

# ISO/IEC 29341-4-10:2008-11 (E)

## Information technology\_ - UPnP Device Architecture\_ - Part\_4-10: Audio Video Device Control Protocol\_ - Level 2\_ - Audio Video Transport Service

---

### CONTENTS

FOREWORD .....	7
ORIGINAL UPNP DOCUMENTS (informative) .....	9
<b>1 Overview and Scope .....</b>	<b>11</b>
1.1 Introduction .....	11
1.2 Notation .....	11
1.2.1 Data Types .....	11
1.2.2 Strings Embedded in Other Strings .....	12
1.2.3 Extended Backus-Naur Form .....	12
1.3 Derived Data Types .....	13
1.3.1 Comma Separated Value (CSV) Lists .....	13
1.4 Management of XML Namespaces in Standardized DCPs .....	14
1.4.1 Namespace Prefix Requirements .....	17
1.4.2 Namespace Names, Namespace Versioning and Schema Versioning .....	18
1.4.3 Namespace Usage Examples .....	19
1.5 Vendor-defined Extensions .....	19
1.6 References .....	20
<b>2 Service Modeling Definitions .....</b>	<b>23</b>
2.1 ServiceType .....	23
2.2 State Variables .....	23
2.2.1 <u><a href="#">TransportState</a></u> .....	28
2.2.2 <u><a href="#">TransportStatus</a></u> .....	28
2.2.3 <u><a href="#">CurrentMediaCategory</a></u> .....	28
2.2.4 <u><a href="#">PlaybackStorageMedium</a></u> .....	29
2.2.5 <u><a href="#">RecordStorageMedium</a></u> .....	29
2.2.6 <u><a href="#">PossiblePlaybackStorageMedia</a></u> .....	29
2.2.7 <u><a href="#">PossibleRecordStorageMedia</a></u> .....	29
2.2.8 <u><a href="#">CurrentPlayMode</a></u> .....	29
2.2.9 <u><a href="#">TransportPlaySpeed</a></u> .....	29
2.2.10 <u><a href="#">RecordMediumWriteStatus</a></u> .....	29
2.2.11 <u><a href="#">CurrentRecordQualityMode</a></u> .....	29
2.2.12 <u><a href="#">PossibleRecordQualityModes</a></u> .....	30
2.2.13 <u><a href="#">NumberOfTracks</a></u> .....	30
2.2.14 <u><a href="#">CurrentTrack</a></u> .....	30
2.2.15 <u><a href="#">CurrentTrackDuration</a></u> .....	30
2.2.16 <u><a href="#">CurrentMediaDuration</a></u> .....	31
2.2.17 <u><a href="#">CurrentTrackMetaData</a></u> .....	31
2.2.18 <u><a href="#">CurrentTrackURI</a></u> .....	31
2.2.19 <u><a href="#">AVTransportURI</a></u> .....	31
2.2.20 <u><a href="#">AVTransportURIMetaData</a></u> .....	31
2.2.21 <u><a href="#">NextAVTransportURI</a></u> .....	31
2.2.22 <u><a href="#">NextAVTransportURIMetaData</a></u> .....	32
2.2.23 <u><a href="#">RelativeTimePosition</a></u> .....	32
2.2.24 <u><a href="#">AbsoluteTimePosition</a></u> .....	32
2.2.25 <u><a href="#">RelativeCounterPosition</a></u> .....	32
2.2.26 <u><a href="#">AbsoluteCounterPosition</a></u> .....	33
2.2.27 <u><a href="#">CurrentTransportActions</a></u> .....	33

