
**Information technology — Supplemental
media technologies —**

Part 1:
**Media streaming application format
protocols**

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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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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 29116-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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- *Part 1: Media streaming application format protocols* ^{ISO/IEC 29116-1:2008}
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Introduction

ISO/IEC 29116 is a family of International Standards that has been developed for the purpose of providing the complete line-up of standards that are required to practically deploy Multimedia Application Format standards. The parts of ISO/IEC 29116 have been developed starting from submissions received by proponents. The proposed technologies have been thoroughly reviewed prior to submission of the Committee Draft and have undergone the full national body review during the process of balloting the Draft International Standards.

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Information technology — Supplemental media technologies —

Part 1: Media streaming application format protocols

1 Scope

This International Standard specifies a set of protocols to be used in conjunction with ISO/IEC 23000-5 (Media streaming Player) in applications where governed audio and video information is streamed to an end-user device.

This International Standard specifies two types of protocols,

- Access Protocols, allowing a device to obtain from another device a content item or parts thereof, a license, or executable code implementing security functions, and
- Domain Management Protocols, allowing a number of devices to create, join, administer, etc. a group of users and devices where the participants share common properties.

2 Normative references

[ISO/IEC 29116-1:2008](https://standards.iteh.ai/catalog/standards/sist/002d4d05-e946-40ac-8469-44df6741fa2c/iso-iec-29116-1-2008)

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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 23000-5, *Information technology — Multimedia application format (MPEG-A) — Part 5: Media streaming application format*

3 Terms and definitions

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

3.1

Content Provider Device

device delivering content to another **device**

3.2

Device

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

3.3

Domain Administrator

user creating and administering a domain by means of a **Domain Management Device**

3.4

Domain Management Device

device managing the lifecycle of a domain and the membership of **devices** and **users** part of it.

3.5

IPMP Processor

module in a Media Streaming Player in charge of retrieving, instantiating, initialising and managing the **IPMP Tools** required to perform actions on content.

3.6

IPMP Tool

module performing (one or more) IPMP functions such as authentication, decryption, watermarking, etc.

3.7

IPMP Tool Agent

module instantiating, initialising, authenticating, and supervising any operation performed between IPMP Tools within an **IPMP Tool Group**

3.8

IPMP Tool Body

executable code implementing either a Single IPMP Tool or an **IPMP Tool Pack**

3.9

IPMP Tool Group

combination of several IPMP Tools

3.10

IPMP Tool Pack

module that comprises an IPMP Tool Group and its **IPMP Tool Agent**

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3.11

IPMP Tool Provider Device

device delivering IPMP Tools to another **device**

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Licence Provider Device

device delivering licenses to another **device**

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3.13

User

any identified entity interacting in a media streaming environment using a media streaming **device**.

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

CPD	Content Provider Device
DID	Digital Item Declaration
DIDL	Digital Item Declaration Language
DII	Digital Item Identification
DMD	Domain Management Device
IPMP	Intellectual Property Management and Protection
LPD	License Provider Device
LLAP	Local License Access Protocol

MSD	Media Streaming Device
MSP	Media Streaming Player
RCAP	Remote Content Access Protocol
RLAP	Remote License Access Protocol
URI	Uniform Resource Identifier

5 Namespace conventions

Throughout this part of ISO/IEC 29116, 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 29116, consistent namespace prefixes are used. Table 1 gives these prefixes and the corresponding namespace.

