

INTERNATIONAL STANDARD



**Consumer terminal function for access to IPTV and open internet multimedia services –
Part 5-1: Declarative application environment**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.170 35.240.95

ISBN 978-2-8322-4573-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	12
INTRODUCTION.....	14
1 Scope.....	15
2 Normative references	15
3 Terms, definitions and abbreviated terms	17
3.1 Terms and definitions.....	17
3.2 Abbreviated terms.....	19
4 DAE overview	19
4.1 General.....	19
4.2 Architecture of the DAE	20
4.3 Gateway discovery and control	21
4.4 Application definition.....	22
4.4.1 General	22
4.4.2 Similarities between applications and traditional web pages	22
4.4.3 Differences between applications and traditional web pages.....	22
4.4.4 The application tree	23
4.4.5 The application display model.....	23
4.4.6 The security model	23
4.4.7 Inheritance of permissions	24
4.4.8 Privileged application APIs	24
4.4.9 Active applications list	24
4.4.10 Widgets	24
4.4.11 Origin for broadcast-delivered documents.....	25
4.5 Resource management	25
4.5.1 General	25
4.5.2 Application lifecycle issues	25
4.5.3 Caching of application files	26
4.5.4 Memory usage	26
4.5.5 Instantiating embedded objects and claiming scarce system resources	26
4.5.6 Media control.....	26
4.5.7 Use of the display	27
4.5.8 Cross-application event handling	28
4.5.9 Tuner resources	29
4.6 Parental access control.....	30
4.7 Content download	31
4.7.1 General	31
4.7.2 Download manager.....	31
4.7.3 Content access download descriptor.....	31
4.7.4 Triggering a download	31
4.7.5 Download protocol(s).....	32
4.8 Streaming CoD	33
4.8.1 General	33
4.8.2 Unicast streaming	33
4.9 Scheduled content	34
4.9.1 General	34
4.9.2 Conveyance of channel list	34
4.9.3 Conveyance of channel list and list of scheduled recordings	35

4.10	DLNA RUI remote control function	36
4.10.1	General	36
4.10.2	Interfaces used by the DLNA RUI remote control function.....	37
4.11	Power consumption.....	38
4.11.1	General	38
4.11.2	DAE application wake-up support	39
4.11.3	OITF hibernate support.....	40
4.11.4	State diagram for the power state	41
4.12	Display model	41
5	DAE application model	41
5.1	Application lifecycle	41
5.1.1	General	41
5.1.2	Creating a new application.....	41
5.1.3	Stopping an application	43
5.1.4	Application boundaries	43
5.2	Application announcement and signalling.....	43
5.2.1	Overview	43
5.2.2	General	44
5.2.3	Broadcast-related applications.....	45
5.2.4	Service provider related applications	50
5.2.5	Broadcast-indepe ndent applications	51
5.2.6	Switching between applications	51
5.2.7	Signalling format.....	51
5.2.8	Widgets lifecycle.....	55
5.3	Event notifications	56
5.3.1	General	56
5.3.2	Event notification framework based on CEA 2014	57
5.3.3	IMS event notification framework	59
6	Formats	66
6.1	Web standards TV profile	66
6.1.1	General	66
6.1.2	Additional restrictions and requirements	67
6.2	Still image formats	67
6.3	Media formats	67
6.3.1	General	67
6.3.2	Media format of A/V media except for audio from memory	67
6.3.3	Media format of A/V media for audio from memory.....	68
6.3.4	Media transport	68
6.4	SVG.....	68
7	APIs	68
7.1	Object factory API.....	68
7.1.1	General	68
7.1.2	Methods	69
7.1.3	Examples.....	71
7.2	Application management APIs.....	72
7.2.1	General	72
7.2.2	The application/oipfApplicationManager embedded object	72
7.2.3	Application class.....	76
7.2.4	The ApplicationCollection class	79

