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Information technology — Multimedia service platform technologies —

Part 2: MPEG extensible middleware (MXM) API

Technologies de l'information — Technologies de la plate-forme de services multimédia —

Partie 2: Intergiciel MPEG extensible (MXM) API

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Contents

Page

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.

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ISO/IEC 23006-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 23006-2:2011) which has been technically revised.

ISO/IEC 23006 consists of the following parts, under the general title *Information technology — Multimedia service platform technologies*:

— *Part 1: Architecture*

— *Part 2: MPEG extensible middleware (MXM) API*

— *Part 3: Conformance and reference software*

— *Part 4: Elementary services*

— *Part 5: Service aggregation*

Introduction

ISO/IEC 23006 is a suite of standards that has been developed for the purpose of enabling the easy design and implementation of media-handling value chains whose devices interoperate because they are all based on the same set of technologies, especially MPEG technologies, accessible from the middleware APIs, elementary services and aggregated services.

ISO/IEC 23006 is referred to as MPEG Extensible Middleware (MXM) in its first edition, and it specifies an architecture (Part 1), an API (Part 2), a conformance and reference software (Part 3) and a set of protocols to which MXM Devices had to adhere (Part 4).

ISO/IEC 23006 is referred to as Multimedia Service Platform Technologies (also abbreviated as MPEG-M) in its second edition, and it conserves the architecture and design philosophy of the first edition, while stressing the Service Oriented Architecture character. It specifies also how to combine elementary services into aggregated services (Part 5).

ISO/IEC 23006 is subdivided in five parts:

Part 1 – Architecture: specifies the architecture that can be used as a guide to an MPEG-M implementation;

Part 2 – MPEG Extensible Middleware (MXM) Application Programming Interface (APIs) (the present document): specifies the middleware APIs;

Part 3 – Conformance and Reference Software: specifies conformance criteria and a reference software implementation with a normative value;

Part 4 – Elementary Services: specifies elementary service protocols between MPEG-M applications; and

Part 5 – Service Aggregation: specifies mechanisms enabling the combination of Elementary Services and other services to build Aggregated Services.

Information technology — Multimedia service platform technologies — Part 2: MPEG extensible middleware (MXM) API

1 Scope

This part of ISO/IEC 23006 specifies a set of Application Programming Interfaces (called for short MXM APIs) so that MPEG-M Applications running on an MPEG-M Device can access the standard multimedia technologies contained in its Middleware as MPEG-M Engines, as specified by ISO/IEC 23006-1.

The MXM APIs belong to two classes:

— the MPEG-M Engine APIs, i.e. the collection of the individual MPEG-M Engine APIs providing access to a single MPEG technology (e.g. video coding) or to a group of MPEG technologies where this is convenient;

— the MPEG-M Orchestrator API, i.e. the API of the special MPEG-M Engine (called Orchestrator Engine) that is capable of creating chains of MPEG-M Engines to execute high-level application calls such as "Play a video", as opposed to the typically low-level MPEG-M Engine API calls.

2 Normative references

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

ISO/IEC 23006-1, *Information technology — Multimedia service platform technologies — Part 1: Architecture*

ISO/IEC 23006-3, *Information technology — Multimedia service platform technologies — Part 3: Conformance and reference software*

ISO/IEC 23006-4, *Information technology — Multimedia service platform technologies — Part 4: Elementary services*

ISO/IEC 23006-5, *Information technology — Multimedia service platform technologies — Part 5: Service aggregation*

ISO/IEC 15938 (all parts), *Information technology — Multimedia content description interface*

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

ISO/IEC 23000 (all parts), *Information technology — Multimedia application format (MPEG-A)*

ISO/IEC 23001 (all parts), *Information technology — MPEG systems technologies*

ISO/IEC 23002 (all parts), *Information technology — MPEG video technologies*

ISO/IEC 23003 (all parts), *Information technology — MPEG audio technologies*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

3.1.1
Aggregated Service
service resulting from the combination of **Elementary Service**s

3.1.2
Elementary Service
basic unit of **service**

3.1.3
content
Digital Item and its component elements, namely resources (e.g., media, scripts, executable), identifiers, descriptions (e.g., metadata), event reports

3.1.4
contract
set of **metadata**, **licenses**, promises and signers agreed by **Users** of a multimedia value chain, where a promise is a signed collection of statements about, e.g., obligations, prohibitions and assertions, and a signer is a **user** whose signature makes the contract valid

