, structural, and conceptual relationships between the elements of a DS, and between DSs. It must provide a rich model for links and references between one or more descriptions and the data that it describes. In addition, it must be platform and application independent and human- and machine-readable.

(Non-normative) DDL Parser applications will be required which are capable of validating description schemes (content and structure) and descriptor data types [both primitive (integer, text, date, time) and composite (histograms, enumerated types)], against the DDL. The DDL Parsers must also be capable of validating MPEG-7 descriptions or instantiations, against their corresponding validated MPEG-7 schemas (DSs and Ds).

The DDL design has been informed by numerous proposals and input documents submitted to MPEG-7 since the MPEG-7 Call for Proposals in October 1998 [2]. It has also been heavily influenced by W3C's XML Schema Language [3,4,5] and the Resource Description Framework (RDF) [6].

At the 51st MPEG meeting in Noordwijkerhout in March 2000, it was decided to adopt XML Schema Language [3,4, 5] as the MPEG-7 DDL. However because XML Schema language was not designed specifically for audiovisual content, certain extensions have been necessary in order to satisfy all of the MPEG-7 DDL requirements.

Hence the W3C's XML Schema Language Recommendations [3,4,5] together with the MPEG-7 extensions described in this document, constitute the normative reference for the MPEG-7 DDL. Overviews of the XML Schema Language structural components and datatypes are given in Annexes A and B for informative purposes only. If Annexes A and B contradict the normative references [3,4,5] then the normative references should be used as the definitive specification.

1.3 Structure of this document

The DDL can be broken down into the following logical normative components:

- The XML Schema structural language components;
- The XML Schema datatype language components;
- The MPEG-7 specific extensions.

The complete normative specifications for XML Schema structural and datatype components can be found in [4] and [5] respectively. This International Standard provides the normative specification of the MPEG-7-specific extensions as well as non-normative examples which provide the MPEG-7 community with a clear understanding of the DDL and assist with the development of valid description schemes and descriptors.

The structure of the remainder of this International Standard is as follows:

- Clause 5 describes the normative MPEG-7–specific extensions.
- Clause 6 describes those features of XML Schema which are currently not used by MPEG-7.
- Annex A provides an informative overview of the structural components of XML Schema Language.
- Annex B provides an informative overview of the datatyping mechanisms within XML Schema Language.
- Annex C provides the normative XML Schema which defines the MPEG-7 extensions.
- Annex D contains the Patent Statements.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 15938. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 15938 are encouraged to

investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau maintains a list of currently valid ITU-T Recommendations.

- ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*
- ISO 639 (all parts), *Codes for the representation of names of languages*
- ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*
- ISO 3166-2, *Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code*

NOTE The current list of valid ISO 3166-1 country and ISO 3166-2 region codes is maintained by the ISO 3166 Maintenance agency at the ISO Central Secretariat. Information on the current list of valid region and country codes can be found at http://www.iso.org/mara/iso3166 [11]

- ISO 4217, *Codes for the representation of currencies and funds*

NOTE The current list of valid ISO 4217 currency code is maintained by the official maintenance authority British Standards Institution (http://www.bsi-global.com/iso4217currency) [12]

- XML, *Extensible Markup Language (XML) 1.0,* 6 October 2000 <http://www.w3.org/TR/2000/REC-xml-20001006>
- *Namespaces in XML*, W3C Recommendation, 14 January 1999 <http://www.w3.org/TR/REC-xml-names/>
- *XML Schema, W3C Recommendation*, 2 May 2001 <http://www.w3.org/XML/Schema>
- *XML Schema Part 0: Primer,* W3C Recommendation, 2 May 2001 <http://www.w3.org/TR/xmlschema-0/>
- *XML Schema Part 1: Structures*, W3C Recommendation, 2 May 2001 <http://www.w3.org/TR/xmlschema-1/>
- *XML Schema Part 2: Datatypes*, W3C Recommendation, 2 May 2001 <http://www.w3.org/TR/xmlschema-2/>
- XPath, *XML Path Language, W3C Recommendation*, 16 November 1999 <http://www.w3.org/TR/1999/REC-xpath-19991116>

NOTE These documents are maintained by the W3C (http://www.w3.org/).

- RFC 2045, *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*
- RFC 2046, *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types*
- RFC 2048, *Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures*
- RFC2045-CHARSETS, *Registered Character set codes of RFC2045*
- RFC2046-MIMETYPES, *Registered Mimetypes of RFC2046*

NOTE The relevant lists can be obtained as follows:

  - MIMETYPES. The current list of registered mimetypes, as defined in RFC2046, RFC2048, is maintained by IANA (Internet Assigned Numbers Authority). It is available from ftp://ftp.isi.edu/in-notes/iana/assignments/media-types/media-types/ [13].
  - CHARSETS. The current list of registered character set codes, as defined in RFC2045 and RFC2048 is maintained by IANA (Internet Assigned Numbers Authority). It is available from http://www.iana.org/assignments/character-sets [14].