

# INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture –  
Part 4-12: Audio Video Device Control Protocol –  
Level 2 – Content Directory Service

**ITeH STANDARD PREVIEW**  
**(standards.iteh.ai)**  
ISO/IEC 29341-4-12:2008  
<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a8f8-1d550bfe05fc/iso-iec-29341-4-12-2008>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2008 ISO/IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### **About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### **About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00



ISO/IEC 29341-4-12

Edition 1.0 2008-11

# INTERNATIONAL STANDARD

---

Information technology – UPnP Device Architecture –  
Part 4-12: Audio Video Device Control Protocol –  
Level 2 – Content Directory Service

<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a8f8-1d550bfe05fc/iso-iec-29341-4-12-2008>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE **XB**

ICS 35.200

ISBN 978-2-88910-854-1

## CONTENTS

FOREWORD .....	14
ORIGINAL UPNP DOCUMENTS (informative) .....	16
<b>1 Overview and Scope .....</b>	<b>18</b>
1.1 Introduction .....	18
1.2 Notation .....	18
1.2.1 Data Types .....	19
1.2.2 Strings Embedded in Other Strings .....	19
1.2.3 Extended Backus-Naur Form .....	19
1.2.3.1 Typographic conventions for EBNF .....	19
1.3 Derived Data Types .....	20
1.3.1 Comma Separated Value (CSV) Lists .....	20
1.4 Management of XML Namespaces in Standardized DCPs .....	21
1.4.1 Namespace Prefix Requirements .....	23
1.4.2 Namespace Names, Namespace Versioning and Schema Versioning .....	24
1.4.3 Namespace Usage Examples .....	25
1.5 Vendor-defined Extensions .....	25
1.6 References .....	26
<b>2 Service Modeling Definitions .....</b>	<b>29</b>
2.1 Service Type .....	29
2.2 Terms .....	29
2.2.1 object .....	29
2.2.2 property .....	29
2.2.2.1 Multi-valued property .....	30
2.2.2.2 Single-valued property .....	30
2.2.3 class .....	30
2.2.4 <i>item</i> .....	30
2.2.5 <i>container</i> .....	30
2.2.6 container modification .....	30
2.2.7 XML Document .....	31
2.2.8 XML Fragment .....	31
2.2.9 <i>ContainerUpdateID</i> .....	31
2.2.10 <i>reference, reference item, referenced item</i> .....	31
2.2.11 <i>CDS feature</i> .....	32
2.3 State Variables .....	32
2.3.1 State Variable Overview .....	33
2.3.2 <i>SearchCapabilities</i> .....	34
2.3.3 <i>SortCapabilities</i> .....	34
2.3.4 <i>SortExtensionCapabilities</i> .....	34
2.3.5 <i>SystemUpdateID</i> .....	35
2.3.6 <i>ContainerUpdateIDs</i> .....	35
2.3.7 <i>TransferIDs</i> .....	36
2.3.8 <i>FeatureList</i> .....	36
2.3.9 <i>A ARG TYPE ObjectID</i> .....	37
2.3.10 <i>A ARG TYPE Result</i> .....	37
2.3.11 <i>A ARG TYPE SearchCriteria</i> .....	37
2.3.11.1 <i>SearchCriteria</i> String Syntax .....	37

