INTERNATIONAL STANDARD

**ISO/IEC 23006-1**

Second edition
2013-05-01

# Information technology — Multimedia service platform technologies —

## Part 1: Architecture

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

*Partie 1: Architecture*



Reference number
ISO/IEC 23006-1:2013(E)



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Published in Switzerland

 

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# Foreword

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The committee responsible for this document is 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 23006-1:2011) 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 was 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 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 also specifies how to combine elementary services into aggregated services (Part 5).

This second edition has been specified to address the demand of service specification for an advanced IPTV terminal (AIT). It also aims at leveraging on advanced technologies to bring into IPTV services the buoyancy of new exciting initiatives – sometimes assembling millions of users in a fortnight – that pop up almost every day with new features such as open APIs and the possibility for third parties to provide applications to those APIs.



The scope of the MPEG-M is to support the service providers' drive to deploy innovative multimedia services by identifying a set of Elementary Services (ESs) and defining the corresponding set of protocols and APIs to enable any user in an MPEG-M value chain to access those services in an interoperable fashion. Note that an MPEG-M value chain is a collection of users, including creators, end users and service providers that conform to the MPEG-M standard.



In many real-world MPEG-M value chains, service providers would not be able to exploit the potential of the standard if they were confined to only offer ESs. Therefore service providers typically offer bundles of ESs, known as Aggregated Services (ASs). In general, as shown in Figure 1, there is a plurality of service providers offering the same or partially overlapping ASs. For example, an SP offering User Description Services may offer Content Description Services as well.

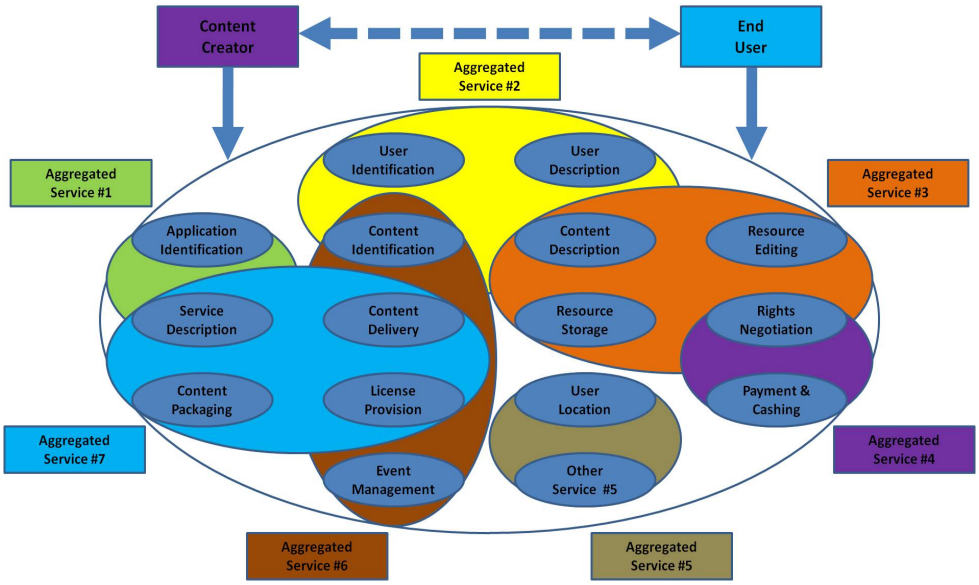


**Figure 1 — Typical devices in a media-handling value chain**

Starting from ISO/IEC 23006 elementary services, the aggregation of services can put together a certain amount of services generating a complex ISO/IEC 23006 value network, having different topologies and associating services in several ways. For example, the Payment and Cashing and Rights Negotiation ESs are aggregated to create AS#4, while Content Delivery and License Provision ESs are both shared between AS#6 and AS#7.

Thanks to the ISO/IEC 23006 suite of standards, aimed at facilitating the creation and provisioning of vastly enhanced IPTV services, it is envisaged that a thriving digital media economy can be established, where:

— developers can offer MPEG-M service components to the professional market because a market will be enabled by the standard MPEG-M component service API;

— manufacturers can offer MPEG-M devices to the global consumer market because of the global reach of MPEG-M services;

— service providers can set up and launch new attractive MPEG-M services because of the ease to design and implement innovative MPEG-M value chains;

— users can seamlessly create, offer, search, access, pay/cash and consume MPEG-M services.

