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**Information technology — Coding of  
audio-visual objects —**

**Part 6:  
Delivery Multimedia Integration Framework  
(DMIF)**

iTeh STANDARD PREVIEW

*Technologies de l'information — Codage des objets audiovisuels —  
Partie 6: Charpente d'intégration de livraison multimédia (DMIF)*

[ISO/IEC 14496-6:2000](https://standards.iso.org/iso-iec-14496-6-2000)

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## Contents

Page

1	Scope .....	1
2	Conformance.....	1
2.1	Requirements for conformance .....	1
2.2	DMIF-Application Interface .....	1
2.3	DMIF signalling messages.....	2
3	Normative references .....	2
4	Terms and definitions .....	2
5	Abbreviations .....	3
6	Organization of this part of ISO/IEC 14496.....	3
7	Compliance terms.....	5
8	DMIF overview.....	5
8.1	ISO/IEC 14496 terminal architecture .....	5
8.2	The objectives of DMIF.....	6
8.3	The DMIF communications architecture .....	6
8.4	DMIF computational model.....	8
8.5	DMIF QoS model .....	9
8.6	The User Plane in the Delivery Layer.....	9
9	Remote interactive scenario.....	10
9.1	Additional requirements.....	10
9.1.1	Introduction.....	10
9.1.2	Billing policies.....	11
9.1.3	Possible evolution to Heterogeneous Networks .....	11
9.2	DMIF within the context of the ISO/OSI layers.....	11
10	The DMIF-Application Interface.....	12
10.1	The DMIF-Application Interface key concepts .....	12
10.2	Common semantic elements .....	13
10.2.1	channelDescriptor .....	13
10.3	DMIF-Application Interface primitives .....	15
10.4	DMIF-Application Interface semantics.....	17
10.4.1	DA_ServiceAttach ().....	17
10.4.2	DA_ServiceAttachCallback ().....	18
10.4.3	DA_ServiceDetach ().....	18
10.4.4	DA_ServiceDetachCallback ().....	18
10.4.5	DA_ChannelAdd () .....	18
10.4.6	DA_ChannelAddCallback ().....	19
10.4.7	DA_ChannelDelete () .....	19
10.4.8	DA_ChannelDeleteCallback ().....	19
10.4.9	DA_UserCommand ().....	19
10.4.10	DA_UserCommandCallback () .....	19
10.4.11	DA_Data ().....	19
10.4.12	DA_DataCallback ().....	20
10.4.13	DA_UserCommandAck() .....	20
10.4.14	DA_UserCommandAckCallback().....	20
10.4.15	DA_ChannelMonitor() .....	20
10.4.16	DA_ChannelEvent() .....	20
10.5	QoS Monitoring .....	21
10.5.1	Monitoring events.....	21

10.5.2	qosMode .....	21
10.5.3	qosReport .....	23
11	The DMIF-Network Interface .....	23
11.1	The DMIF-Network Interface key concepts .....	23
11.2	Common syntax elements .....	24
11.2.1	DMIF Descriptors .....	24
11.2.2	DMIF to DMIF data.....	26
11.2.3	Resource Descriptors.....	26
11.2.4	Direction parameter .....	28
11.2.5	Reason parameter.....	28
11.2.6	Response parameter.....	28
11.2.7	channelDescriptor and qosDescriptors.....	29
11.3	DMIF-Network Interface primitives.....	34
11.4	DMIF-Network Interface semantics .....	36
11.4.1	DN_SessionSetup ().....	36
11.4.2	DN_SessionRelease () .....	36
11.4.3	DN_ServiceAttach ().....	36
11.4.4	DN_ServiceDetach ().....	37
11.4.5	DN_TransMuxSetup () .....	37
11.4.6	DN_TransMuxRelease ().....	37
11.4.7	DN_ChannelAdd() .....	37
11.4.8	DN_ChannelAdded() .....	38
11.4.9	DN_ChannelDelete () .....	38
11.4.10	DN_TransMuxConfig ().....	39
11.4.11	DN_UserCommand () .....	39
11.4.12	DN_UserCommandAck () .....	39
12	Control Plane mappings.....	40
12.1	Default syntax.....	40
12.1.1	Syntax elements.....	40
12.1.2	DNI mapping to DMIF signalling messages.....	46
12.2	Syntax for IP networks with (or without) RSVP signalling, using TCP for DMIF signalling.....	56
12.2.1	Approach overview .....	56
12.2.2	DSM-CC Resource Descriptors used.....	56
12.2.3	Usage of networkSessionIds .....	56
12.2.4	Usage of transactionIds .....	57
12.2.5	DNI mapping to socket actions and RSVP signalling .....	57
12.3	Syntax for IP networks with (or without) RSVP Signalling, using UDP for DMIF signalling .....	59
12.3.1	Approach overview .....	60
12.3.2	DSM-CC Resource Descriptors used.....	60
12.3.3	Usage of networkSessionIds .....	60
12.3.4	Usage of transactionIds .....	60
12.3.5	DNI mapping to socket actions and RSVP signalling .....	60
12.4	Syntax for ATM networks with Q.2931 signalling.....	61
12.4.1	Approach overview .....	61
12.4.2	DSM-CC Resource Descriptors used.....	61
12.4.3	Usage of networkSessionIds .....	61
12.4.4	Usage of transactionIds .....	61
12.4.5	DNI mapping to Q.2931 signalling messages .....	62
12.5	Syntax for Networks with ITU-T H.245 Signaling.....	66
12.5.1	Approach overview .....	66
12.5.2	DSM-CC Resource Descriptors used.....	66
12.5.3	Usage of networkSessionIds .....	66
12.5.4	Usage of transactionIds .....	67
12.5.5	DNI mapping to H.245 Signaling messages .....	67
12.5.6	Data transmission procedures .....	68
13	Terminal Capability Matching.....	68
13.1	DMIF Default signalling with Compatibility Descriptors.....	68