2.3.11.2	<u><a href="#">SearchCriteria</a></u> String Semantics and Examples .....	38
2.3.12	<u><a href="#">A ARG TYPE BrowseFlag</a></u> .....	39
2.3.13	<u><a href="#">A ARG TYPE Filter</a></u> .....	39
2.3.14	<u><a href="#">A ARG TYPE SortCriteria</a></u> .....	40
2.3.15	<u><a href="#">A ARG TYPE Index</a></u> .....	41
2.3.16	<u><a href="#">A ARG TYPE Count</a></u> .....	41
2.3.17	<u><a href="#">A ARG TYPE UpdateID</a></u> .....	41
2.3.18	<u><a href="#">A ARG TYPE TransferID</a></u> .....	42
2.3.19	<u><a href="#">A ARG TYPE TransferStatus</a></u> .....	42
2.3.20	<u><a href="#">A ARG TYPE TransferLength</a></u> .....	42
2.3.21	<u><a href="#">A ARG TYPE TransferTotal</a></u> .....	42
2.3.22	<u><a href="#">A ARG TYPE TagValueList</a></u> .....	42
2.3.23	<u><a href="#">A ARG TYPE URI</a></u> .....	42
2.4	Eventing and Moderation .....	43
2.5	Actions .....	44
2.5.1	<u><a href="#">GetSearchCapabilities()</a></u> .....	45
2.5.1.1	Arguments .....	45
2.5.1.2	Dependency on State .....	45
2.5.1.3	Effect on State .....	45
2.5.1.4	Errors .....	45
2.5.2	<u><a href="#">GetSortCapabilities()</a></u> .....	45
2.5.2.1	Arguments .....	45
2.5.2.2	Dependency on State .....	45
2.5.2.3	Effect on State .....	45
2.5.2.4	Errors .....	46
2.5.3	<u><a href="#">GetSortExtensionCapabilities()</a></u> .....	46
2.5.3.1	Arguments .....	46
2.5.3.2	Dependency on State .....	46
2.5.3.3	Effect on State .....	46
2.5.3.4	Errors .....	46
2.5.4	<u><a href="#">GetFeatureList()</a></u> .....	46
2.5.4.1	Arguments .....	46
2.5.4.2	Dependency on State .....	46
2.5.4.3	Effect on State .....	46
2.5.4.4	Errors .....	47
2.5.5	<u><a href="#">GetSystemUpdateID()</a></u> .....	47
2.5.5.1	Arguments .....	47
2.5.5.2	Dependency on State .....	47
2.5.5.3	Effect on State .....	47
2.5.5.4	Errors .....	47
2.5.6	<u><a href="#">Browse()</a></u> .....	47
2.5.6.1	Arguments .....	47
2.5.6.2	Dependency on State .....	48
2.5.6.3	Effect on State .....	48
2.5.6.4	Errors .....	49
2.5.7	<u><a href="#">Search()</a></u> .....	49
2.5.7.1	Arguments .....	49
2.5.7.2	Dependency on State .....	50
2.5.7.3	Effect on State .....	50

2.5.7.4	Errors .....	50
2.5.8	<u>CreateObject()</u> .....	51
2.5.8.1	<u>res</u> Property Creation .....	51
2.5.8.2	Arguments .....	54
2.5.8.3	Dependency on State .....	54
2.5.8.4	Effect on State .....	54
2.5.8.5	Errors .....	55
2.5.9	<u>DestroyObject()</u> .....	55
2.5.9.1	Arguments .....	56
2.5.9.2	Dependency on State .....	56
2.5.9.3	Effect on State .....	56
2.5.9.4	Errors .....	56
2.5.10	<u>UpdateObject()</u> .....	56
2.5.10.1	Arguments .....	58
2.5.10.2	Dependency on State .....	58
2.5.10.3	Effect on State .....	58
2.5.10.4	Errors .....	59
2.5.11	<u>MoveObject()</u> .....	59
2.5.11.1	Arguments .....	60
2.5.11.2	Dependency on State .....	60
2.5.11.3	Effect on State .....	60
2.5.11.4	Errors .....	61
2.5.12	<u>ImportResource()</u> .....	61
2.5.12.1	Arguments .....	61
2.5.12.2	Dependency on State .....	62
2.5.12.3	Effect on State .....	62
2.5.12.4	Errors .....	62
2.5.13	<u>ExportResource()</u> .....	62
2.5.13.1	Arguments .....	62
2.5.13.2	Dependency on State .....	62
2.5.13.3	Effect on State .....	63
2.5.13.4	Errors .....	63
2.5.14	<u>DeleteResource()</u> .....	63
2.5.14.1	Arguments .....	63
2.5.14.2	Dependency on State .....	64
2.5.14.3	Effect on State .....	64
2.5.14.4	Errors .....	64
2.5.15	<u>StopTransferResource()</u> .....	64
2.5.15.1	Arguments .....	64
2.5.15.2	Dependency on State .....	64
2.5.15.3	Effect on State .....	64
2.5.15.4	Errors .....	64
2.5.16	<u>GetTransferProgress()</u> .....	65
2.5.16.1	Arguments .....	65
2.5.16.2	Dependency on State .....	65
2.5.16.3	Effect on State .....	65
2.5.16.4	Errors .....	65

ITeh STANDARD PREVIEW  
(standards.iteh.ai)

ISO/IEC 29341-4-12:2008

<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a818-1d550bf05f/iso-iec-29341-4-12-2008>

