

CONTENTS

FOREWORD	14
ORIGINAL UPNP DOCUMENTS (informative)	16
1 Overview and Scope	18
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
2 Service Modeling Definitions	29
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>SearchCriteria</u> String Semantics and Examples	38
2.3.12	<u>A ARG TYPE BrowseFlag</u>	39
2.3.13	<u>A ARG TYPE Filter</u>	39
2.3.14	<u>A ARG TYPE SortCriteria</u>	40
2.3.15	<u>A ARG TYPE Index</u>	41
2.3.16	<u>A ARG TYPE Count</u>	41
2.3.17	<u>A ARG TYPE UpdateID</u>	41
2.3.18	<u>A ARG TYPE TransferID</u>	42
2.3.19	<u>A ARG TYPE TransferStatus</u>	42
2.3.20	<u>A ARG TYPE TransferLength</u>	42
2.3.21	<u>A ARG TYPE TransferTotal</u>	42
2.3.22	<u>A ARG TYPE TagValueList</u>	42
2.3.23	<u>A ARG TYPE URI</u>	42
2.4	Eventing and Moderation	43
2.5	Actions	44
2.5.1	<u>GetSearchCapabilities()</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>GetSortCapabilities()</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>GetSortExtensionCapabilities()</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>GetFeatureList()</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>GetSystemUpdateID()</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>Browse()</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>Search()</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	<i>res</i> 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

2.5.17	<i>CreateReference()</i>	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 <i>ImportResource()</i> 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 <i>ExportResource()</i> 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	<i>bookmarkItem</i> 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
3	XML Service Description	99
4	Test	108

Annex A (normative) Schemas	109
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
Annex B (normative) AV Working Committee Properties	110
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	<u>upnp:artist</u>	121
B.3.1.1	<u>upnp:artist@role</u>	121
B.3.2	<u>upnp:actor</u>	121
B.3.2.1	<u>upnp:actor@role</u>	121
B.3.3	<u>upnp:author</u>	121
B.3.3.1	<u>upnp:author@role</u>	122
B.3.4	<u>upnp:producer</u>	122
B.3.5	<u>upnp:director</u>	122
B.3.6	<u>dc:publisher</u>	122
B.3.7	<u>dc:contributor</u>	122
B.4	Affiliation-related Properties	122
B.4.1	<u>upnp:genre</u>	123
B.4.1.1	<u>upnp:genre@id</u>	123
B.4.1.2	<u>upnp:genre@extended</u>	123
B.4.2	<u>upnp:album</u>	123
B.4.3	<u>upnp:playlist</u>	123
B.5	Associated Resources Properties	123
B.5.1	<u>upnp:albumArtURI</u>	124
B.5.2	<u>upnp:artistDiscographyURI</u>	124
B.5.3	<u>upnp:lyricsURI</u>	124
B.5.4	<u>dc:relation</u>	124
B.6	Storage-Related Properties	124
B.6.1	<u>upnp:storageTotal</u>	124
B.6.2	<u>upnp:storageUsed</u>	124
B.6.3	<u>upnp:storageFree</u>	125
B.6.4	<u>upnp:storageMaxPartition</u>	125
B.6.5	<u>upnp:storageMedium</u>	125
B.6.5.1	allowedValueList for the <u>upnp:storageMedium</u> Property	125
B.7	General Description (mainly for UI purposes) Properties	125
B.7.1	<u>dc:description</u>	126
B.7.2	<u>upnp:longDescription</u>	126
B.7.3	<u>upnp:icon</u>	126
B.7.4	<u>upnp:region</u>	126
B.7.5	<u>upnp:rights</u>	126
B.7.6	<u>dc:date</u>	126
B.7.7	<u>dc:language</u>	127
B.7.8	<u>upnp:playbackCount</u>	127
B.7.9	<u>upnp:lastPlaybackTime</u>	127
B.7.10	<u>upnp:lastPlaybackPosition</u>	127
B.7.11	<u>upnp:recordedStartDate Time</u>	127
B.7.12	<u>upnp:recordedDuration</u>	127
B.7.13	<u>upnp:recordedDayOfWeek</u>	128
B.7.13.1	allowedValueList for the <u>upnp:recordedDayOfWeek</u> Property	128
B.7.14	<u>upnp:srsRecordScheduleID</u>	128
B.7.15	<u>upnp:srsRecordTaskID</u>	128
B.7.16	<u>upnp:recordable</u>	128