2.2.28	<a href="#"><u>LastChange</u></a>	33
2.2.29	<a href="#"><u>DRMState</u></a>	33
2.2.30	<a href="#"><u>A_ARG_TYPE SeekMode</u></a>	34
2.2.31	<a href="#"><u>A_ARG_TYPE SeekTarget</u></a>	34
2.2.32	<a href="#"><u>A_ARG_TYPE InstanceID</u></a>	34
2.2.33	<a href="#"><u>A_ARG_TYPE DeviceUDN</u></a>	34
2.2.34	<a href="#"><u>A_ARG_TYPE ServiceType</u></a>	35
2.2.35	<a href="#"><u>A_ARG_TYPE ServiceID</u></a>	35
2.2.36	<a href="#"><u>A_ARG_TYPE StateVariableValuePairs</u></a>	35
2.2.37	<a href="#"><u>A_ARG_TYPE StateVariableList</u></a>	35
2.3	Eventing and Moderation	36
2.3.1	Event Model	37
2.4	Actions	38
2.4.1	<a href="#"><u>SetAVTransportURI()</u></a>	39
2.4.2	<a href="#"><u>SetNextAVTransportURI()</u></a>	41
2.4.3	<a href="#"><u>GetMediaInfo()</u></a>	43
2.4.4	<a href="#"><u>GetMediaInfo Ext()</u></a>	44
2.4.5	<a href="#"><u>GetTransportInfo()</u></a>	45
2.4.6	<a href="#"><u>GetPositionInfo()</u></a>	46
2.4.7	<a href="#"><u>GetDeviceCapabilities()</u></a>	47
2.4.8	<a href="#"><u>GetTransportSettings()</u></a>	48
2.4.9	<a href="#"><u>Stop()</u></a>	49
2.4.10	<a href="#"><u>Play()</u></a>	50
2.4.11	<a href="#"><u>Pause()</u></a>	52
2.4.12	<a href="#"><u>Record()</u></a>	52
2.4.13	<a href="#"><u>Seek()</u></a>	54
2.4.14	<a href="#"><u>Next()</u></a>	56
2.4.15	<a href="#"><u>Previous()</u></a>	58
2.4.16	<a href="#"><u>SetPlayMode()</u></a>	60
2.4.17	<a href="#"><u>SetRecordQualityMode()</u></a>	61
2.4.18	<a href="#"><u>GetCurrentTransportActions()</u></a>	62
2.4.19	<a href="#"><u>GetDRMState()</u></a>	63
2.4.20	<a href="#"><u>GetStateVariables()</u></a>	64
2.4.21	<a href="#"><u>SetStateVariables()</u></a>	65
2.4.22	Common Error Codes	66
2.5	Theory of Operation	68
2.5.1	TransportState Control	68
2.5.2	Transport Settings	69
2.5.3	Navigation	69
2.5.4	AVTransportURI Concept	69
2.5.5	AVTransport Abstraction	70
2.5.6	Supporting Multiple Virtual Transports	72
2.5.7	Playlist Playback	73
<b>3</b>	<b>XML Service Description</b>	<b>74</b>
<b>4</b>	<b>Test</b>	<b>89</b>
<b>Annex A</b>	<b>(normative) <a href="#"><u>SetAVTransportURI()</u></a> Protocol Specifics</b>	<b>90</b>
A.1	Application to HTTP Streaming	90
A.1.1	<a href="#"><u>AVTransportURI</u></a> Definition	90

A.1.2	Control Point Behavior for <a href="#"><u>SetAVTransportURI()</u></a> .....	90
A.1.3	Implementation of <a href="#"><u>SetAVTransportURI()</u></a> .....	90
A.1.4	Cleanup.....	90
A.2	Application to RTSP/RTP/UDP Streaming.....	90
A.2.1	<a href="#"><u>AVTransportURI</u></a> Definition.....	90
A.2.2	Control Point behavior for <a href="#"><u>SetAVTransportURI()</u></a> .....	91
A.2.3	Implementation of <a href="#"><u>SetAVTransportURI()</u></a> .....	91
A.2.4	Cleanup.....	91
A.2.5	Implementation of Transport Controls.....	92
A.3	Application to Internal Streaming.....	92
A.3.1	<a href="#"><u>AVTransportURI</u></a> Definition.....	92
A.3.2	Implementation of <a href="#"><u>SetAVTransportURI()</u></a> .....	92
A.3.3	Cleanup.....	92
A.4	Application to IEC61883 Streaming.....	92
A.4.1	<a href="#"><u>AVTransportURI</u></a> Definition.....	92
A.4.2	Implementation of <a href="#"><u>SetAVTransportURI()</u></a> .....	92
A.4.3	Cleanup.....	93
A.5	Application to Vendor-specific Streaming.....	93
A.5.1	<a href="#"><u>AVTransportURI</u></a> Definition.....	93
A.5.2	Implementation of <a href="#"><u>SetAVTransportURI()</u></a> .....	93
A.5.3	Cleanup.....	93