Table 1 — Namespaces and prefixes

Prefix	Corresponding namespace
ipmpdidl	urn:mpeg:mpeg21:2004:01-IPMPDIDL-NS
ipmpmsg	urn:mpeg:mpeg21:2006:07-IPMPMESSAGES-NS
ipmpinfo	urn:mpeg:mpeg21:2004:01-IPMPINFO-NS
didl	urn:mpeg:mpeg21:2002:02-DIDL-NS
didmodel	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS
didl-msx	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS
dii	urn:mpeg:mpeg21:2002:01-DII-NS
r	urn:mpeg:mpeg21:2003:01-REL-R-NS
sx	urn:mpeg:mpeg21:2003:01-REL-SX-NS
mlx	urn:mpeg:mpeg21:2005:01-REL-M1X-NS
xsd	http://www.w3.org/2001/XMLSchema
xsi	http://www.w3.org/2001/XMLSchema-instance
dsig	http://www.w3.org/2000/09/xmlsig#
msap	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS
msd	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS
msdp	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS
msbp	urn:mpeg:mpeg21:2002:02-DIDMODEL-NS

6 System overview

ISO/IEC 29116-1 specifies the format of the data exchanged between a Media Streaming Player and other Media Streaming Devices, namely:

- a. *Content Provider Device*, a device capable of interacting with a *Media Streaming Player* to provide Media Streaming Content
- b. *Licence Provider Device*, a device capable of interacting with a *Media Streaming Player* to provide Licences
- c. *IPMP Tool Provider Device*, a device capable of interacting with a *Media Streaming Player* to provide IPMP Tools¹⁾
- d. *Domain Management Device*, a device capable of managing various functions needed for a proper functioning of a domain.

7 Access Protocols

7.1 Introduction

This section specifies the messages exchanged between devices when communicating with the purpose of obtaining from another device:

Content
 A license
 An IPMP Tool Body

7.2 Base Protocol Representation

This section specifies the base information commonly used in both the access protocols and the domain management protocols. The namespace `msbp` defines the elements on which the access protocols and the domain protocols are based.

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7.2.1 ProtocolBaseType

The `msbp:ProtocolBaseType` abstract complex type is defined in the figure below. All the complex types defined in this standard extends `msbp:ProtocolBaseType`.

```
<complexType name="ProtocolBaseType" abstract="true"/>
```

Figure 1 — The `msbp:ProtocolBaseType` complex type

7.2.2 ProtocolType

The abstract `msbp:ProtocolType` complex type, defined in the figure below, extends the `msbp:ProtocolBaseType` for conveying the `msbp:TransactionID` element which conveys a value which is used to track a message exchange session. Any message in response to another message shall specify the same `TransactionID` value contained in the request.

```
<complexType name="ProtocolType" abstract="true"/>
  <complexContent>
    <extension base="msbp:ProtocolBaseType">
      <sequence>
        <element name="TransactionID" type="string"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 2 — The `msbp:ProtocolType` complex type

1) Related terms include: IPMP Processor, IPMP Tool Agent, IPMP Tool Group, IPMP Tool Pack.

7.2.3 Ack

The msbp:Ack element defined in the figure below extends the msbp:ProtocolType complex type by specifying a boolean attribute, Result, which shall indicate whether the protocol was carried out with success or otherwise, and the msbp:ProtocolResult element, that may convey further information concerning the result of an operation.

```
<element name="Ack" type="msbp:AckType"/>
<complexType name="AckType">
  <complexContent>
    <extension base="msbp:ProtocolType">
      <sequence minOccurs="0">
        <element ref="msbp:ProtocolResult"/>
      </sequence>
      <attribute name="Result" type="boolean" use="required"/>
    </extension>
  </complexContent>
</complexType>
```

Figure 3 — The msbp:Ack element

7.2.4 ProtocolResult

The ProtocolResult element may convey either one of the codes specified in Table 2, of a user-defined result code. Furthermore, the DisplayString element may convey a string to be shown to a user as the result of the operation.

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```
<element name="ProtocolResult" type="msbp:ProtocolResultType"/>
<complexType name="ProtocolResultType">
  <complexContent>
    <extension base="msbp:ProtocolBaseType">
      <sequence>
        <choice>
          <element name="ResultCode" type="msbp:ResultCodeType"/>
          <element name="UserDefinedResult" type="string"/>
        </choice>
        <element name="DisplayString" type="string" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<simpleType name="ResultCodeType">
  <restriction base="hexBinary">
    <enumeration value="00"/>
    <enumeration value="01"/>
    <enumeration value="02"/>
    <enumeration value="03"/>
    <enumeration value="04"/>
    <enumeration value="05"/>
    <enumeration value="06"/>
    <enumeration value="07"/>
  </restriction>
</simpleType>
</complexType>
```

Figure 4 — The msbp:ProtocolResult element

A list of result codes is given in the table below.