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<b>Annex A (informative) Overview of DAI and DNI parameters</b> .....	<b>69</b>
<b>A.1 Sessions and services</b> .....	<b>69</b>
<b>A.2 Channels</b> .....	<b>69</b>
<b>Annex B (informative) Information flows for DMIF</b> .....	<b>71</b>
<b>B.1 Information flows for Remote Interactive DMIF</b> .....	<b>71</b>
<b>B.1.1 Initiation of a service in a Remote Interactive DMIF</b> .....	<b>72</b>
<b>B.1.2 Addition of Channels in a Remote Interactive DMIF</b> .....	<b>74</b>
<b>B.1.3 Deletion of Channels in a Remote Interactive DMIF</b> .....	<b>80</b>
<b>B.1.4 Termination of a Service in a Remote Interactive DMIF</b> .....	<b>82</b>
<b>B.2 Information Flows for Broadcast DMIF</b> .....	<b>83</b>
<b>B.2.1 Initiation of a service in a Broadcast DMIF</b> .....	<b>84</b>
<b>B.2.2 Addition of Channels in a Broadcast DMIF</b> .....	<b>85</b>
<b>B.2.3 Deletion of Channels in a Broadcast DMIF</b> .....	<b>86</b>
<b>B.2.4 Termination of a service in a Broadcast DMIF</b> .....	<b>87</b>
<b>B.3 Information Flows for Local Storage DMIF</b> .....	<b>87</b>
<b>B.3.1 Initiation of a service in a Local Storage DMIF</b> .....	<b>88</b>
<b>B.3.2 Addition of Channels in a Local Storage DMIF</b> .....	<b>89</b>
<b>B.3.3 Deletion of Channels in a Local Storage DMIF</b> .....	<b>90</b>
<b>B.3.4 Termination of a service in a Local Storage DMIF</b> .....	<b>91</b>
<b>Annex C (informative) Use of URLs in DMIF</b> .....	<b>92</b>
<b>C.1 Introduction</b> .....	<b>92</b>
<b>C.2 Generic concepts</b> .....	<b>92</b>
<b>C.3 URL schemes allowed in DMIF</b> .....	<b>92</b>
<b>C.4 New URL schemes</b> .....	<b>92</b>
<b>C.4.1 URL scheme for DMIF signalling over UDP/IP</b> .....	<b>93</b>
<b>C.4.2 URL scheme for DMIF signalling over TCP/IP</b> .....	<b>93</b>
<b>C.4.3 URL scheme for DMIF signalling over networks using NSAP addresses format</b> .....	<b>93</b>
<b>Annex D (informative) Protocol error recovery</b> .....	<b>94</b>
<b>D.1 Timouts and retransmission</b> .....	<b>94</b>
<b>D.2 Transaction state variables</b> .....	<b>94</b>
<b>D.2.1 Transaction identifier: Tid</b> .....	<b>94</b>
<b>D.2.2 Transaction state: Tid.state</b> .....	<b>94</b>
<b>D.2.3 Associated session: Tid.Sid</b> .....	<b>94</b>
<b>D.2.4 Transaction message timeout: Tid.tMessage</b> .....	<b>94</b>
<b>D.2.5 Expired transactionId holding timer: Tid.tHold</b> .....	<b>95</b>
<b>D.2.6 Transaction message: Tid.message</b> .....	<b>95</b>
<b>D.2.7 Tid.retransBound</b> .....	<b>95</b>
<b>D.2.8 Tid.numRetrans</b> .....	<b>95</b>
<b>D.3 Transaction Identifier State Machine</b> .....	<b>95</b>
<b>D.4 Transaction Identifier State table</b> .....	<b>96</b>
<b>Annex E (informative) Subset of DSM-CC resource descriptors from DSM-CC ISO/IEC 13818-6</b> .....	<b>98</b>
<b>E.1 ResourceDescriptor format</b> .....	<b>98</b>
<b>E.1.1 ResourceDescriptorDataField</b> .....	<b>98</b>
<b>E.1.2 Specifying ranges and lists of values in resource descriptors</b> .....	<b>99</b>
<b>E.2 Resource descriptor types useful to this part of ISO/IEC 14496</b> .....	<b>101</b>
<b>E.3 Resource descriptor definitions</b> .....	<b>102</b>
<b>E.3.1 AtmSvcConnection resource descriptor definition</b> .....	<b>102</b>
<b>E.3.2 IP resource descriptor definition</b> .....	<b>102</b>
<b>E.3.3 AtmVcConnection resource descriptor definition</b> .....	<b>103</b>
<b>Annex F (informative) ISO/IEC 14496 content carried over an ETS 300 401 system</b> .....	<b>104</b>
<b>F.1 Introduction</b> .....	<b>104</b>
<b>F.2 ISO/IEC 14496 content embedded in an ETS 300 401 multiplex</b> .....	<b>104</b>
<b>F.2.1 Overview of ETS 300 401 payload transmission</b> .....	<b>104</b>
<b>F.2.2 Object descriptor encapsulation</b> .....	<b>105</b>
<b>F.2.3 Scene description stream encapsulation</b> .....	<b>109</b>
<b>F.2.3.1 BIFSCCommandDataField</b> .....	<b>110</b>