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

B.13.5.1	<u>upnp:stateVariableCollection@serviceName</u>	139
B.13.5.2	<u>upnp:stateVariableCollection@rcsInstanceType</u>	139
B.14	Miscellaneous Properties	140
B.14.1	<u>upnp:DVDRegionCode</u>	140
B.14.2	<u>upnp:originalTrackNumber</u>	140
B.14.3	<u>upnp:toc</u>	140
B.14.4	<u>upnp:userAnnotation</u>	140
Annex C	(normative) AV Working Committee Class Definitions	141
C.1	Class Hierarchy	141
C.1.1	Class name syntax	142
C.1.2	Class Properties Overview	143
C.2	<u>object</u> (Base Class)	147
C.2.1	<u>item:object</u>	147
C.2.1.1	<u>imageItem:item</u>	147
C.2.1.2	<u>audioItem:item</u>	148
C.2.1.3	<u>videoItem:item</u>	149
C.2.1.4	<u>playlistItem:item</u>	151
C.2.1.5	<u>textItem:item</u>	152
C.2.1.6	<u>bookmarkItem:item</u>	153
C.2.1.7	<u>epgItem:item</u>	153
C.2.2	<u>container:object</u>	155
C.2.2.1	<u>person:container</u>	155
C.2.2.2	<u>playlistContainer:container</u>	156
C.2.2.3	<u>album:container</u>	157
C.2.2.4	<u>genre:container</u>	158
C.2.2.5	<u>channelGroup:container</u>	158
C.2.2.6	<u>epgContainer:container</u>	159
C.2.2.7	<u>storageSystem:container</u>	160
C.2.2.8	<u>storageVolume:container</u>	161
C.2.2.9	<u>storageFolder:container</u>	162
C.2.2.10	<u>bookmarkFolder:container</u>	162
Annex D	(normative) EBNF Syntax Definitions	163
D.1	Date&time Syntax	163
Annex E	(normative) CDS features	164
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 <u>GetSearchCapabilities()</u>	45
Table 2-8:	Error Codes for <u>GetSearchCapabilities()</u>	45
Table 2-9:	Arguments for <u>GetSortCapabilities()</u>	45
Table 2-10:	Error Codes for <u>GetSortCapabilities()</u>	46
Table 2-11:	Arguments for <u>GetSortExtensionCapabilities()</u>	46
Table 2-12:	Error Codes for <u>GetSortExtensionCapabilities()</u>	46
Table 2-13:	Arguments for <u>GetFeatureList()</u>	46
Table 2-14:	Error Codes for <u>GetFeatureList()</u>	47
Table 2-15:	Arguments for <u>GetSystemUpdateID()</u>	47
Table 2-16:	Error Codes for <u>GetSystemUpdateID()</u>	47
Table 2-17:	Arguments for <u>Browse()</u>	48
Table 2-18:	Error Codes for <u>Browse()</u>	49
Table 2-19:	Arguments for <u>Search()</u>	50
Table 2-20:	Error Codes for <u>Search()</u>	50
Table 2-21:	Arguments for <u>CreateObject()</u>	54
Table 2-22:	Error codes for <u>CreateObject()</u>	55
Table 2-23:	Arguments for <u>DestroyObject()</u>	56
Table 2-24:	Error Codes for <u>DestroyObject()</u>	56
Table 2-25:	Update examples	58
Table 2-26:	Arguments for <u>UpdateObject()</u>	58
Table 2-27:	Error Codes for <u>UpdateObject()</u>	59
Table 2-28:	Arguments for <u>MoveObject()</u>	60
Table 2-29:	Error Codes for <u>MoveObject()</u>	61
Table 2-30:	Arguments for <u>ImportResource()</u>	61
Table 2-31:	Error Codes for <u>ImportResource()</u>	62
Table 2-32:	Arguments for <u>ExportResource()</u>	62

Table 2-33:	Error Codes for ExportResource()	63
Table 2-34:	Arguments for DeleteResource()	63
Table 2-35:	Error Codes for DeleteResource()	64
Table 2-36:	Arguments for StopTransferResource()	64
Table 2-37:	Error Codes for StopTransferResource()	64
Table 2-38:	Arguments for GetTransferProgress()	65
Table 2-39:	Error Codes for GetTransferProgress()	65
Table 2-40:	Arguments for CreateReference()	66
Table 2-41:	Error Codes for CreateReference()	66
Table 2-42:	Common error codes.....	67
Table B-1:	Base Properties Overview.....	110
Table B-2:	allowedValueList for the upnp:class Property.....	113
Table B-3:	allowedValueList for the upnp:writeStatus 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 upnp:recordedDayOfWeek 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 upnp:radioBand 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 upnp:stateVariableCollection@rcsInstanceType Property.....	139
Table B-19:	Miscellaneous Properties Overview.....	140
Table C-1:	Class Properties Overview.....	143
Table C-2:	object Properties.....	147
Table C-3:	item Properties.....	147
Table C-4:	imageItem:item Properties.....	147
Table C-5:	photo:imageItem Properties.....	148
Table C-6:	audioItem:item Properties.....	148
Table C-7:	musicTrack:audioItem Properties.....	148
Table C-8:	audioBroadcast:audioItem Properties.....	149
Table C-9:	audioBook:audioItem Properties.....	149

Table C-10:	<u>videoItem:item</u> Properties.....	150
Table C-11:	<u>movie:videoItem</u> Properties.....	150
Table C-12:	<u>videoBroadcast:videoItem</u> Properties.....	151
Table C-13:	<u>musicVideoClip:videoItem</u> Properties.....	151
Table C-14:	<u>playlistItem:item</u> Properties.....	152
Table C-15:	<u>textItem:item</u> Properties.....	152
Table C-16:	<u>bookmarkItem:item</u> Properties.....	153
Table C-17:	<u>epgItem:item</u> Properties.....	153
Table C-18:	<u>audioProgram:epgItem</u> Properties.....	155
Table C-19:	<u>videoProgram:epgItem</u> Properties.....	155
Table C-20:	<u>container</u> Properties.....	155
Table C-21:	<u>person:container</u> Properties.....	155
Table C-22:	<u>musicArtist:person</u> Properties.....	156
Table C-23:	<u>playlistContainer:container</u> Properties.....	156
Table C-24:	<u>album:container</u> Properties.....	157
Table C-25:	<u>musicAlbum:album</u> Properties.....	157
Table C-26:	<u>photoAlbum:album</u> Properties.....	157
Table C-27:	<u>genre:container</u> Properties.....	158
Table C-28:	<u>channelGroup:container</u> Properties.....	159
Table C-29:	<u>epgContainer:container</u> Properties.....	160
Table C-30:	<u>storageSystem:container</u> Properties.....	161
Table C-31:	<u>storageVolume:container</u> Properties.....	161
Table C-32:	<u>storageFolder:container</u> 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

LIST OF FIGURES

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