2.5.17	<a href="#"><i>CreateReference()</i></a> .....	65
2.5.17.1	Arguments .....	66
2.5.17.2	Dependency on State .....	66
2.5.17.3	Effect on State .....	66
2.5.17.4	Errors .....	66
2.5.18	Non-Standard Actions Implemented by a UPnP Vendor .....	66
2.5.19	Common Error Codes .....	67
2.6	Theory of Operation (Informative) .....	69
2.6.1	Introduction .....	69
2.6.2	Content Setup for Browsing and Searching .....	69
2.6.3	Browsing .....	69
2.6.3.1	Retrieving Sort Capabilities .....	70
2.6.3.2	Browsing the Root Level Metadata .....	70
2.6.3.3	Browsing the Children of the Root Level .....	71
2.6.3.4	Browsing the Children of the My Music Folder .....	72
2.6.3.5	Browsing the Children of the Singles Soundtrack Music Album .....	72
2.6.3.6	Browsing the Children of the Album Art Folder .....	74
2.6.4	Searching .....	74
2.6.4.1	Retrieving Search Capabilities .....	75
2.6.4.2	Search for All Content Created by the performer Sting .....	75
2.6.4.3	Search for all Photos Taken During the Month of October .....	76
2.6.4.4	Search for All Objects in the My Photos Folder Containing the Word “Christmas” .....	77
2.6.4.5	Search for all <i>album</i> objects in the ContentDirectory service .....	77
2.6.5	Browsing, Searching, and References .....	79
2.6.5.1	Creating a reference to a photo in the Mexico Trip album inside the Christmas album .....	79
2.6.5.2	Search for All Photos Taken During the Month of October .....	79
2.6.5.3	Deletion of the Reference to the Photo in the Mexico Trip Album .....	80
2.6.6	Object Creation .....	80
2.6.6.1	Creating a New Object .....	80
2.6.6.2	Example: Creating a New MusicTrack in the Album1 ( <i>@id</i> = 10) .....	80
2.6.7	Object Resource Binding (Importing a Resource) .....	81
2.6.7.1	Transfer Using the <a href="#"><i>ImportResource()</i></a> Action .....	81
2.6.7.2	Transfer Using Direct HTTP POST .....	82
2.6.8	Exporting ContentDirectory Resources .....	82
2.6.8.1	Transfer Using the <a href="#"><i>ExportResource()</i></a> Action .....	83
2.6.8.2	Transfer using HTTP GET .....	84
2.6.9	Playlist Manipulation .....	84
2.6.9.1	Playlist File Representation in the ContentDirectory Service .....	84
2.6.9.2	Playlist File Generation .....	84
2.6.10	Internet Content Representation .....	85
2.6.11	Bookmark Manipulation .....	86
2.6.11.1	<a href="#"><i>bookmarkItem</i></a> Example .....	86
2.6.11.2	Creating and Destroying Bookmarks .....	88
2.6.11.3	Browsing Bookmarks .....	92
2.6.12	Vendor Metadata Extensions .....	98
<b>3</b>	<b>XML Service Description</b> .....	<b>99</b>
<b>4</b>	<b>Test</b> .....	<b>108</b>