The MPEG-M suite of standards extends the devices capabilities with advanced features such as content generation, processing, and distribution by a large number of users; easy creation of new services by combining service components of their choice; global, seamless and transparent use of services regardless of geo-location, service provider, network provider, device manufacturer and provider of payment and cashing services; diversity of user experience through easy download and installation of applications produced by a global community of developers since all applications share the same middleware APIs; and innovative business models because of the ease to design and implement media-handling value chains whose devices interoperate because they are all based on the same set of technologies, especially MPEG technologies.



The ISO/IEC 23006 suite of standards is subdivided into five parts:



Part 1: Architecture (the present document): 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): 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 1: Architecture

## 1 Scope

This part of ISO/IEC 23006 specifies the MPEG-M architecture that is made accessible through the set of MPEG-M middleware APIs, elementary services and service aggregation specified in ISO/IEC 23006-2, ISO/IEC 23006-4 and ISO/IEC 23006-5 and as a software implementation in ISO/IEC 23006-3, respectively.

The elements of the MPEG-M Architecture are:

1. MPEG-M Engines: collections of specific technologies that are meaningfully bundled together to provide a specific functionality requested by applications;
2. MPEG-M Engine APIs: APIs that can be used by applications to access an MPEG-M Engine functionality;
3. MPEG-M Orchestrator Engine: a special MPEG-M Engine capable of creating chains of MPEG-M Engines to execute a high-level application call such as “Play” that typically requires the activation of multiple engine functionalities;
4. MPEG-M Orchestrator Engine APIs: APIs that can be used to access the MPEG-M Orchestrator Engine;
5. MPEG-M Device: a device equipped with MPEG-M Engines;
6. MPEG-M Application: an application that runs on an MPEG-M Device and makes calls to the MPEG-M Engine and MPEG-M Orchestrator Engine APIs.



The second edition of this part of ISO/IEC 23006 has been developed with a focus on advanced IPTV terminals. It preserves the architecture and design philosophy of the first edition, but stresses the Service Oriented Architecture character.

## 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 23006-2, *Information technology — Multimedia service platform technologies — Part 2: MPEG extensible middleware (MXM) API*

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*

OMG BPMN 2.0, Business Process Model and Notation (BPMN) Version 2.0, Object Management Group, January 2011, http://www.omg.org/spec/BPMN/2.0/

## 3 Terms and definitions

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

**3.1**
**Device**
combination of hardware and software or just an instance of software that allows a user to perform actions

**3.2**
**Domain**
set of **devices** sharing a set of common properties such as ownership

**3.3**
**Inter-MPEG-M Protocol**
protocol that enables communication between MPEG-M Devices

**3.4**
**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



**3.5**
**MPEG-M Device**
**device** equipped with a selected set of MPEG-M engines



**3.6**
**MPEG-M Engine**
collection of specific technologies that are bundled together to provide a specific functionality that is needed by MPEG-M Applications

**3.7**
**MPEG-M Engine API**
API of a single MPEG-M Engine

**3.8**
**MPEG-M Orchestrator API**
API of the MPEG-M Orchestrator Engine

**3.9**
**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.

**3.10**
**MPEG-M Technology**
technology that is required to implement (a profile of) MPEG-M

**3.11**
**User**
any entity making use of an MPEG-M **device**

## 4 Symbols and abbreviated terms

| | |
|---|---|
| BBL | Bitstream Binding Language |
| BPMN | Business Process Model and Notation |
| 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 |
| IPMP | Intellectual Property Management and Protection |
| REL | Rights Expression Language |
| RTP | Real Time Protocol |
| RTSP | Real Time Streaming Protocol |
| URI | Uniform Resource Identifier |

## 5 Namespace conventions



Throughout this part of ISO/IEC 23006, Qualified Names are written with a namespace prefix followed by a colon followed by the local part of the Qualified Name.