F.2.4	ClockReferenceStream encapsulation .....	111
F.2.5	Audiovisual stream encapsulation.....	111
F.2.6	ISO/IEC 14496 stream indication in ETS 300 401 Service Information .....	112
F.3	Walkthrough of a typical MPEG-4 session carried in an ETS 300 401 system.....	112
F.3.1	General.....	112
F.3.2	Start of a session.....	113
F.3.3	Retrieval of the InitialIOD .....	113
F.3.4	Retrieval of the subsequent BIFS and Object Descriptor streams.....	113
F.3.5	Retrieval of the clock reference and the audio-visual streams.....	113
F.3.6	Dynamic changes to the scene .....	113
F.4	Mapping of DAI procedures to ETS 300 401 procedures.....	113
F.4.1	Initiation of an MPEG-4 service in a DAB system.....	114
F.4.2	Addition of channels in an MPEG-4 service in a DAB system .....	114
F.4.3	Deletion of Channels in an MPEG-4 service in a DAB system .....	115
F.4.4	Termination of a service in an MPEG-4 service in a DAB system .....	115
Annex G	(informative) Patent statement .....	116
G.1	Patent statement .....	116
Annex H	(informative) ISO/IEC 14496 content carried over an H.324 system .....	118
H.1	Introduction.....	118
H.2	Walkthrough of a typical MPEG-4 session carried in an H.324 system.....	118
H.2.1	General .....	118
H.2.2	Start of a session.....	118
H.2.3	Retrieval of the InitialIOD.....	118
H.3	Mapping of DAI procedures to H.245 procedures.....	118
H.3.1	Initiation of a service in a Remote Interactive DMIF .....	119
H.3.2	Addition of Channels in a Remote Interactive DMIF .....	119
H.3.3	Deletion of Channels in a Remote Interactive DMIF .....	121
H.3.4	Termination of a Service in a Remote Interactive DMIF .....	122
Annex I	(informative) DMIF Application Programming Interface – Syntax definition .....	123
I.1	Objectives of this Annex .....	123
I.2	DAI protocol flow .....	123
I.3	Application Programming Interface .....	124
I.3.1	DMIF primitives .....	124
I.4	DMIF Application Programming Interface – ANSI C/C++ .....	126
I.4.1	Reference Implementation .....	126

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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.