3.1.5
device
hardware/software or simply software apparatus that enables a **user** to play a role in multimedia **value chain**s

3.1.6
event
performance of a specified set of functions or Operations

3.1.7
entity
one of the following elements in the multimedia value chain: **content**, **contract**, **device**, **event**, **license**, **service**, and **user**

3.1.8
license
collection of authorizations, conditions and payment terms granted by a **user** to other **user**s

3.1.9
protocol
set of rules and data format used by two **Device**s to communicate

3.1.10
resource
individually identifiable asset or a sequence of assets such as a video or audio clip, a 3D synthetic scene, an image, a textual asset, a 2D LASeR scene, a web page, a single program or a full 24 hour programming of a TV broadcast, a script or executable, etc.

3.1.11
right
ability of a **user** to perform an Operation in the multimedia **value chain**

3.1.12
role
ability of a **user** to perform a set of Operations in the multimedia **value chain**

3.1.13
service
operation performed on an **entity** by a **user** on behalf of other **user**s

3.1.14
service provider
user offering **service**s to other **user**s

3.1.15
user
any participant in multimedia **value chains**

3.1.16
value chain
collection of **user**s, including Creators, End Users and Service Providers, that conform to this standard

3.1.17
MPEG-M Application
application that runs on an **MPEG-M Device** and makes calls to the MPEG-M Application API and **MPEG-M Engine APIs**

3.1.18
MPEG-M Device
device equipped with a selected set of **MPEG-M engines**

3.1.19
MPEG-M Engine
collection of specific technologies that are bundled together to provide a specific functionality that is needed by **MPEG-M Applications**

3.1.20
MPEG-M Engine API
API of a single MPEG-M Engine

3.1.21
MPEG-M Orchestrator API
API of the **MPEG-M Orchestrator Engine**

3.1.22
MPEG-M Orchestrator Engine
special **MPEG-M Engine** capable of creating chains of **MPEG-M engines**, i.e. to set-up a sequence of connected MPEG-M engines for the purpose of executing a high-level application call such as Play

3.1.23
MPEG-M Technology
technology that is required to implement an MPEG-M functionality

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in the following apply:

AIT	Advanced IPTV Terminal
API	Application Programming Interface
AS	Aggregated Service
BBL	Bitstream Binding Language
BPMN	Business Process Model and Notation
CEL	Contract Expression Language

DI	Digital Item
DIA	Digital Item Adaptation
DID	Digital Item Declaration
DIDL	Digital Item Declaration Language
DII	Digital Item Identification
DIS	Digital Item Streaming
ER	Event Report
ERR	Event Report Request
ES	Elementary Service
IPMP	Intellectual Property Management and Protection
IPTV	Internet Protocol Television
MDS	Multimedia Description Schemes
MPEG	Moving Picture Experts Group
MPEG-21	Multimedia Framework (see ISO/IEC 21000)
MPEG-A	Multimedia application format (see ISO/IEC 23000)
MPEG-M	Multimedia Service Platform Technologies (see ISO/IEC 23006)
MPQF	MPEG Query Format
REL	Rights Expression Language
RTP	Real Time Protocol
RTSP	Real Time Streaming Protocol
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WSDL	Web Services Description Language
XML	Extensible Markup Language
XSD	XML Schema Definition
XSLT	Extensible Stylesheet Language Transformations

4 Namespace conventions

4.1 Introduction

For clarity, throughout this Part of ISO/IEC 23006, consistent namespace prefixes are used.

"`xml:`" and "`xmlns:`" are normative prefixes defined in W3C XMLNAMES. The prefix "`xml:`" is by definition bound to "`http://www.w3.org/XML/1998/namespace`". The prefix "`xmlns:`" is used only for namespace bindings and is not itself bound to any namespace name.

"`xsi:`" prefix is not normative. It is a naming convention in this document to refer to an element of the `http://www.w3.org/2001/XMLSchema-instance` namespace. All other prefixes used in either the text or examples of this specification are not normative, e.g., "`mpegm:`", "`dia:`".

In particular, most of the informative examples in this specification are provided as XML fragments without the normally required XML document declaration and, thus, miss a correct namespace binding context declaration.

Unless specified otherwise, all unqualified descriptions fragments assume the default namespace "`urn:mpeg:mpegM:schema:02-service-NS:2012`".

In these descriptions fragments the different prefixes are bound to the namespaces as given in Table 1. The schema locations of the namespaces in Table 1 are only an informative indication as schema locations may change over time.