7.2.5	The ApplicationPrivateData class	79
7.2.6	The Keyset class	80
7.2.7	New DOM events for application support	82
7.2.8	Examples	83
7.2.9	Widget APIs	84
7.3	Configuration and setting APIs	85
7.3.1	General	85
7.3.2	The application/oipfConfiguration embedded object	85
7.3.3	The Configuration class	86
7.3.4	The LocalSystem class	88
7.3.5	The NetworkInterface class	94
7.3.6	The AVOutput class	94
7.3.7	The NetworkInterfaceCollection class	98
7.3.8	The AVOutputCollection class	98
7.3.9	The TunerCollection class	98
7.3.10	The Tuner class	98
7.3.11	The SignalInfo class	99
7.3.12	The LNBInfo class	100
7.3.13	The StartupInformation class	101
7.4	Content download APIs	101
7.4.1	General	101
7.4.2	The application/oipfDownloadTrigger embedded object	101
7.4.3	Extensions to application/oipfDownloadTrigger	104
7.4.4	The application/oipfDownloadManager embedded object	104
7.4.5	The Download class	110
7.4.6	The DownloadCollection class	113
7.4.7	The DRMControllInformation class	113
7.4.8	The DRMControllInfoCollection class	114
7.5	Content on demand metadata APIs	114
7.5.1	General	114
7.5.2	The application/oipfCodManager embedded object	114
7.5.3	The ContentCatalogueCollection class	116
7.5.4	The ContentCatalogue class	116
7.5.5	The ContentCatalogueEvent class	117
7.5.6	The CODFolder class	117
7.5.7	The CODAsset class	118
7.5.8	The CODService class	121
7.6	Content service protection API	123
7.6.1	General	123
7.6.2	The application/oipfDrmAgent embedded object	123
7.7	Gateway discovery and control APIs	125
7.7.1	General	125
7.7.2	The application/oipfGatewayInfo embedded object	126
7.8	Communication services APIs	128
7.8.1	General	128
7.8.2	The application/oipfCommunicationServices embedded object	129
7.8.3	Extensions to application/oipfCommunicationServices for presence and messaging services	132
7.8.4	The UserData class – Properties	135

7.8.5	The UserDataCollection class	136
7.8.6	The FeatureTag class – Properties	136
7.8.7	The FeatureTagCollection class	136
7.8.8	The Contact class – Properties	136
7.8.9	The ContactCollection class	136
7.8.10	Extensions to application/oipfCommunicationServices for voice telephony services	137
7.8.11	Extensions to application/oipfCommunicationServices for video telephony services	143
7.8.12	The DeviceInfo class	145
7.8.13	The DeviceInfoCollection class	146
7.8.14	The CodecInfo class	146
7.8.15	The CodecInfoCollection class	146
7.9	Parental rating and parental control APIs	147
7.9.1	General	147
7.9.2	The application/oipfParentalControlManager embedded object	147
7.9.3	The ParentalRatingScheme class	150
7.9.4	The ParentalRatingSchemeCollection class	151
7.9.5	The ParentalRating class	152
7.9.6	The ParentalRatingCollection class	154
7.10	Scheduled Recording APIs	155
7.10.1	General	155
7.10.2	The application/oipfRecordingScheduler embedded object	155
7.10.3	The ScheduledRecording class	158
7.10.4	The ScheduledRecordingCollection class	162
7.10.5	Extension to application/oipfRecordingScheduler for control of recordings	162
7.10.6	The Recording class	164
7.10.7	The RecordingCollection class	167
7.10.8	The PVREvent class	167
7.10.9	The Bookmark class	167
7.10.10	The BookmarkCollection class	168
7.11	Remote Management APIs	168
7.11.1	General	168
7.11.2	The application/oipfRemoteManagement embedded object	168
7.12	Metadata APIs	172
7.12.1	General	172
7.12.2	The application/oipfSearchManager embedded object	173
7.12.3	The MetadataSearch class	175
7.12.4	The Query class	180
7.12.5	The SearchResults class	181
7.12.6	The MetadataSearchEvent class	182
7.12.7	The MetadataUpdateEvent class	182
7.13	Scheduled content and hybrid tuner APIs	182
7.13.1	General	182
7.13.2	The video/broadcast embedded object	182
7.13.3	Extensions to video/broadcast for recording and time-shift	198
7.13.4	Extensions to video/broadcast for access to EIT p/f	207
7.13.5	Extensions to video/broadcast for playback of selected components	208
7.13.6	Extensions to video/broadcast for parental ratings errors	209