For clarity, throughout this part of ISO/IEC 23006, consistent namespace prefixes are used. Table 1 gives these prefixes and the corresponding namespace.

**Table 1 — Namespaces and prefixes**

| Prefix | Corresponding namespace |
|---|---|
| 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 |
| erl | urn:mpeg:mpeg21:2005:01-ERL-NS |
| fru | urn:mpeg:mpegB:schema:FragmentRequestUnits:2007 |
| 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 |
| dii | urn:mpeg:mpeg21:2002:01-DII-NS |
| mpqf | urn:mpeg:mpqf:schema:2008 |
| mpeg4ipmp | urn:mpeg:mpeg4:IPMPSchema:2002 |
| ipmpdidl | urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS |
| ipmpmsg | urn:mpeg:mpeg21:2006:07-IPMPMESSAGES-NS |
| ipmpinfo | urn:mpeg:mpeg21:2004:01-IPMPINFO-NS |

| Prefix | Corresponding namespace |
|---|---|
| didl | urn:mpeg:mpeg21:2002:02-DIDL-NS |
| didl-mpegm | urn:mpeg:mpegm:2011:12-DIDL-NS |
| didmodel | urn:mpeg:mpeg21:2002:02-DIDMODEL-NS |
| didl-msx | urn:mpeg:maf:schema:mediastreaming:DIDLextensions |
| dii | urn:mpeg:mpeg21:2002:01-DII-NS |
| rel-r | urn:mpeg:mpeg21:2003:01-REL-R-NS |
| rel-sx | urn:mpeg:mpeg21:2003:01-REL-SX-NS |
| xsd | http://www.w3.org/2001/XMLSchema |
| xsi | http://www.w3.org/2001/XMLSchema-instance |
| dsig | http://www.w3.org/2000/09/xmldsig# |
| xenc | http://www.w3.org/2001/04/xmlenc# |

## 6 System overview

The MPEG-M Platform is an end-to-end platform populated with MPEG-M Devices.



Figure 2 shows a rather general configuration of a media value chain with the explicit indication of MPEG-M devices with specific functionalities. The figure also highlights some protocols that are used by different MPEG-M devices to communicate with one another.



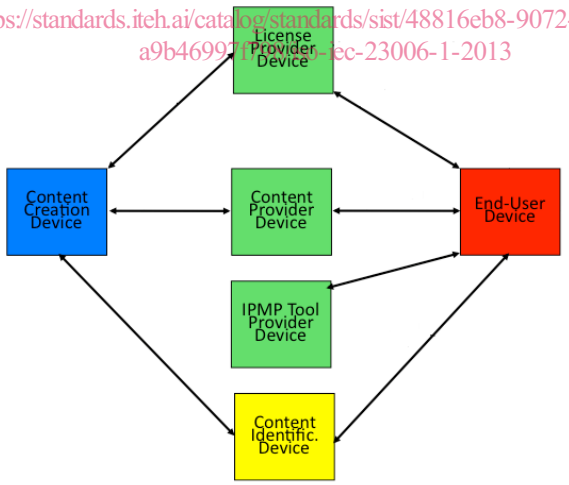


**Figure 2 — Typical devices in a media-handling value chain**

A general architecture of an MPEG-M Device is given in the figure below where MPEG-M Applications running on an MPEG-M Device call the Engines in the Middleware via an Application-Middleware API.

In general an MPEG-M Device can have several MPEG-M Applications running on it (there may be other applications but these are not relevant here). Some may be “resident”, i.e. they have been loaded by the MPEG-M manufacturer and some may be temporary, i.e. they have been downloaded for a specific purpose.

Engines are of two types: Protocol Engines (specified in ISO/IEC 23006-4) and Technology Engines (specified in ISO/IEC 23006-2).