<b>Annex A (normative) Schemas</b> .....	<b>109</b>
A.1 DIDL-Lite .....	109
A.2 UPnP Elements .....	109
A.3 Dublin Core Subset Elements .....	109
A.4 <i>FeatureList</i> State Variable Schema.....	109
<b>Annex B (normative) AV Working Committee Properties</b> .....	<b>110</b>
B.1 Base Properties .....	110
B.1.1 <i>@id</i> .....	111
B.1.2 <i>@parentID</i> .....	111
B.1.3 <i>@refID</i> .....	111
B.1.4 <i>@restricted</i> .....	111
B.1.5 <i>@searchable</i> .....	111
B.1.6 <i>@childCount</i> .....	111
B.1.7 <i>dc:title</i> .....	112
B.1.8 <i>dc:creator</i> .....	112
B.1.9 <i>res</i> .....	112
B.1.10 <i>upnp:class</i> .....	112
B.1.10.1 allowedValueList for the <i>upnp:class</i> Property .....	113
B.1.10.2 <i>upnp:class@name</i> .....	114
B.1.11 <i>upnp:searchClass</i> .....	114
B.1.11.1 <i>upnp:searchClass@name</i> .....	114
B.1.11.2 <i>upnp:searchClass@includeDerived</i> .....	114
B.1.12 <i>upnp:createClass</i> .....	114
B.1.12.1 <i>upnp:createClass@name</i> .....	115
B.1.12.2 <i>upnp:createClass@includeDerived</i> .....	115
B.1.13 <i>upnp:writeStatus</i> .....	115
B.1.13.1 allowedValueList for the <i>upnp:writeStatus</i> Property.....	115
B.2 Resource Encoding Characteristics Properties.....	116
B.2.1 <i>res</i> .....	116
B.2.1.1 <i>res@protocolInfo</i> .....	116
B.2.1.2 <i>res@importUri</i> .....	117
B.2.1.3 <i>res@size</i> .....	117
B.2.1.4 <i>res@duration</i> .....	117
B.2.1.5 <i>res@protection</i> .....	117
B.2.1.6 <i>res@bitrate</i> .....	118
B.2.1.7 <i>res@bitsPerSample</i> .....	118
B.2.1.8 <i>res@sampleFrequency</i> .....	118
B.2.1.9 <i>res@nrAudioChannels</i> .....	118
B.2.1.10 <i>res@resolution</i> .....	118
B.2.1.11 <i>res@colorDepth</i> .....	118
B.2.1.12 <i>res@tspec</i> .....	119
B.2.1.13 <i>res@allowedUse</i> .....	119
B.2.1.14 <i>res@validityStart</i> .....	119
B.2.1.15 <i>res@validityEnd</i> .....	119
B.2.1.16 <i>res@remainingTime</i> .....	120
B.2.1.17 <i>res@usageInfo</i> .....	120
B.2.1.18 <i>res@rightsInfoURI</i> .....	120
B.2.1.19 <i>res@contentInfoURI</i> .....	120
B.2.1.20 <i>res@recordQuality</i> .....	120

B.3	Contributor-related Properties .....	121
B.3.1	<a href="#"><u>upnp:artist</u></a> .....	121
B.3.1.1	<a href="#"><u>upnp:artist@role</u></a> .....	121
B.3.2	<a href="#"><u>upnp:actor</u></a> .....	121
B.3.2.1	<a href="#"><u>upnp:actor@role</u></a> .....	121
B.3.3	<a href="#"><u>upnp:author</u></a> .....	121
B.3.3.1	<a href="#"><u>upnp:author@role</u></a> .....	122
B.3.4	<a href="#"><u>upnp:producer</u></a> .....	122
B.3.5	<a href="#"><u>upnp:director</u></a> .....	122
B.3.6	<a href="#"><u>dc:publisher</u></a> .....	122
B.3.7	<a href="#"><u>dc:contributor</u></a> .....	122
B.4	Affiliation-related Properties .....	122
B.4.1	<a href="#"><u>upnp:genre</u></a> .....	123
B.4.1.1	<a href="#"><u>upnp:genre@id</u></a> .....	123
B.4.1.2	<a href="#"><u>upnp:genre@extended</u></a> .....	123
B.4.2	<a href="#"><u>upnp:album</u></a> .....	123
B.4.3	<a href="#"><u>upnp:playlist</u></a> .....	123
B.5	Associated Resources Properties .....	123
B.5.1	<a href="#"><u>upnp:albumArtURI</u></a> .....	124
B.5.2	<a href="#"><u>upnp:artistDiscographyURI</u></a> .....	124
B.5.3	<a href="#"><u>upnp:lyricsURI</u></a> .....	124
B.5.4	<a href="#"><u>dc:relation</u></a> .....	124
B.6	Storage-Related Properties .....	124
B.6.1	<a href="#"><u>upnp:storageTotal</u></a> .....	124
B.6.2	<a href="#"><u>upnp:storageUsed</u></a> .....	124
B.6.3	<a href="#"><u>upnp:storageFree</u></a> .....	125
B.6.4	<a href="#"><u>upnp:storageMaxPartition</u></a> .....	125
B.6.5	<a href="#"><u>upnp:storageMedium</u></a> .....	125
B.6.5.1	allowedValueList for the <a href="#"><u>upnp:storageMedium</u></a> Property .....	125
B.7	General Description (mainly for UI purposes) Properties .....	125
B.7.1	<a href="#"><u>dc:description</u></a> .....	126
B.7.2	<a href="#"><u>upnp:longDescription</u></a> .....	126
B.7.3	<a href="#"><u>upnp:icon</u></a> .....	126
B.7.4	<a href="#"><u>upnp:region</u></a> .....	126
B.7.5	<a href="#"><u>upnp:rights</u></a> .....	126
B.7.6	<a href="#"><u>dc:date</u></a> .....	126
B.7.7	<a href="#"><u>dc:language</u></a> .....	127
B.7.8	<a href="#"><u>upnp:playbackCount</u></a> .....	127
B.7.9	<a href="#"><u>upnp:lastPlaybackTime</u></a> .....	127
B.7.10	<a href="#"><u>upnp:lastPlaybackPosition</u></a> .....	127
B.7.11	<a href="#"><u>upnp:recordedStartDateTime</u></a> .....	127
B.7.12	<a href="#"><u>upnp:recordedDuration</u></a> .....	127
B.7.13	<a href="#"><u>upnp:recordedDayOfWeek</u></a> .....	128
B.7.13.1	allowedValueList for the <a href="#"><u>upnp:recordedDayOfWeek</u></a> Property .....	128
B.7.14	<a href="#"><u>upnp:srsRecordScheduleID</u></a> .....	128
B.7.15	<a href="#"><u>upnp:srsRecordTaskID</u></a> .....	128
B.7.16	<a href="#"><u>upnp:recordable</u></a> .....	128