7.13.7	Extensions to video/broadcast for DRM rights errors.....	210
7.13.8	Extensions to video/broadcast for current channel information.....	211
7.13.9	Extensions to video/broadcast for creating channel lists from SD&S fragments	211
7.13.10	The ChannelConfig class	211
7.13.11	The ChannelList class	216
7.13.12	The Channel class	217
7.13.13	The FavouriteListCollection class	222
7.13.14	The FavouriteList class	223
7.13.15	Extensions to video/broadcast for channel scan.....	225
7.13.16	The ChannelScanEvent class	225
7.13.17	The ChannelScanOptions class	225
7.13.18	The ChannelScanParameters class	225
7.13.19	The DVBTChannelScanParameters class	225
7.13.20	The DVBSChannelScanParameters class	227
7.13.21	The DVBCChannelScanParameters class.....	228
7.13.22	Extensions to video/broadcast for synchronization.....	229
7.13.23	The ATSCChannelScanParameters class	230
7.14	Media playback APIs.....	231
7.14.1	General	231
7.14.2	The A/V Control object.....	231
7.14.3	Extensions to A/V Control object for playback through Content-Access Streaming Descriptor	238
7.14.4	Extensions to A/V Control object for trickmodes.....	239
7.14.5	Extensions to A/V Control object for playback of selected components	240
7.14.6	Extensions to A/V Control object for parental rating errors	240
7.14.7	Extensions to A/V Control object for DRM rights errors	242
7.14.8	Extensions to A/V Control object for playing media objects	243
7.14.9	Extensions to A/V Control object for UI feedback of buffering A/V content	243
7.14.10	DOM events for A/V Control object	247
7.14.11	Playback of memory audio	248
7.14.12	Extensions to A/V Control object for media queuing.....	250
7.14.13	Extensions to A/V Control object for volume control.....	251
7.14.14	Extensions to A/V Control object for resource management.....	251
7.15	Miscellaneous APIs.....	252
7.15.1	The application/oipfMDTF embedded object	252
7.15.2	The application/oipfStatusView embedded object	254
7.15.3	The application/oipfCapabilities embedded object.....	255
7.15.4	The Navigator class	256
7.15.5	Debug print API	256
7.16	Shared Utility classes and features	256
7.16.1	Base collections	256
7.16.2	The Programme class	257
7.16.3	The ProgrammeCollection class	262
7.16.4	The DisclInfo class	262
7.16.5	Extensions for playback of selected media components.....	262
7.16.6	Additional support for protected content.....	266
7.17	DLNA RUI remote control function APIs	267
7.17.1	General	267

7.17.2	The application/oipfRemoteControlFunction embedded object	267
8	System integration aspects.....	272
8.1	HTTP protocol.....	272
8.1.1	General	272
8.1.2	HTTP User-Agent header	272
8.1.3	HTTP X-OITF-RCF-User-Agent header	273
8.2	Mapping from APIs to protocols	273
8.2.1	General	273
8.2.2	CoD download over HTTP	274
8.2.3	CoD unicast streaming with SIP session management.....	274
8.2.4	Scheduled content multicast streaming with SIP session management	278
8.2.5	Communication services with SIP session management	284
8.2.6	CoD unicast streaming over RTP and HTTP	284
8.2.7	Scheduled content multicast streaming.....	288
8.3	URI schemes and their usage	289
8.3.1	General	289
8.3.2	Media fragments support	290
8.4	Mapping from APIs to content formats	291
8.4.1	Character conversion.....	291
8.4.2	AVComponent	291
8.4.3	Channel.....	294
8.4.4	Programme, ScheduledRecording, Recording and Download.....	299
8.4.5	Exposing audio description streams as AVComponent objects.....	307
8.4.6	HTML5 media element mapping.....	307
8.5	DLNA RUI remote control function implementation	309
8.5.1	General	309
8.5.2	Relationship between DAE application and control UI	309
8.5.3	XML UI listing provisioning	310
8.5.4	Retrieving the control UI	312
8.5.5	Receiving and responding to a message between the control UI in the remote control device and OITF.....	313
8.5.6	Notification to the remote control device	315
8.5.7	Handling multiple DAE applications and multiple remote control devices	316
9	Capabilities	317
9.1	Minimum DAE capability requirements	317
9.1.1	General	317
9.1.2	SSL/TTLS Requirements	320
9.2	Default UI profiles	321
9.3	Client capability description	324
9.3.1	General	324
9.3.2	Tuner/broadcast capability indication	325
9.3.3	Broadcast content over IP capability indication	326
9.3.4	PVR capability indication	326
9.3.5	Download CoD capability indication	327
9.3.6	Parental ratings	328
9.3.7	Extended A/V API support	329
9.3.8	OITF metadata API support	329
9.3.9	OITF configuration API support.....	329
9.3.10	Communication services API Support	330

