

ISO/IEC 29341-20-10:2017-09 (E)

Information technology - UPnP Device Architecture - Part 20-10: Audio video device control protocol - Level 4 - Audio video transport service

Contents	Page
1 Scope	1
2 Normative references	1
3 Terms, definitions, symbols and abbreviations	4
3.1 Provisioning terms	4
3.2 Symbols	5
4 Notations and Conventions	5
4.1 Notation	5
4.1.1 Data Types	5
4.1.2 Strings Embedded in Other Strings	5
4.1.3 Extended Backus-Naur Form	6
4.2 Derived Data Types	6
4.2.1 Summary	6
4.2.2 CSV Lists	6
4.3 Management of XML Namespaces in Standardized DCPs	8
4.3.1 Namespace Prefix Requirements	12
4.3.2 Namespace Names, Namespace Versioning and Schema Versioning	13
4.3.3 Namespace Usage Examples	15
4.4 Vendor-defined Extensions	15
4.4.1 Vendor-defined Action Names	15
4.4.2 Vendor-defined State Variable Names	15
4.4.3 Vendor-defined XML Elements and attributes	16
4.4.4 Vendor-defined Property Names	16
5 Service Modeling Definitions	16
5.1 ServiceType	16
5.2 State Variables	16
5.2.1 State Variable Overview	16
5.2.2 <u>TransportState</u>	18
5.2.3 <u>TransportStatus</u>	19
5.2.4 <u>CurrentMediaCategory</u>	19
5.2.5 <u>PlaybackStorageMedium</u>	19
5.2.6 <u>RecordStorageMedium</u>	21
5.2.7 <u>PossiblePlaybackStorageMedia</u>	21
5.2.8 <u>PossibleRecordStorageMedia</u>	21
5.2.9 <u>CurrentPlayMode</u>	21
5.2.10 <u>TransportPlaySpeed</u>	21
5.2.11 <u>RecordMediumWriteStatus</u>	21
5.2.12 <u>CurrentRecordQualityMode</u>	22
5.2.13 <u>PossibleRecordQualityModes</u>	22
5.2.14 <u>NumberOfTracks</u>	22
5.2.15 <u>CurrentTrack</u>	23
5.2.16 <u>CurrentTrackDuration</u>	23
5.2.17 <u>CurrentMediaDuration</u>	23
5.2.18 <u>CurrentTrackMetaData</u>	24
5.2.19 <u>CurrentTrackURI</u>	24
5.2.20 <u>AVTransportURI</u>	24

5.2.21	<u>AVTransportURIMetaData</u>	24
5.2.22	<u>NextAVTransportURI</u>	24
5.2.23	<u>NextAVTransportURIMetaData</u>	24
5.2.24	<u>RelativeTimePosition</u>	25
5.2.25	<u>AbsoluteTimePosition</u>	25
5.2.26	<u>RelativeCounterPosition</u>	25
5.2.27	<u>AbsoluteCounterPosition</u>	25
5.2.28	<u>CurrentTransportActions</u>	26
5.2.29	<u>LastChange</u>	26
5.2.30	<u>DRMState</u>	26
5.2.31	<u>SyncOffset</u>	27
5.2.32	<u>A ARG TYPE SeekMode</u>	28
5.2.33	<u>A ARG TYPE SeekTarget</u>	28
5.2.34	<u>A ARG TYPE InstanceID</u>	29
5.2.35	<u>A ARG TYPE DeviceUDN</u>	29
5.2.36	<u>A ARG TYPE ServiceType</u>	29
5.2.37	<u>A ARG TYPE ServiceID</u>	29
5.2.38	<u>A ARG TYPE StateVariableValuePairs</u>	29
5.2.39	<u>A ARG TYPE StateVariableList</u>	30
5.2.40	<u>A ARG TYPE PlaylistData</u>	30
5.2.41	<u>A ARG TYPE PlaylistDataLength</u>	30
5.2.42	<u>A ARG TYPE PlaylistOffset</u>	30
5.2.43	<u>A ARG TYPE PlaylistTotalLength</u>	30
5.2.44	<u>A ARG TYPE PlaylistMIMEType</u>	31
5.2.45	<u>A ARG TYPE PlaylistExtendedType</u>	31
5.2.46	<u>A ARG TYPE PlaylistStep</u>	31
5.2.47	<u>A ARG TYPE PlaylistType</u>	31
5.2.48	<u>A ARG TYPE PlaylistInfo</u>	32
5.2.49	<u>A ARG TYPE PlaylistStartObjID</u>	35
5.2.50	<u>A ARG TYPE PlaylistStartGroupID</u>	35
5.2.51	<u>A ARG TYPE SyncOffsetAdj</u>	35
5.2.52	<u>A ARG TYPE PresentationTime</u>	36
5.2.53	<u>A ARG TYPE ClockID</u>	36
5.3	Eventing and Moderation	36
5.3.1	Eventing and Moderation Overview	36
5.3.2	Event Model	38
5.4	Actions	39
5.4.1	Action Overview	39
5.4.2	<u>SetAVTransportURI()</u>	41
5.4.3	<u>SetNextAVTransportURI()</u>	42
5.4.4	<u>GetMediaInfo()</u>	44
5.4.5	<u>GetMediaInfo Ext()</u>	45
5.4.6	<u>GetTransportInfo()</u>	45
5.4.7	<u>GetPositionInfo()</u>	46
5.4.8	<u>GetDeviceCapabilities()</u>	47
5.4.9	<u>GetTransportSettings()</u>	47
5.4.10	<u>Stop()</u>	48
5.4.11	<u>Play()</u>	49
5.4.12	<u>Pause()</u>	50