B.8	Recorded Object-related Properties	129
B.8.1	<a href="#"><u>upnp:programTitle</u></a>	129
B.8.2	<a href="#"><u>upnp:seriesTitle</u></a>	129
B.8.3	<a href="#"><u>upnp:programID</u></a>	130
B.8.3.1	<a href="#"><u>upnp:programID@type</u></a>	130
B.8.4	<a href="#"><u>upnp:seriesID</u></a>	130
B.8.4.1	<a href="#"><u>upnp:seriesID@type</u></a>	130
B.8.5	<a href="#"><u>upnp:channelID</u></a>	131
B.8.5.1	<a href="#"><u>upnp:channelID@type</u></a>	131
B.8.6	<a href="#"><u>upnp:episodeCount</u></a>	131
B.8.7	<a href="#"><u>upnp:episodeNumber</u></a>	131
B.8.8	<a href="#"><u>upnp:programCode</u></a>	132
B.8.8.1	<a href="#"><u>upnp:programCode@type</u></a>	132
B.8.9	<a href="#"><u>upnp:rating</u></a>	132
B.8.9.1	<a href="#"><u>upnp:rating@type</u></a>	132
B.8.10	<a href="#"><u>upnp:episodeType</u></a>	132
B.9	User Channel and EPG Related Properties	133
B.9.1	<a href="#"><u>upnp:channelGroupName</u></a>	133
B.9.1.1	<a href="#"><u>upnp:channelGroupName@id</u></a>	133
B.9.2	<a href="#"><u>upnp:callSign</u></a>	133
B.9.3	<a href="#"><u>upnp:networkAffiliation</u></a>	134
B.9.4	<a href="#"><u>upnp:serviceProvider</u></a>	134
B.9.5	<a href="#"><u>upnp:price</u></a>	134
B.9.5.1	<a href="#"><u>upnp:price@currency</u></a>	134
B.9.6	<a href="#"><u>upnp:payPerView</u></a>	134
B.9.7	<a href="#"><u>upnp:epgProviderName</u></a>	134
B.9.8	<a href="#"><u>upnp:dateTimeRange</u></a>	134
B.10	Radio Broadcast Properties	135
B.10.1	<a href="#"><u>upnp:radioCallSign</u></a>	135
B.10.2	<a href="#"><u>upnp:radioStationID</u></a>	135
B.10.3	<a href="#"><u>upnp:radioBand</u></a>	135
B.10.3.1	allowedValueList for the <a href="#"><u>upnp:radioBand</u></a> Property	135
B.11	Video Broadcast Properties	135
B.11.1	<a href="#"><u>upnp:channelNr</u></a>	136
B.11.2	<a href="#"><u>upnp:channelName</u></a>	136
B.11.3	<a href="#"><u>upnp:scheduledStartTime</u></a>	136
B.11.4	<a href="#"><u>upnp:scheduledEndTime</u></a>	136
B.12	Physical Tuner Status-related Properties	136
B.12.1	<a href="#"><u>upnp:signalStrength</u></a>	137
B.12.2	<a href="#"><u>upnp:signalLocked</u></a>	137
B.12.3	<a href="#"><u>upnp:tuned</u></a>	137
B.13	Bookmark-related Properties	137
B.13.1	<a href="#"><u>@neverPlayable</u></a>	138
B.13.2	<a href="#"><u>upnp:bookmarkID</u></a>	138
B.13.3	<a href="#"><u>upnp:bookmarkedObjectID</u></a>	138
B.13.4	<a href="#"><u>upnp:deviceUDN</u></a>	138
B.13.4.1	<a href="#"><u>upnp:deviceUDN@serviceType</u></a>	138
B.13.4.2	<a href="#"><u>upnp:deviceUDN@serviceId</u></a>	138
B.13.5	<a href="#"><u>upnp:stateVariableCollection</u></a>	139