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

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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 part of ISO/IEC 14496 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 14496-6 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 14496-6:1999), which has been technically revised.

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ISO/IEC 14496 consists of the following parts, under the general title *Information technology — Coding of audio-visual objects*:

- *Part 1: Systems*
- *Part 2: Visual*
- *Part 3: Audio*
- *Part 4: Conformance testing*
- *Part 5: Reference software*
- *Part 6: Delivery Multimedia Integration Framework (DMIF)*

Annexes A to I of this part of ISO/IEC 14496 are for information only.

## Introduction

The digital technology has transformed the generation, storage and communication of information. With this, the information age was borne allowing humankind to generate multimedia contents, communicate them and store them in meaningful ways. Digitization has also meant a rich variety of delivery and storage technologies, each bringing its own unique characteristics, over which multimedia material is communicated, broadcast or stored. The MPEG Delivery Multimedia Integration Framework (DMIF) allows each delivery technology to be used for its unique characteristics in a way transparent to application developers. DMIF specifies the semantics for the DMIF-Application Interface (DAI) in a way that it satisfies the requirements for both broadcast, local storage and remote interactive scenarios while maintaining uniformity across all cases. By including the ability to bundle connections into sessions DMIF enables network operators to apply appropriate billing policies in the provision of multimedia services. By adopting QoS metrics which relate to the media and not to the transport mechanism, DMIF hides the delivery technology details to applications. These unique features of DMIF give multimedia application developers what they need in terms of permanence and richness beyond what is possible with each individual delivery technology. With DMIF, application developers can begin to invest in commercial multimedia applications with the assurance that their investment will not be made obsolete by new delivery technologies. In order to fully reach its goal, DMIF needs "real" instantiation of its DMIF-Application Interface, and well defined, specific mappings of DMIF concepts and parameters into existing signalling infrastructures.

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# Information technology — Coding of audio-visual objects —

## Part 6:

## Delivery Multimedia Integration Framework (DMIF)

### 1 Scope

This part of ISO/IEC 14496 specifies the Delivery Layer of ISO/IEC 14496, which allows applications to transparently access and view multimedia streams whether the source of the streams is located on an interactive remote end-system, the streams are available on broadcast media or they are on storage media.

In this part of ISO/IEC 14496, the following aspects are covered:

DMIF communication architecture

DMIF-Application Interface (DAI) definition

URL semantic to locate and make available the multimedia streams

DMIF Default Signalling Protocol (DDSP) for remote interactive scenarios, and its related variations using existing native network signaling protocols

Information flows for player access to streams on remote interactive end-systems, from broadcast media or from storage media

### 2 Conformance

#### 2.1 Requirements for conformance

DMIF conformance is only requested at the boundary of the equipment implementing a DMIF Instance. This includes the syntax and semantics of the particular Control protocol selected for a particular network (e.g., DMIF signalling messages), as well as the compliance to the mappings defined for broadcast and local storage systems.

DMIF conformance specifications is provided in ISO/IEC 14496-4.

#### 2.2 DMIF-Application Interface

The DAI is a reference point. The exact syntax of the DAI is not defined by this part of ISO/IEC 14496, and does not represent a conformance point.

The DAI does not impose any programming language, nor syntax (e.g., the exact format for specifying a particular parameter -within the bounds of its semantic definition- or the definition of reserved values). Moreover the DAI provides only the minimal semantics for defining the behaviour of DMIF.

A real interface needs more than what is specified in the DAI (e.g.; methods to initialise, reset, reconfigure, destroy, query the status or register services). Most of these aspects, as well as the detailed syntax, deeply depend on the implementation and language bindings. Moreover such details have no impact on the DMIF model and on the conformance issues, and therefore they are out of the scope of DMIF.

## 2.3 DMIF signalling messages

This part of ISO/IEC 14496 specifies the syntax and semantics of a few instances of protocols for DMIF peer to DMIF peer interactivity, designed for specific network environments. A DMIF Instance making use of one of the specified protocols shall fully comply to it. A DMIF Instance implementing a protocol not specified in this International Standard cannot be tested for conformance, but may still be evaluated at the DAI Reference Point.

## 3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14496. 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 14496 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.