9.3.11	DRM capability indication	330
9.3.12	Media profile capability indication	331
9.3.13	Remote diagnostics support.....	332
9.3.14	SVG	332
9.3.15	Third party notification support	333
9.3.16	Multicast delivery terminating function support.....	333
9.3.17	Other capability extensions.....	333
9.3.18	HTML5 video	333
9.3.19	DLNA RUI remote control function support	333
9.3.20	Power consumption	333
9.3.21	Widgets	333
9.3.22	Buffer control of AV content playback API support.....	334
9.3.23	Temporal clipping	334
9.3.24	Capability elements from other schemas.....	335
9.3.25	Pointer support	335
10	Security.....	335
10.1	Application / service security.....	335
10.1.1	General	335
10.1.2	OITF requirements.....	335
10.1.3	Server requirements	336
10.1.4	Specific security requirements for privileged JavaScript APIs	336
10.1.5	Permission names	339
10.1.6	Loading documents from different domains.....	341
10.2	User authentication	341
10.3	DLNA RUI remote control.....	341
11	DAE Widgets	341
11.1	General.....	341
11.2	Widgets packaging and configuration	341
11.3	Access request	342
11.4	Widget interface.....	342
11.5	Digital signature.....	342
12	Graphics performance	343
12.1	Overview.....	343
12.2	Performance levels	343
12.3	Minimum 2D graphics performance	343
12.4	Minimum 3D graphics performance	344
12.5	Minimum canvas performance.....	344
12.6	Minimum WebGL performance	344
12.7	Performance measurement	344
Annex A (informative)	Design rationale – application model	346
Annex B (informative)	Clarification of download CoD, streaming CoD and CSP interfaces.....	347
B.1	Overview.....	347
B.2	List of interfaces	348
B.2.1	Interface a): browse, select and purchase content from CoD store.....	348
B.2.2	Interface b*): in-session interaction from web page with underlying DRM agent	348
B.2.3	Interface c*): autonomous out-of-session interaction between DRM agent and CoD store.....	349

B.2.4	Interface d*): downloading content.....	349
B.2.5	Interface e*): unicast streaming and playback of downloaded content using A/V Control object	351
B.2.6	Interface f): request licence	351
B.2.7	Interface g*): local metadata based applications	351
B.3	Additional notes about content-on-demand	351
Annex C (normative)	Content access descriptor syntax and semantics	352
C.1	Content access download descriptor format	352
C.2	Content access streaming descriptor format.....	353
C.3	Abstract content access descriptor format.....	354
Annex D (normative)	Capability extensions schema	359
Annex E (normative)	Client channel listing format	362
Annex F (normative)	Display model.....	366
F.1	Logical plane model.....	366
F.2	Interaction with the video/broadcast and A/V Control objects	367
F.3	Graphic safe area	368
F.4	Current channel	368
Annex G (normative)	Backwards compatible profile of HTML5 media elements	370
G.1	General.....	370
G.2	Video element.....	370
G.3	Audio element.....	370
G.4	Source element.....	371
G.5	Media element	371
G.6	Other object types.....	372
G.7	Dependencies	372
Annex H (informative)	DLNA RUI remote control function sequences	373
H.1	Remote UI and box models	373
H.1.1	Overview	373
H.1.2	i-box model.....	374
H.1.3	2-box model.....	374
H.1.4	3-box model.....	375
H.2	DLNA RUI remote control function sequences.....	375
H.2.1	General	375
H.2.2	Launching a DAE application to obtain the Control UI	376
H.2.3	Obtaining the control UI from a running DAE application.....	378
H.2.4	Sending and receiving messages between the remote control device and DAE application	380
Annex I (normative)	Collections	382
I.1	General.....	382
I.2	The Collection template	382
I.2.1	General	382
I.2.2	Properties.....	382
I.2.3	Methods	382
Annex J (informative)	SVG video tag support.....	383
Annex K (informative)	Multimedia telephony sequences.....	386
K.1	General.....	386
K.2	Full-duplex voice telephony call flow	386
K.3	Full-duplex video telephony call flow	388