STANDARD PREVIEW  
(standards.iteh.ai)

ISO/IEC 29341-4-12:2008

<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a818->

<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a818-1550bf05fc/iso-iec-29341-4-12-2008>

B.13.5.1	<a href="#"><u>upnp:stateVariableCollection@serviceName</u></a>	139
B.13.5.2	<a href="#"><u>upnp:stateVariableCollection@rcsInstanceType</u></a>	139
B.14	Miscellaneous Properties	140
B.14.1	<a href="#"><u>upnp:DVDRegionCode</u></a>	140
B.14.2	<a href="#"><u>upnp:originalTrackNumber</u></a>	140
B.14.3	<a href="#"><u>upnp:toc</u></a>	140
B.14.4	<a href="#"><u>upnp:userAnnotation</u></a>	140
<b>Annex C</b>	<b>(normative) AV Working Committee Class Definitions</b>	<b>141</b>
C.1	Class Hierarchy	141
C.1.1	Class name syntax	142
C.1.2	Class Properties Overview	143
C.2	<a href="#"><u>object</u></a> (Base Class)	147
C.2.1	<a href="#"><u>item:object</u></a>	147
C.2.1.1	<a href="#"><u>imageItem:item</u></a>	147
C.2.1.2	<a href="#"><u>audioItem:item</u></a>	148
C.2.1.3	<a href="#"><u>videoItem:item</u></a>	149
C.2.1.4	<a href="#"><u>playlistItem:item</u></a>	151
C.2.1.5	<a href="#"><u>textItem:item</u></a>	152
C.2.1.6	<a href="#"><u>bookmarkItem:item</u></a>	153
C.2.1.7	<a href="#"><u>epgItem:item</u></a>	153
C.2.2	<a href="#"><u>container:object</u></a>	155
C.2.2.1	<a href="#"><u>person:container</u></a>	155
C.2.2.2	<a href="#"><u>playlistContainer:container</u></a>	156
C.2.2.3	<a href="#"><u>album:container</u></a>	157
C.2.2.4	<a href="#"><u>genre:container</u></a>	158
C.2.2.5	<a href="#"><u>channelGroup:container</u></a>	158
C.2.2.6	<a href="#"><u>epgContainer:container</u></a>	159
C.2.2.7	<a href="#"><u>storageSystem:container</u></a>	160
C.2.2.8	<a href="#"><u>storageVolume:container</u></a>	161
C.2.2.9	<a href="#"><u>storageFolder:container</u></a>	162
C.2.2.10	<a href="#"><u>bookmarkFolder:container</u></a>	162
<b>Annex D</b>	<b>(normative) EBNF Syntax Definitions</b>	<b>163</b>
D.1	Date&time Syntax	163
<b>Annex E</b>	<b>(normative) CDS features</b>	<b>164</b>
E.1	Requirements for the <i>EPG feature</i> , Version 1	165
E.2	Requirements for the <i>TUNER feature</i> , Version 1	166
E.3	Requirements for the <i>BOOKMARK feature</i> , Version 1	167