Table 2 — List of Result Code

Result Code	Description
"00"	RESERVED
"01"	OK
"02"	UNKNOWN_MESSAGE
"03"	TIMEOUT
"04"	UNABLE_TO_PROCESS
"05"	UNKNOWN_FAILURE
"06"	PERMISSION_DENIED
"07"	BUSY

7.3 Access Protocols Representation specification

7.3.1 Introduction

The namespace identified by the prefix msap, indicates protocols to access content, licenses and keys.

7.3.2 AccessProtocolType

The msap:AccessProtocolType complex type, defined in the figure below, extends the msbp:ProtocolType.

```
<complexType name="AccessProtocolType" abstract="true">
  <complexContent>
    <extension base="msbp:ProtocolType"/>
  </complexContent>
</complexType>
```

Figure 5 — The msap: ProtocolType complex type

7.3.3 Ack

The msap:Ack element defined in the figure below extends the msap:AccessProtocolType complex type by specifying a boolean attribute, Result, indicating whether the protocol was carried out with success or otherwise, and the msbp:ProtocolResult element, that may convey further information concerning the result of an operation.

```
<element name="Ack" type="msap:AckType"/>
<complexType name="AckType">
  <complexContent>
    <extension base="msap:AccessProtocolType">
      <sequence minOccurs="0">
        <element ref="msbp:ProtocolResult"/>
      </sequence>
      <attribute name="Result" type="boolean" use="required"/>
    </extension>
  </complexContent>
</complexType>
```

Figure 6 — The msap:Ack element

7.3.4 RequestContent

A device sends a Request Content message (specified in the figure below) to the content provider device in order to access content.

```
<element name="RequestContent" type="msap:RequestContentType"/>
<complexType name="RequestContentType">
  <complexContent>
    <extension base="msap:AccessProtocolType">
      <sequence>
        <element name="ContentIdentifier"
type="msap:ContentIdentifierType"/>
        <element name="MimeType" type="string" minOccurs="0"/>
        <element ref="r:license" minOccurs="0"/>
        <element name="UsageEnvironmentDescription"
type="dia:UsageEnvironmentType" minOccurs="0"/>
        <element name="UsageEnvironmentDescription" type="string"
minOccurs="0"/>
        <element ref="dsig:Signature" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 7 — The msap:RequestContent element

The msap:RequestContent message conveys the following information:

- msap:ContentIdentifier: the identifier of the requested content item or content element within a content item, as defined in the figure below
- msap:MimeType: the Mime Type of the content being requested. The following values are permitted:
 - application/mp21 – the MPEG-21 file is requested
 - application/xml – the digital item representing the content item or content element identified in msap:ContentIdentifier is requested
 - the mime type of the resource identified in msap:ContentIdentifier
- r:license: an optional license specifying additional information about the requested license needed to access the requested content
- msap:UsageEnvironmentDescription: Tool for describing the usage environment. Each UsageEnvironmentProperty child element describes a property of the usage environment, such as User characteristics, or terminal capabilities, or network characteristics, or natural environment characteristics
- dsig:Signature: an optional digital signature of the msap:RequestContent message by the device

The ContentIdentifierType complex type specified in the figure below conveys the identifier of a content item and optionally the identifier of a content element within the content item. In the case the msap:ContentElementIdentifier element is specified in an msap:RequestContent message, this implies that only the specific content element is requested, and not the whole content item.