K.4	Capture device and call parameters setting flow	389
K.5	Full-duplex Voice to Video telephony session update flow.....	390
Annex L (informative)	Server root certificate selection policy	392
L.1	Overview.....	392
L.2	Background.....	392
L.3	Policy.....	392
Annex M (normative)	Changes to 5.6.2 of CEA-2014-A	394
Bibliography		397
Figure 1	– OITF architecture	20
Figure 2	– OIPF architecture with DLNA RUI RCF scenario	37
Figure 3	– State diagram of OITF power states	41
Figure 4	– Behaviour when the selected channel changes	47
Figure 5	– Behaviour when the application signalling for the currently selected channel changes or when a running broadcast-related application exits	49
Figure 6	– General event notification architecture on OITF and remote UI server	57
Figure 7	– HNI-IGI transaction for outgoing SIP requests from a DAE application	60
Figure 8	– HNI-IGI transaction for in-session incoming SIP request	62
Figure 9	– What happens when the OITF is first turned on	64
Figure 10	– User logs in using the DAE interface	65
Figure 11	– Unsolicited message from the network	66
Figure 12	– State diagram for embedded application/oipfDownloadManager objects	105
Figure 13	– State machine for a metadata search	176
Figure 14	– State diagram for embedded video/broadcast objects	183
Figure 15	– PVR States for recordNow and timeshifting using video/broadcast	199
Figure 16	– State diagram for embedded A/V Control objects (normative).....	236
Figure 17	– XML UI listing provisioning	310
Figure 18	– Remote control message handling.....	313
Figure 19	– Remote control device changes mapping between DAE applications	317
Figure 20	– Remote control device retains control of DAE application	317
Figure B.1	– Main scenario	347
Figure F.1	– Logical plane model	366
Figure F.2	– Graphic safe area	368
Figure H.1	– i-box model.....	374
Figure H.2	– 2-box Model.....	375
Figure H.3	– 3-box model.....	375
Figure H.4	– Launching of a DAE application	377
Figure H.5	– Obtaining remote control of a running DAE application	379
Figure H.6	– Message flow between the remote control device and the DAE application	381
Figure K.1	– Full-duplex voice telephony call flow	387
Figure K.2	– Full-duplex Video telephony call flow	388
Figure K.3	– Capture device and call parameters setting flow	390
Figure K.4	– Full-duplex Voice to Video telephony session update flow.....	391

Table 1 – Events applicable for cross application event handling	29
Table 2 – Application signalling.....	51
Table 3 – DAE application control codes	53
Table 4 – Supported application signalling features	53
Table 5 – Key to status column	55
Table 6 – New DOM events for application support.....	83
Table 7 – Metadata search states	177
Table 8 – State transitions for the video/broadcast embedded object	184
Table 9 – Properties of the A/V Control object when the type attribute refers to video or audio	232
Table 10 – Additional properties of the A/V Control object when the type attribute refers to video.....	233
Table 11 – Methods of the A/V Control object when the type attribute refers to video or audio	234
Table 12 – Additional methods of the A/V Control object when the type attribute refers to video.....	234
Table 13 – Additional applicable requirements from CEA-2014	235
Table 14 – URI schemes and usages	290
Table 15 – Base UI profile names	321
Table 16 – Complementary UI profile name fragments	322
Table 17 – Minimum 2D graphics performance.....	344
Table F.1 – Clarification of the "current channel" concept in different scenarios	369
Table J.1 – SVG video tag support.....	383

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONSUMER TERMINAL FUNCTION
FOR ACCESS TO IPTV AND OPEN
INTERNET MULTIMEDIA SERVICES –**
Part 5-1: Declarative application environment**FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62766-5-1 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on the following documents:

CDV	Report on voting
100/2548/CDV	100/2662/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, part 2.

A list of all parts in the IEC 62766 series, published under the general title *Consumer terminal function for access to IPTV and open internet multimedia services*, can be found on the IEC website.

In this standard, the following print type is used: object and event labels: Lucida Console.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The IEC 62766 series is based on a series of specifications that was originally developed by the OPEN IPTV FORUM (OIPF). They specify the user-to-network interface (UNI) for consumer terminals to access IPTV and open internet multimedia services over managed or non-managed networks as defined by OIPF.