## LIST OF TABLES

Table 1-1:	EBNF Operators .....	12
Table 1-2:	CSV Examples .....	14
Table 1-3:	Namespace Definitions.....	16
Table 1-4:	Schema-related Information .....	17
Table 1-5:	Default Namespaces for the AV Specifications .....	18
Table 2-6:	State Variables .....	23
Table 2-7:	allowedValueList for <a href="#"><u>TransportState</u></a> .....	24
Table 2-8:	allowedValueList for <a href="#"><u>CurrentMediaCategory</u></a> .....	24
Table 2-9:	allowedValueList for <a href="#"><u>PlaybackStorageMedium</u></a> and <a href="#"><u>RecordStorageMedium</u></a> .....	25
Table 2-10:	allowedValueList for <a href="#"><u>CurrentPlayMode</u></a> .....	26
Table 2-11:	allowedValueList for <a href="#"><u>RecordMediumWriteStatus</u></a> .....	26
Table 2-12:	allowedValueList for <a href="#"><u>CurrentRecordQualityMode</u></a> .....	26
Table 2-13:	allowedValueRange for <a href="#"><u>NumberOfTracks</u></a> .....	26
Table 2-14:	allowedValueRange for <a href="#"><u>CurrentTrack</u></a> .....	27
Table 2-15:	allowedValueList for <a href="#"><u>CurrentTransportActions</u></a> .....	27
Table 2-16:	allowedValueList for <a href="#"><u>DRMState</u></a> .....	27
Table 2-17:	allowedValueList for <a href="#"><u>A_ARG_TYPE_SeekMode</u></a> .....	28
Table 2-18:	Format of <a href="#"><u>A_ARG_TYPE_SeekTarget</u></a> .....	34
Table 2-19:	Event Moderation.....	36
Table 2-20:	Actions .....	38
Table 2-21:	Arguments for <a href="#"><u>SetAVTransportURI()</u></a> .....	39
Table 2-22:	Error Codes for <a href="#"><u>SetAVTransportURI()</u></a> .....	40
Table 2-23:	Arguments for <a href="#"><u>SetNextAVTransportURI()</u></a> .....	41
Table 2-24:	Error Codes for <a href="#"><u>SetNextAVTransportURI()</u></a> .....	41
Table 2-25:	Arguments for <a href="#"><u>GetMediaInfo()</u></a> .....	43
Table 2-26:	Error Codes for <a href="#"><u>GetMediaInfo()</u></a> .....	43
Table 2-27:	Arguments for <a href="#"><u>GetMediaInfo_Ext()</u></a> .....	44
Table 2-28:	Error Codes for <a href="#"><u>GetMediaInfo_Ext()</u></a> .....	44
Table 2-29:	Arguments for <a href="#"><u>GetTransportInfo()</u></a> .....	45
Table 2-30:	Error Codes for <a href="#"><u>GetTransportInfo()</u></a> .....	45
Table 2-31:	Arguments for <a href="#"><u>GetPositionInfo()</u></a> .....	46
Table 2-32:	Error Codes for <a href="#"><u>GetPositionInfo()</u></a> .....	46
Table 2-33:	Arguments for <a href="#"><u>GetDeviceCapabilities()</u></a> .....	47
Table 2-34:	Error Codes for <a href="#"><u>GetDeviceCapabilities()</u></a> .....	47
Table 2-35:	Arguments for <a href="#"><u>GetTransportSettings()</u></a> .....	48
Table 2-36:	Error Codes for <a href="#"><u>GetTransportSettings()</u></a> .....	48
Table 2-37:	Arguments for <a href="#"><u>Stop()</u></a> .....	49
Table 2-38:	Error Codes for <a href="#"><u>Stop()</u></a> .....	49
Table 2-39:	Arguments for <a href="#"><u>Play()</u></a> .....	50

Table 2-40:	Error Codes for <a href="#"><u>Play()</u></a> .....	51
Table 2-41:	Arguments for <a href="#"><u>Pause()</u></a> .....	52
Table 2-42:	Error Codes for <a href="#"><u>Pause()</u></a> .....	52
Table 2-43:	Arguments for <a href="#"><u>Record()</u></a> .....	53
Table 2-44:	Error Codes for <a href="#"><u>Record()</u></a> .....	53
Table 2-45:	Arguments for <a href="#"><u>Seek()</u></a> .....	54
Table 2-46:	Error Codes for <a href="#"><u>Seek()</u></a> .....	55
Table 2-47:	Arguments for <a href="#"><u>Next()</u></a> .....	56
Table 2-48:	Error Codes for <a href="#"><u>Next()</u></a> .....	57
Table 2-49:	Arguments for <a href="#"><u>Previous()</u></a> .....	58
Table 2-50:	Error Codes for <a href="#"><u>Previous()</u></a> .....	59
Table 2-51:	Arguments for <a href="#"><u>SetPlayMode()</u></a> .....	60
Table 2-52:	Error Codes for <a href="#"><u>SetPlayMode()</u></a> .....	60
Table 2-53:	Arguments for <a href="#"><u>SetRecordQualityMode()</u></a> .....	61
Table 2-54:	Error Codes for <a href="#"><u>SetRecordQualityMode()</u></a> .....	61
Table 2-55:	Arguments for <a href="#"><u>GetCurrentTransportActions()</u></a> .....	62
Table 2-56:	Error Codes for <a href="#"><u>GetCurrentTransportActions()</u></a> .....	62
Table 2-57:	Arguments for <a href="#"><u>GetDRMState()</u></a> .....	63
Table 2-58:	Error Codes for <a href="#"><u>GetDRMState()</u></a> .....	63
Table 2-59:	Arguments for <a href="#"><u>GetStateVariables()</u></a> .....	64
Table 2-60:	Error Codes for <a href="#"><u>GetStateVariables()</u></a> .....	64
Table 2-61:	Arguments for <a href="#"><u>SetStateVariables()</u></a> .....	65
Table 2-62:	Error Codes for <a href="#"><u>SetStateVariables()</u></a> .....	65
Table 2-63:	Common Error Codes.....	66
Table 2-64:	Allowed AVTransportURIs.....	70
Table 2-65:	Example mappings of resources type to track sequences.....	70
Table 2-66:	Example seek modes, play modes and transport actions, per resource type.....	71

## LIST OF FIGURES

Figure 1:	<a href="#"><u>TransportState</u></a> Transitions - INFORMATIVE.....	68
-----------	----------------------------------------------------------------------	----