```
<complexType name="ContentIdentifierType">
  <complexContent>
    <extension base="msbp:ProtocolBaseType">
      <sequence>
        <element name="ContentItemIdentifier" type="anyURI"/>
        <element name="ContentElementIdentifier" type="anyURI"
minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 8 — The msap:ContentIdentifierType complex type

7.3.5 RequestContentResponse

The RequestContentResponse message, sent in response to a RequestContent message, is specified in the figure below.

```
<element name="RequestContentResponse" type="msap:RequestContentResponseType"/>
<complexType name="RequestContentResponseType">
  <complexContent>
    <extension base="msap:AccessProtocolType">
      <sequence>
        <element name="DI" type="didl:DIDLType" minOccurs="0"/>
        <element name="ContentURL" type="msap:ContentURLType" minOccurs="0"
maxOccurs="unbounded"/>
        <element ref="dsig:Signature" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 9 — The msap:RequestContentResponse element

The msap:RequestContentResponse message is employed by the Content Provider Device to deliver the following information:

- msap:DI: the optional digital item representing the content item being requested
- msap:ContentURL: an optional sequence of elements (whose syntax is specified in the figure below) specifying the URLs from where the requested resource and any associated metadata can be obtained
- dsig:Signature: an optional digital signature applied to the message

7.3.6 ContentURL

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If the target of a RequestContent message is a content element part of a content item, depending on the nature of the content element being requested, a number of resources may be made available to the requesting party. The ContentURL complex type allows signalling the mime type of each resource and the URL from which each resource is available. As an example, if the content element being requested consists of a media resource (e.g. an audio elementary stream) and associated metadata, two separate msap:ContentURL elements shall be returned in the msap:RequestContentResponse, one indicating the URL for the audio elementary stream and the other the URL for the metadata elementary stream.

The msap:ContentURLType complex type is specified in the figure below.

```
<complexType name="ContentURLType">
  <complexContent>
    <extension base="msbp:ProtocolBaseType">
      <sequence>
        <element name="MimeType" type="string"/>
        <element name="URL" type="anyURI"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 10 — The msap:RequestContentResponse element

7.3.7 Request License

The msap:RequestLicense specified in the figure below is sent by a device to a License Provider Device in order to request a license granting the device or the user of the device one or more rights over a content item or a content element part of a content item. The msap:RequestLicense message allows requesting a license for either a content item or content element, or a license having a specific license identifier.

```
<element name="RequestLicense" type="msap:RequestLicenseType"/>
<complexType name="RequestLicenseType">
  <complexContent>
    <extension base="msap:AccessProtocolType">
      <sequence>
        <choice>
          <element name="ContentIdentifier"
type="msap:ContentIdentifierType"/>
          <element name="LicenseID" type="anyURI"/>
        </choice>
        <element ref="r:license" minOccurs="0"/>
        <element ref="dsig:Signature" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 11 — The msap:RequestLicense element

The semantics for the msap:RequestLicense message is given below:

- msap:ContentIdentifier: the identifier of the governed asset for which a license is requested
- msap:LicenseID : The identifier of the license being requested
- r:license: an optional license specifying the principal(s), the right(s), the resource(s) and the condition(s) that the requesting party would like to be specified in the license being requested.
- dsig:Signature: an optional digital Signature of the msap:RequestLicense message.

7.3.8 RequestLicenseResponse

The msap:RequestLicenseResponse message, sent in response to an msap:RequestLicense message, is specified in the figure below.

```
<element name="RequestLicenseResponse" type="msap:RequestLicenseResponseType"/>
<complexType name="RequestLicenseResponseType">
  <complexContent>
    <extension base="msap:AccessProtocolType">
      <sequence>
        <element ref="r:license"/>
        <element ref="dsig:Signature" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Figure 12 — The msap:RequestLicenseResponse element

The msap:RequestLicenseResult element is employed by the License Provider to deliver a license, which shall be included in the r:license element. Shall this message be signed, the digital signature shall be included in the dsig:Signature element.