CONSUMER TERMINAL FUNCTION FOR ACCESS TO IPTV AND OPEN INTERNET MULTIMEDIA SERVICES –

Part 5-1: Declarative application environment

1 Scope

This part of IEC 62766 specifies the Declarative Application Environment (DAE) component of the OIPF terminal function (OITF). The DAE is a declarative language based environment (browser) based on the OIPF web standards TV profile specified in IEC 62766-5-2 for the presentation of user interfaces and including scripting support for interaction with network server-side applications and access to the APIs of the other OITF functions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 62481, *Digital living network alliance*

IEC 62766-1, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 1: General*

IEC 62766-2-1, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 2-1: Media Formats*

IEC 62766-2-2, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 2-2: HTTP Adaptive Streaming*

IEC 62766-3:2016, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 3: Content Metadata*

IEC 62766-4-1:2017, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 4-1: Protocols*

IEC 62766-5-2, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 5-2: Web standards TV profile*

IEC 62766-7:2017, *Open IPTV Forum (OIPF) consumer terminal function and network interfaces for access to IPTV and open Internet multimedia services – Part 7: Authentication, content protection and service protection*

ISO/IEC 15938-5:2003, *Multimedia content description interface – Part 5: Multimedia description schemes*

ISO/IEC 15948:2004, *Information technology – Computer graphics and image processing – Portable Network Graphics (PNG): Functional specification*

ISO/IEC 23009-1:2014, *Information technology – Dynamic adaptive streaming over HTTP (DASH) – Part 1: Media presentation description and segment formats*

ISO 639-2, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

ETSI TS 102 034 V1.5.1, *Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks (and associated XML)*

ETSI TS 102 323, *Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams*

ETSI TS 102 539, *Digital Video Broadcasting (DVB); Carriage of Broadband Content Guide (BCG) information over Internet Protocol (IP)*

ETSI TS 102 809, *Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments*

ETSI TS 102 851, *Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems*

ETSI TS 183 063, *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based IPTV stage 3 specification*

ETSI EN 300 468, *Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB Systems*

IETF RFC 1321, *The MD5 Message-Digest Algorithm*

IETF RFC 1918, *Address Allocation for Private Internets*

IETF RFC 2246, *The Transport Layer Security (TLS) Protocol Version 1.0*

IETF RFC 2326, *Real Time Streaming Protocol (RTSP)*

IETF RFC 2616, *Hypertext Transfer Protocol – HTTP/1.1*

IETF RFC 2818, *HTTP over TLS*

IETF RFC 3550, *RTP: A Transport Protocol for Real-Time Applications*

IETF RFC 3840, *Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)*

IETF RFC 3841, *Caller Preferences for the Session Initiation Protocol (SIP)*

IETF RFC 5019, *The Lightweight Online Certificate Status Protocol (OCSP) Profile for High-Volume Environments*

IETF RFC 5246, *The Transport Layer Security (TLS) Protocol Version 1.2*

IETF RFC 5280, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*

IETF RFC 5746, *Transport Layer Security (TLS) Renegotiation Indication Extension*

IETF RFC 6265, *HTTP State Management Mechanism*

IETF RFC 6454, *The Web Origin Concept*, December 2011

3GPP TS 24.229, *IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 (Release 8)*

3GPP TS 26.234 V9.3.0 (2010-06), *Transparent end-to-end Packet-switched Streaming Service (PSS) Protocols and codecs (Release 9)*

Consumer Electronics Association CEA-2014-A (including the August 2008 Errata), *Web-based Protocol Framework for Remote User Interface on UPnP Networks and the Internet (Web4CE)*

Graphics Interchange Format version 89a

Available from <http://www.w3.org/Graphics/GIF/spec-gif89a.txt>

Open Mobile Alliance, *OMA-TS-Presence_SIMPLE_XDM-V1_1-20080627-A, Presence XDM Specification*

Open Mobile Alliance, *OMA-TS-SIMPLE_IM-V1_0-20080820-D, Instant Messaging using SIMPLE*

W3C, *Web Storage*, W3C Recommendation 30 July 2013

Available at <http://www.w3.org/TR/2013/REC-webstorage-20130730/>

W3C, *Widget Access Request Policy*, W3C Recommendation 7 February 2012

Available at: <http://www.w3.org/TR/2012/REC-widgets-access-20120207/>

W3C, *Widget Interface*, W3C Recommendation 31 October 2013

Available at: <http://www.w3.org/TR/2013/REC-widgets-apis-20131031/>

W3C, *XML Digital Signatures for Widgets*, W3C Recommendation 18 April 2013

Available at: <http://www.w3.org/TR/2013/REC-widgets-digsig-20130418/>

W3C, *Packaged Web Apps (Widgets) – Packaging and XML Configuration (Second Edition)*, W3C Recommendation 27 November 2012

Available at: <http://www.w3.org/TR/2012/REC-widgets-20121127/>

W3C, *Media Fragments URI 1.0 (basic)*, W3C Recommendation 25 September 2012

Available at <http://www.w3.org/TR/2012/REC-media-frags-20120925/>