## LIST OF TABLES

Table 1-1:	EBNF Operators .....	20
Table 1-2:	CSV Examples .....	21
Table 1-3:	Namespace Definitions .....	22
Table 1-4:	Schema-related Information .....	23
Table 1-5:	Default Namespaces for the AV Specifications.....	24
Table 2-1:	Properties in XML .....	29
Table 2-2:	State variables .....	33
Table 2-3:	Sort Modifiers .....	34
Table 2-4:	ContainerUpdateIDs Example .....	36
Table 2-5:	Event moderation .....	43
Table 2-6:	Actions .....	44
Table 2-7:	Arguments for <a href="#"><u>GetSearchCapabilities()</u></a> .....	45
Table 2-8:	Error Codes for <a href="#"><u>GetSearchCapabilities()</u></a> .....	45
Table 2-9:	Arguments for <a href="#"><u>GetSortCapabilities()</u></a> .....	45
Table 2-10:	Error Codes for <a href="#"><u>GetSortCapabilities()</u></a> .....	46
Table 2-11:	Arguments for <a href="#"><u>GetSortExtensionCapabilities()</u></a> .....	46
Table 2-12:	Error Codes for <a href="#"><u>GetSortExtensionCapabilities()</u></a> .....	46
Table 2-13:	Arguments for <a href="#"><u>GetFeatureList()</u></a> .....	46
Table 2-14:	Error Codes for <a href="#"><u>GetFeatureList()</u></a> .....	47
Table 2-15:	Arguments for <a href="#"><u>GetSystemUpdateID()</u></a> .....	47
Table 2-16:	Error Codes for <a href="#"><u>GetSystemUpdateID()</u></a> .....	47
Table 2-17:	Arguments for <a href="#"><u>Browse()</u></a> .....	48
Table 2-18:	Error Codes for <a href="#"><u>Browse()</u></a> .....	49
Table 2-19:	Arguments for <a href="#"><u>Search()</u></a> .....	50
Table 2-20:	Error Codes for <a href="#"><u>Search()</u></a> .....	50
Table 2-21:	Arguments for <a href="#"><u>CreateObject()</u></a> .....	54
Table 2-22:	Error codes for <a href="#"><u>CreateObject()</u></a> .....	55
Table 2-23:	Arguments for <a href="#"><u>DestroyObject()</u></a> .....	56
Table 2-24:	Error Codes for <a href="#"><u>DestroyObject()</u></a> .....	56
Table 2-25:	Update examples.....	58
Table 2-26:	Arguments for <a href="#"><u>UpdateObject()</u></a> .....	58
Table 2-27:	Error Codes for <a href="#"><u>UpdateObject()</u></a> .....	59
Table 2-28:	Arguments for <a href="#"><u>MoveObject()</u></a> .....	60
Table 2-29:	Error Codes for <a href="#"><u>MoveObject()</u></a> .....	61
Table 2-30:	Arguments for <a href="#"><u>ImportResource()</u></a> .....	61
Table 2-31:	Error Codes for <a href="#"><u>ImportResource()</u></a> .....	62
Table 2-32:	Arguments for <a href="#"><u>ExportResource()</u></a> .....	62

Table 2-33:	Error Codes for <a href="#"><u>ExportResource()</u></a> .....	63
Table 2-34:	Arguments for <a href="#"><u>DeleteResource()</u></a> .....	63
Table 2-35:	Error Codes for <a href="#"><u>DeleteResource()</u></a> .....	64
Table 2-36:	Arguments for <a href="#"><u>StopTransferResource()</u></a> .....	64
Table 2-37:	Error Codes for <a href="#"><u>StopTransferResource()</u></a> .....	64
Table 2-38:	Arguments for <a href="#"><u>GetTransferProgress()</u></a> .....	65
Table 2-39:	Error Codes for <a href="#"><u>GetTransferProgress()</u></a> .....	65
Table 2-40:	Arguments for <a href="#"><u>CreateReference()</u></a> .....	66
Table 2-41:	Error Codes for <a href="#"><u>CreateReference()</u></a> .....	66
Table 2-42:	Common error codes.....	67
Table B-1:	Base Properties Overview.....	110
Table B-2:	allowedValueList for the <a href="#"><u>upnp:class</u></a> Property.....	113
Table B-3:	allowedValueList for the <a href="#"><u>upnp:writeStatus</u></a> Property.....	115
Table B-4:	Resource Encoding Characteristics Properties Overview.....	116
Table B-5:	Contributor-related Properties Overview.....	121
Table B-6:	Affiliation-related Properties Overview.....	122
Table B-7:	Associated Resources Properties Overview.....	123
Table B-8:	Storage-Related Properties Overview.....	124
Table B-9:	General Description (mainly for UI purposes) Properties Overview.....	125
Table B-10:	allowedValueList for the <a href="#"><u>upnp:recordedDayOfWeek</u></a> Property.....	128
Table B-11:	Recorded Object-related Properties Overview.....	129
Table B-12:	User Channel and EPG Related Properties Overview.....	133
Table B-13:	Radio Broadcast Properties Overview.....	135
Table B-14:	allowedValueList for the <a href="#"><u>upnp:radioBand</u></a> Property.....	135
Table B-15:	Video Broadcast Properties Overview.....	135
Table B-16:	Physical Tuner Status-related Properties Overview.....	136
Table B-17:	Bookmark-related Properties Overview.....	137
Table B-18:	allowedValueList for the <a href="#"><u>upnp:stateVariableCollection@rcsInstanceType</u></a> Property.....	139
Table B-19:	Miscellaneous Properties Overview.....	140
Table C-1:	Class Properties Overview.....	143
Table C-2:	<a href="#"><u>object</u></a> Properties.....	147
Table C-3:	<a href="#"><u>item</u></a> Properties.....	147
Table C-4:	<a href="#"><u>imageItem:item</u></a> Properties.....	147
Table C-5:	<a href="#"><u>photo:imageItem</u></a> Properties.....	148
Table C-6:	<a href="#"><u>audioItem:item</u></a> Properties.....	148
Table C-7:	<a href="#"><u>musicTrack:audioItem</u></a> Properties.....	148
Table C-8:	<a href="#"><u>audioBroadcast:audioItem</u></a> Properties.....	149
Table C-9:	<a href="#"><u>audioBook:audioItem</u></a> Properties.....	149