ETS 300 401:1997, *Radio broadcasting systems: Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers.*

IEEE 802:1990, *IEEE Organization Unique Identifier.*

ISO/IEC 13818-6:1998, *Information technology — Generic coding of moving pictures and associated audio information — Part 6: Extension for DSM-CC.*

ISO/IEC 14496-1:—<sup>1)</sup>, *Information technology — Coding of audio-visual objects — Part 1: Systems.*

ITU-T Recommendation Q.2931:1995, *Broadband Integrated Services Digital Network (B-ISDN) — Digital Subscriber Signalling System No. 2 (DSS 2) — User-Network Interface (UNI) — Layer 3 specification for basic call/connection control.*

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ITU-T Recommendation E.164:1997, *The international public telecommunication numbering plan.*

RFC1738:1994, *Uniform Resource Locators (URL).*

## 4 Terms and definitions

For the purposes of this part of ISO/IEC 14496, the following terms and definitions apply.

**4.1 Association Tag:** In the context of this specification an Association Tag is used to identify elements within a Network Session with unique end-to-end significant values.

**4.2 Channel:** Is the entity over which a DMIF User sends or receives data.

**4.3 Delivery layer:** The layer of an ISO/IEC 14496 terminal that abstracts the delivery mechanism used to store or transmit streaming data and associated control information.

**4.4 DMIF-Application Interface:** Is the interface between an application (DMIF User) and the Delivery layer.

**4.5 DMIF Default Signalling Protocol (DDSP):** A session level protocol for the management of multimedia streaming over generic delivery technologies defined in this part of ISO/IEC 14496. The protocol comprises primitives to setup and tear down sessions as well as individual data channels.

**4.6 DMIF Instance:** Is an implementation of the Delivery layer for a specific delivery technology.

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1) To be published. (Revision of ISO/IEC 14496-1:1999)

**4.7 DMIF-Network Interface:** Is a semantic API that abstracts the signalling between DMIF peers irrespectively of the delivery support.

**4.8 DMIF peer:** a shorthand for "peer DMIF Instance".

**4.9 DMIF User:** Is the application that exploits the functions offered by the Delivery Layer through the DAI.

**4.10 Heterogeneous Network:** A Network composed of different transport technologies which are connected in tandem through InterWorking Units.

**4.11 Homogeneous Network:** A Network composed of one transport technology only.

**4.12 Network Session:** An association between two DMIF peers providing the capability to group together the resources needed for an instance of a service. The Network Session is identified by a network-wide unique ID. A Network Session could group one or more Service Sessions.

**4.13 Service:** Is an entity identified by a Service Name (opaque to DMIF) which responds to DAI primitives.

**4.14 Service Session:** A local association between the local DMIF Instance and a particular service.

**4.15 Transmux Channel:** A native network transport channel: it includes the transport protocol stack that is directly supported by the signalling means of the network. It provides the basic transport stack element that DMIF may complement with additional multiplexing or protection tools.

## 5 Abbreviations

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**CAT:** Channel Association Tag

**DAI:** DMIF-Application Interface [ISO/IEC 14496-6:2000  
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**DDSP:** DMIF Default Signalling Protocol [9cfd20e0cc12/iso-iec-14496-6-2000](https://standards.iteh.ai/catalog/standards/sist/4b9c6aa5-35ab-4697-a191-9cfd20e0cc12/iso-iec-14496-6-2000)

**DS:** DMIF Signaling

**DNI:** DMIF-Network Interface

**QoS:** Quality of Service

**TAT:** Transmux Association Tag

**URL:** Universal Resource Locator

## 6 Organization of this part of ISO/IEC 14496

This part of ISO/IEC 14496 contains the following technical clauses:

Clause	Definition
8	DMIF Overview - This clause explains how DMIF reaches its two-fold goal of hiding the delivery technology details from the DMIF User, and ensuring interoperability between end-systems. It describes the DMIF communications architecture and explains how this architecture can support current and future delivery technologies, preserving application from continuous updates to follow evolving technologies.
9	The remote interactive scenario - In this clause the additional requirements due to a remote

interactive scenario are considered.

