
**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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/IEC JTC 1, *Information technology, SC 29, Coding of audio, picture, multimedia and hypermedia information*.

This third edition cancels and replaces the second edition (ISO/IEC 23006-2:2013), which has been technically revised.

A list of all parts in the ISO/IEC 23006 series can be found on the ISO website.

Introduction

The ISO/IEC 23006 series 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.

The ISO/IEC 23006 series is referred to as MPEG Extensible Middleware (MXM) in its first edition, and it specifies an architecture (ISO/IEC 23006-1), an API (ISO/IEC 23006-2), a conformance and reference software (ISO/IEC 23006-3) and a set of protocols which MXM Devices had to adhere (ISO/IEC 23006-4). It specifies also how to combine elementary services into aggregated services (ISO/IEC 23006-5).

The ISO/IEC 23006 series is subdivided into 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) (this 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;

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

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Information technology — Multimedia service platform technologies —

Part 2: MPEG extensible middleware (MXM) API

1 Scope

This document 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

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

Aggregated Service

service resulting from the combination of *Elementary Services* (3.1.2)

3.1.2

Elementary Service

basic unit of *service* (3.1.13)

3.1.3

content

Digital Item and its component elements, namely resources (e.g. media, scripts, executable), identifiers, descriptions (e.g. metadata) and *event* (3.1.6) reports

3.1.4

contract

set of metadata, *licenses* (3.1.8), promises and signers agreed by *users* (3.1.15) of a multimedia *value chain* (3.1.16), 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* (3.1.15) to play a *role* (3.1.12) in multimedia *value chains* (3.1.16)

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* (3.1.16): *content* (3.1.3), *contract* (3.1.4), *device* (3.1.5), *event* (3.1.6), *license* (3.1.8), *service* (3.1.13), and *user* (3.1.15)

3.1.8

license

collection of authorizations, conditions and payment terms granted by a *user* (3.1.15) to other users

3.1.9

protocol

set of rules and data format used by two *devices* (3.1.5) to communicate

3.1.10

resource

individually identifiable asset or a sequence of assets

EXAMPLE 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* (3.1.15) to perform an operation in the multimedia *value chain* (3.1.16)

3.1.12

role

ability of a *user* (3.1.15) to perform a set of operations in the multimedia *value chain* (3.1.16)

3.1.13

service

operation performed on an *entity* (3.1.7) by a *user* (3.1.15) on behalf of other users

3.1.14

service provider

user (3.1.15) offering *services* (3.1.13) to other users

3.1.15

user

participant in multimedia *value chains* (3.1.16)

3.1.16

value chain

collection of *users* (3.1.15), including creators, end users and *service providers* (3.1.14), that conform to this document

3.1.17**MPEG-M Application**

application that runs on an *MPEG-M device* (3.1.18) and makes calls to the MPEG-M Application API and *MPEG-M Engine APIs* (3.1.20)

3.1.18**MPEG-M Device**

device (3.1.5) equipped with a selected set of *MPEG-M Engines* (3.1.19)

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* (3.1.17)

3.1.20**MPEG-M Engine API**

API of a single *MPEG-M Engine* (3.1.19)

3.1.21**MPEG-M orchestrator API**

API of the *MPEG-M Orchestrator Engine* (3.1.22)

3.1.22**MPEG-M Orchestrator Engine**

special *MPEG-M Engine* (3.1.19) capable of creating chains of MPEG-M Engines

Note 1 to entry: It is also 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

AIT	Advanced IPTV Terminal
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 (all parts)]
MPEG-A	Multimedia Application Format [see ISO/IEC 23000 (all parts)]
MPEG-M	Multimedia Service Platform Technologies [see ISO/IEC 23006 (all parts)]
MPEG-V	Multimedia Context and Control [see ISO/IEC 23005 (all parts)]
MPQF	MPEG Query Format
REL	Rights Expression Language
RTP	Real Time Protocol
RTSP	Real Time Streaming Protocol
SE	Sensory Effect
SEM	Sensory Effect Metadata
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

For clarity, throughout this document, 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 document are not normative, e.g. "mpeg:", "dia:".

In particular, most of the informative examples in this document 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:mpegB: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/ipmp-didl.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/ipmp-general.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	

Table 1 (continued)

Prefix	Corresponding namespace	Schema location
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/xmenc#	
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/EBU-Core/20100820/EBU-CORE_20100820.xsd
esi	urn:mpeg:mpegM:service-type:03-extract-sensory-information-NS:2012	