Table 1 — Mapping of prefixes to namespaces used in examples and text

Prefix	Corresponding namespace	Schema location
mpegm	urn:mpeg:mpegM:schema:02-service-NS:2011	
mpegmb	urn:mpeg:mpegM:schema:01-base-NS:2011	
dia	urn:mpeg:mpeg21:2003:01-DIA-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/dia-2nd/UED-2nd.xsd
erl	urn:mpeg:mpeg21:2005:01-ERL-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/er/er.xsd
fru	urn:mpeg:mpeg21:schema:FragmentRequestUnits:2007	Defined in ISO/IEC 23001-2:2008
mpeg7	urn:mpeg:mpeg7:schema:2004	
mpeg7s	urn:mpeg:mpeg7:systems:2001	
cel	urn:mpeg:mpeg21:cel:contract:2011	
bbl	urn:mpeg:mpeg21:2007:01-BBL-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/dis/bbl.xsd
dii	urn:mpeg:mpeg21:2002:01-DII-NS	
mpqf	urn:mpeg:mpqf:schema:2008	Defined in ISO/IEC 15938-12
mpeg4ipmp	urn:mpeg:mpeg4:IPMPSchema:2002	Defined in ISO/IEC 14496-13:2004
ipmpdidl	urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/ipmp/ipmpdidl.xsd

ipmpmsg	urn:mpeg:mpegB:schema:IPMP-XML-MESSAGES:2007	Defined in ISO/IEC 23001-3:2008
ipmpinfo	urn:mpeg:mpeg21:2004:01-IPMPINFO-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/ipmp/ipmpgeneral.xsd
didl	urn:mpeg:mpeg21:2002:02-DIDL-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/did/didl.xsd
mpegm-didl	urn:mpeg:mpegM:schema:06-didl-NS:2012	
didmodel	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/did/didmodel.xsd
didl-msx	urn:mpeg:maf:schema:mediastreaming:DIDLextensions	Defined in ISO/IEC 23000-5:2011
dii	urn:mpeg:mpeg21:2002:01-DII-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/dii/dii.xsd
rel-r	urn:mpeg:mpeg21:2003:01-REL-R-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/rel-r/rel-r.xsd
rel-sx	urn:mpeg:mpeg21:2003:01-REL-SX-NS	http://standards.iso.org/ittf/PubliclyAvailableStandards/MPEG-21_schema_files/rel-r/rel-sx.xsd

xsd	http://www.w3.org/2001/XMLSchema	http://www.w3.org/2001/XMLSchema.xsd
xsi	http://www.w3.org/2001/XMLSchema-instance	
dsig	http://www.w3.org/2000/09/xmldsig#	http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/xmldsig-core-schema.xsd
xenc	http://www.w3.org/2001/04/xmlenc#	
bpmn	http://www.omg.org/spec/BPMN/20100524/MODEL	http://www.omg.org/spec/BPMN/20100501/BPMN20.xsd
bpmnext1	urn:mpeg:mpegM:schema:04-bpmn-ext-mfr-NS:2012	
ca	urn:mpeg:mpegM:service-type:04-content-adaptation-NS:2012	
cel	urn:mpeg:mpeg21:2010:01-CEL-NS	
cidl	urn:mpeg:mpeg-v:2010:01-CIDL-NS	
dc	http://purl.org/dc/elements/1.1/	http://dublincore.org/schemas/xmls/qdc/2008/02/11/dc.xsd
dcdv	urn:mpeg:mpeg-v:2010:01-DCDV-NS	
ebucore	urn:ebu:metadata-schema:ebuCore_2010	http://www.ebu.ch/metadata/schemas/EBUCore/20100820/EBU_CORE_20100820.xsd
esi	urn:mpeg:mpegM:service-type:03-extract-sensory-information-NS:2012	
etsi	urn:dvb:metadata:iptv:sdns:2008-1	Defined in ETSI TS 102 034 [3]
ipmpinfo-msx	urn:mpeg:maf:Schema:mediastreaming:IPMPINFOextensions:2007	Defined in ISO/IEC 23000-5:2011
rs	urn:mpeg:mpegM:service-type:01-recognize-speech-NS:2012	
saml	urn:oasis:names:tc:SAML:2.0:assertion	http://docs.oasis-open.org/security/saml/v2.0/saml-schema-assertion-2.0.xsd