- 10 The DMIF-Application Interface - This clause defines a (semantic) API, called the DAI, that allows for the development of applications involving media content delivery, irrespective of delivery technology. The DAI provides primitives for contacting remote services, for establishing data communication channels with these services, and also exchanging data over these channels. It should be noted that the DAI provides a minimum semantics, which means that a DMIF User would have to turn to a specific implementation of the DAI for a syntax; moreover this implementation would probably provide additional functionality. The only elements whose syntax is specified at the DAI are the URL, for locating services.
- 11 The DMIF-Network Interface (informative) - The DMIF-Network Interface (DNI) is a semantic API that abstracts the signalling between DMIF peers irrespective of the delivery support. The DNI is informative, and is introduced in support to the description of the DMIF Signalling Protocol.
- 12 Control Plane mappings - This clause describes the mappings of the DNI primitives into DMIF Signalling Protocol messages. A Default DMIF Signalling Protocol is specified as well as a set of mappings into native network signalling protocols (extended through additional DMIF signalling messages, usually carried opaque to native signalling in a dedicated channel). These specifications ensure that different implementations of a DMIF Instance interoperate.
- 13 Terminal Capability Matching – Specifies how DMIF determines compatibility between DMIF terminals.
- Annex A Overview of DAI and DNI parameters (informative) - This Annex provides the glue to link concepts and parameters as defined in DAI and DNI.
- Annex B Information Flows for DMIF (informative) - This Annex defines the scenarios for remote interactive end-system, broadcast and local storage DMIF implementations.
- Annex C Use of URLs in DMIF (informative) - This Annex defines the URL schemes currently supported.
- Annex D Protocol error recovery (informative) – This Annex specifies the state machine for the transactions in the DMIF Signalling Protocol.
- Annex E Subset of DSM-CC resource descriptors from DSM-CC ISO/IEC 13818-6 (informative) – This Annex reports selected dsm-cc resource descriptors from ISO/IEC 13818-6 that are used by this part of ISO/IEC 14496.
- Annex F ISO/IEC 14496 content carried over an ETS 300 401 System (informative) – This Annex defines how ISO/IEC 14496 content can be carried over an ETS 300 401 System (DAB), and describes how to access it through the DMIF-Application Interface.
- Annex G Patent statement (informative)
- Annex H ISO/IEC 14496 content carried over an H.324 system (informative)
- Annex I DMIF Application Programming Interface – Syntax definition (informative)

## 7 Compliance terms

The following table defines the meaning of terms used in this part of ISO/IEC 14496:

**Table 7—1 — Definition of terms used in this part of ISO/IEC 14496**

Term	Definition
shall	Means that an item is required. For example, the phrase “The widget shall be blue.” means that no color other than blue is acceptable for the widget.
shall not	Means that an item is not allowed. For example, the phrase “The widget shall not be blue.” means that the color blue is not acceptable for the widget.
must	Not used. Use “shall” instead.
must not	Not used. Use “shall not” instead.
should	Means that, if possible, an item shall be used. For example, the phrase “The widget should be blue.” Means that blue is the preferred color for the widget but, if blue is not possible, other colors are acceptable.
should not	Means that, if possible, an item shall not be used. For example, the phrase “The widget should not be blue.” Means that it is preferred that the color of the widget not be blue, however it is allowable to use that color if necessary.
may	Means that an item is optional. For example, the phrase “The widget may be blue.” Means that it is allowable to use blue as the widget color.
may not	Not used. Use “shall not” instead.