Table C-10:	<a href="#"><u>videoItem:item</u></a> Properties.....	150
Table C-11:	<a href="#"><u>movie:videoItem</u></a> Properties.....	150
Table C-12:	<a href="#"><u>videoBroadcast:videoItem</u></a> Properties.....	151
Table C-13:	<a href="#"><u>musicVideoClip:videoItem</u></a> Properties.....	151
Table C-14:	<a href="#"><u>playlistItem:item</u></a> Properties .....	152
Table C-15:	<a href="#"><u>textItem:item</u></a> Properties .....	152
Table C-16:	<a href="#"><u>bookmarkItem:item</u></a> Properties .....	153
Table C-17:	<a href="#"><u>epgItem:item</u></a> Properties .....	153
Table C-18:	<a href="#"><u>audioProgram:epgItem</u></a> Properties .....	155
Table C-19:	<a href="#"><u>videoProgram:epgItem</u></a> Properties.....	155
Table C-20:	<a href="#"><u>container</u></a> Properties .....	155
Table C-21:	<a href="#"><u>person:container</u></a> Properties .....	155
Table C-22:	<a href="#"><u>musicArtist:person</u></a> Properties .....	156
Table C-23:	<a href="#"><u>playlistContainer:container</u></a> Properties.....	156
Table C-24:	<a href="#"><u>album:container</u></a> Properties .....	157
Table C-25:	<a href="#"><u>musicAlbum:album</u></a> Properties.....	157
Table C-26:	<a href="#"><u>photoAlbum:album</u></a> Properties.....	157
Table C-27:	<a href="#"><u>genre:container</u></a> Properties.....	158
Table C-28:	<a href="#"><u>channelGroup:container</u></a> Properties.....	159
Table C-29:	<a href="#"><u>epgContainer:container</u></a> Properties.....	160
Table C-30:	<a href="#"><u>storageSystem:container</u></a> Properties.....	161
Table C-31:	<a href="#"><u>storageVolume:container</u></a> Properties.....	161
Table C-32:	<a href="#"><u>storageFolder:container</u></a> Properties.....	162
Table C-33:	genre:container Properties .....	162
Table E-1:	<i>CDS features</i> .....	164
Table E-2:	REQUIRED characteristics of the <i>EPG Feature</i> element .....	165
Table E-3:	REQUIRED characteristics of the <i>TUNER Feature</i> element.....	166
Table E-4:	REQUIRED characteristics of the <i>BOOKMARK feature</i> element .....	167

ITeH STANDARD PREVIEW  
 (standards.iteh.ai)  
 ISO/IEC 29341-4-12:2008  
<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a88-14550bf0556/iso-iec-29341-4-12-2008>

## LIST OF FIGURES

Figure 1: Class hierarchy for the item base class. ....	141
Figure 2: Class hierarchy for the container base class. ....	142

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[ISO/IEC 29341-4-12:2008](https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a8f8-1d550bfe05fc/iso-iec-29341-4-12-2008)

<https://standards.iteh.ai/catalog/standards/sist/cd036769-10ca-43cb-a8f8-1d550bfe05fc/iso-iec-29341-4-12-2008>