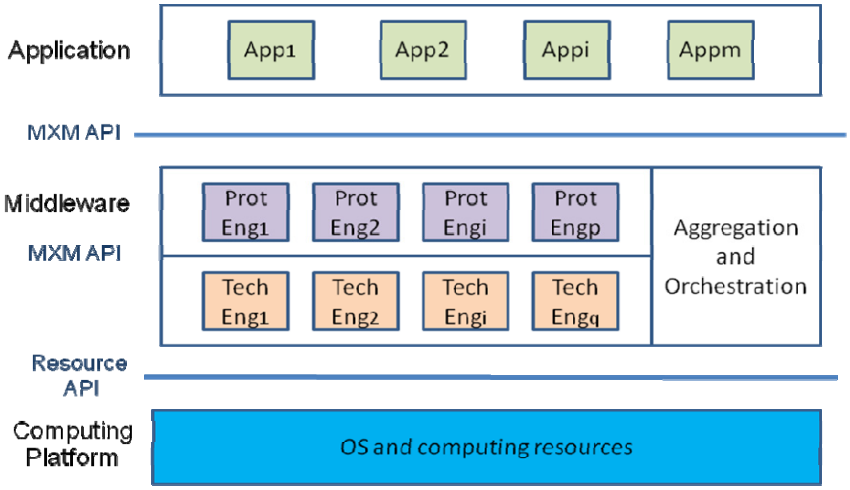


**Figure 3 — Generic MPEG-M Device architecture**

Two Applications running on networked MPEG-M Devices communicate by executing service protocols as depicted in the figure below.

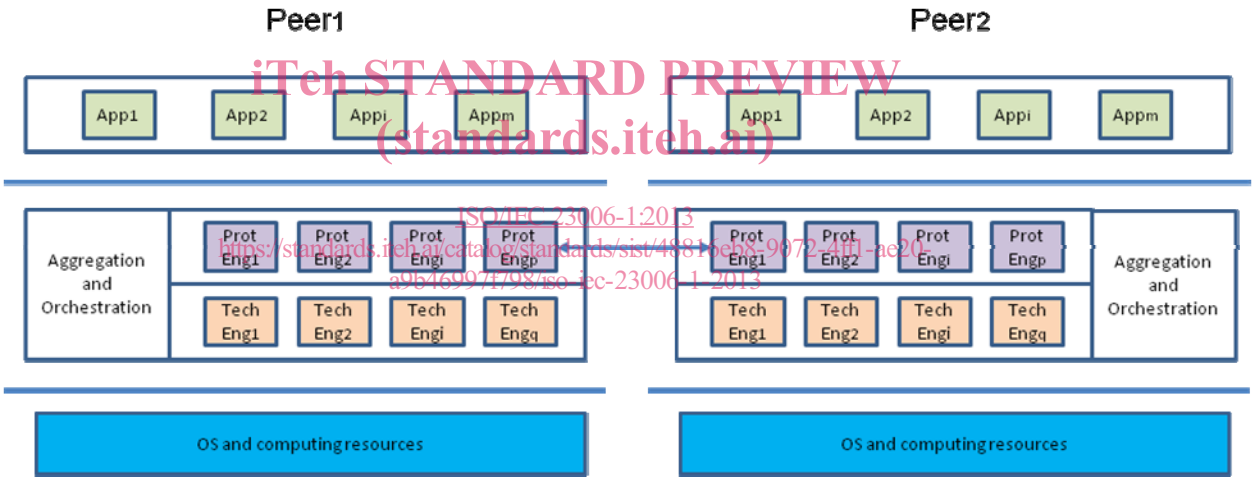




**Figure 4 — Communication between two MPEG-M Devices**

When the MPEG-M Device on the right hand side (e.g. a “client”) communicates to the MPEG-M Device on the left hand side (e.g. a “server”) the following happens:

1. A client Application makes a Service request (e.g. an Elementary Service such as Create Licence) using a Protocol Engine

2. The corresponding server-side Protocol Engine, upon receiving the request, calls the appropriate Orchestrator Engine’s API functionality (e.g. REL Orchestration) or chain of Engines

3. The Orchestrator Engine on the server, if required, sets up a chain of Engines: in the REL example just one Technology Engine (the REL Engine) creates the requested licence

4. The server-side Protocol Engine returns the Licence to client-side Protocol Engine.

The same happens if the client Application makes an Aggregated Service request. In this case the Orchestrator Engine sets up a more complex chain of Technology and Protocol Engines.