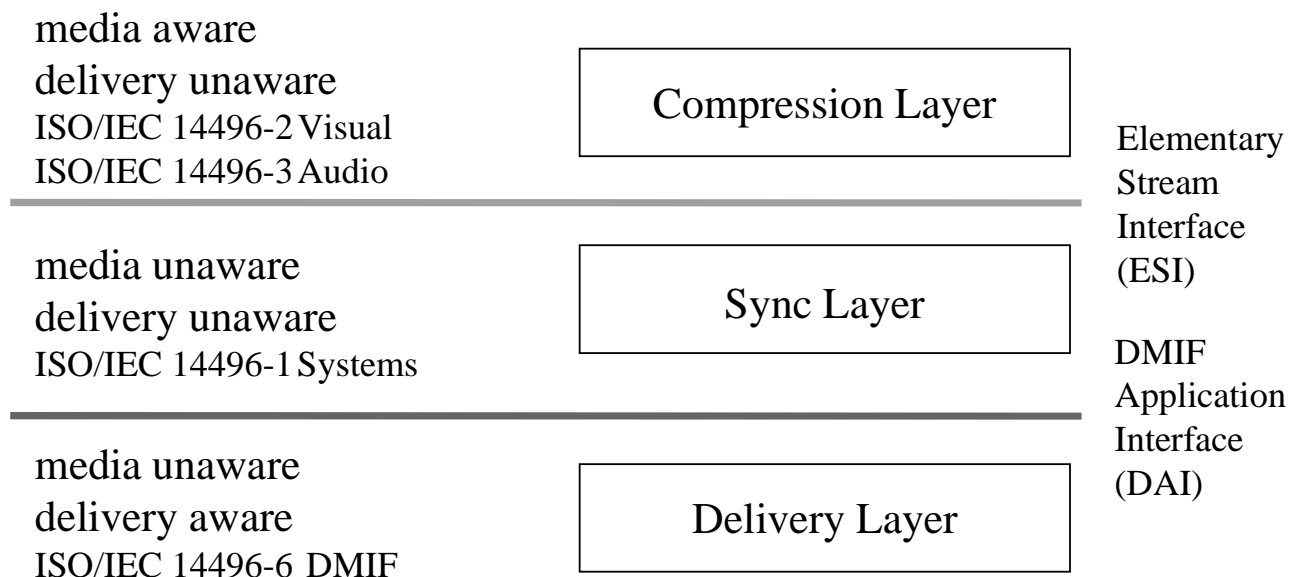
## 8 DMIF overview

(standards.iteh.ai)

### 8.1 ISO/IEC 14496 terminal architecture ISO/IEC 14496-6:2000

[https://standards.iteh.ai/catalog/standards/sist/4b9c6aa5-35ab-4697-a191-](https://standards.iteh.ai/catalog/standards/sist/4b9c6aa5-35ab-4697-a191-9c53078c126a/iec-14496-6-2000)

The generic ISO/IEC 14496 terminal architecture is depicted in Figure 1. It comprises three layers: the Compression Layer, the Sync Layer and the Delivery Layer. The Compression Layer is media aware and delivery unaware; the Sync Layer is media unaware and delivery unaware; the Delivery Layer is media unaware and delivery aware.



**Figure 1 — ISO/IEC 14496 terminal architecture**

## ISO/IEC 14496-6:2000(E)

The Compression Layer performs media encoding and decoding of Elementary Streams and is specified in ISO/IEC 14496-2:1999 and ISO/IEC 14496-3:1999; the Sync Layer manages Elementary Streams and their synchronisation and hierarchical relations and is specified in ISO/IEC 14496-1:2001; the Delivery Layer ensures transparent access to content irrespective of delivery technology and is specified in this part of ISO/IEC 14496.

The boundary between the Compression Layer and the Sync Layer is named Elementary Stream Interface (ESI) and its minimum semantic is specified in ISO/IEC 14496-1:2001.

The boundary between the Sync Layer and the Delivery Layer is named DMIF-Application Interface (DAI) and its minimum semantic is specified in this part of ISO/IEC 14496.

### 8.2 The objectives of DMIF

The Delivery Multimedia Integration Framework has a number of objectives:

- to hide the delivery technology details from the DMIF User
- to manage real time, QoS sensitive channels
- to allow service providers to log resources per session for usage accounting
- to ensure interoperability between end-systems

DMIF defines a communication architecture that hides the details of the delivery technologies below an interface that is exposed to the application, called the DMIF-Application Interface (DAI). Delivery technologies include transport network technologies (e.g. the Internet, or an ATM infrastructure), as well as broadcast technologies and local storage technologies.

The DAI separates the delivery aware and delivery unaware layers of the ISO/IEC 14496 terminal architecture. In the case of transport network technologies the DAI fulfils the specific needs of ISO/IEC 14496 based applications, however, its design is generic enough to allow the exploitation of DMIF in contexts other than ISO/IEC 14496 based applications.

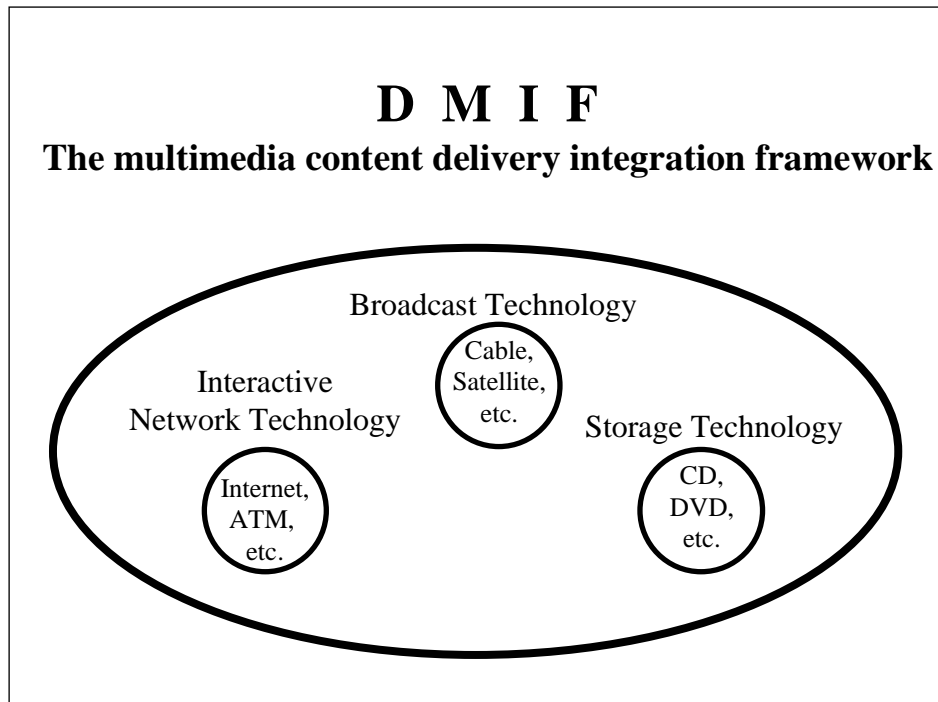
The DAI is a semantic API that allows the development of applications irrespective of the delivery support. No syntax is specified for this Interface, since this would be programming language and operating system dependent; moreover only the minimum functionality is specified.

DMIF takes into account the QoS management aspects and the requirement of allowing service providers to log resources per session for usage accounting, in order to facilitate the implementation of appropriate billing policies. In the case of interactive networks it derives a generic protocol to fulfil the requirements (the DMIF Default Signalling Protocol – DDSP).

By adapting the generic protocol to the native network signalling mechanisms, DMIF fully specifies the behaviour of the DMIF Instances operating on particular network environments, thus ensuring interoperability for those cases. Other network environments and protocol implementations are not prevented, as far as the DAI functionality is preserved, but are out of the scope of this specification.

### 8.3 The DMIF communications architecture

The integration framework of DMIF covers three major technologies, interactive network technology, broadcast technology and the storage technology; this is shown in Figure 2.



**Figure 2 — DMIF addresses the delivery integration of three major technologies**

Figure 3 represents the DMIF communication architecture. The shaded boxes clarify what are the boundaries of a DMIF implementation: this part of ISO/IEC 14496 normatively specifies the behaviour of a DMIF implementation at those boundaries, while the additional modelling and definitions which apply to elements internal to the shaded boxes have only informative value.

The DMIF architecture is such that applications that rely on DMIF for communications do not have to be concerned with the underlying communications method. The implementation of DMIF takes care of the delivery technology details presenting a common interface to the application.

Figure 3 depicts the above concept. An application accesses data through the DMIF-Application Interface, irrespective whether such data comes from a broadcast source, from local storage or from a remote server. A Delivery layer implementation allows the concurrent presence of more than one DMIF Instance. When requesting a specific service the Application supplies a URL that allows the Delivery layer to determine the appropriate DMIF Instance to activate. The DMIF Instances will then translate the Originating Application requests into specific actions to be taken with respect to the broadcast network or the local file system, or translate it into messages to be delivered to the Target Application, taking care of the peculiarities of the involved delivery technology. Similarly, data entering the terminal (from remote servers, broadcast networks or local files) is uniformly delivered to the Originating Application through the DAI. The DAI allows the DMIF User to group elementary streams into services and to specify the QoS requirements for the desired elementary streams.

DMIF separates the common features that should be implemented in each DMIF Instance from the details of the delivery technology. In the case of interactive networks DMIF specifies a logical interface (the DMIF-Network Interface – DNI) between a hypothetical module implementing this common features and the network specific modules. The DNI specifies the information flow that should occur between peers of such hypothetical module; the network specific modules specify the exact mapping of the DNI primitives into signalling messages.

DNI primitives need to be adapted to the native network signalling mechanisms in order to provide access to the network resources. DNI primitives represent one of the possible solutions to ensure the DAI functionality when interacting with a remote peer. A straightforward mapping of DNI primitives into signalling messages is defined, and named DMIF Default Signalling Protocol (DDSP). The DMIF Default Signalling Protocol is a session level protocol for the management of multimedia streaming over generic delivery technologies. The protocol comprises primitives to set-up and tear down sessions as well as individual data channels.