5.4.13	<u>Record()</u>	51
5.4.14	<u>Seek()</u>	52
5.4.15	<u>Next()</u>	54
5.4.16	<u>Previous()</u>	55
5.4.17	<u>SetPlayMode()</u>	56
5.4.18	<u>SetRecordQualityMode()</u>	57
5.4.19	<u>GetCurrentTransportActions()</u>	57
5.4.20	<u>GetDRMState()</u>	58
5.4.21	<u>GetStateVariables()</u>	58
5.4.22	<u>SetStateVariables()</u>	59
5.4.23	<u>GetSyncOffset()</u>	60
5.4.24	<u>SetSyncOffset()</u>	61
5.4.25	<u>AdjustSyncOffset()</u>	61
5.4.26	<u>SyncPlay()</u>	62
5.4.27	<u>SyncStop()</u>	64
5.4.28	<u>SyncPause()</u>	65
5.4.29	<u>SetStaticPlaylist()</u>	66
5.4.30	<u>SetStreamingPlaylist()</u>	68
5.4.31	<u>GetPlaylistInfo()</u>	69
5.4.32	Common Error Codes	70
6	XML Service Description	72
7	Test	92
Annex A	(normative) <u>SetAVTransportURI()</u> Protocol Specifics	93
A.1	Application to HTTP Streaming	93
A.1.1	<u>AVTransportURI</u> Definition	93
A.1.2	Control Point Behavior for <u>SetAVTransportURI()</u>	93
A.1.3	Implementation of <u>SetAVTransportURI()</u>	93
A.1.4	Cleanup	93
A.2	Application to RTSP/RTP/UDP Streaming	93
A.2.1	<u>AVTransportURI</u> Definition	93
A.2.2	Control Point behavior for <u>SetAVTransportURI()</u>	93
A.2.3	Implementation of <u>SetAVTransportURI()</u>	94
A.2.4	Cleanup	94
A.2.5	Implementation of Transport Controls	94
A.3	Application to Internal Streaming	95
A.3.1	<u>AVTransportURI</u> Definition	95
A.3.2	Implementation of <u>SetAVTransportURI()</u>	95
A.3.3	Cleanup	95
A.4	Application to IEC61883 Streaming	95
A.4.1	<u>AVTransportURI</u> Definition	95
A.4.2	Implementation of <u>SetAVTransportURI()</u>	95
A.4.3	Cleanup	95
A.5	Application to Vendor-specific Streaming	95
A.5.1	<u>AVTransportURI</u> Definition	95
A.5.2	Implementation of <u>SetAVTransportURI()</u>	96
A.5.3	Cleanup	96
Annex B	(informative) Theory of Operation	97
B.1	TransportState Control	97

B.2	Transport Settings	98
B.3	Navigation	98
B.4	AVTransportURI Concept.....	98
B.5	AVTransport Abstraction.....	99
B.6	Supporting Multiple Virtual Transports.....	101
B.7	Playlist Playback	102
B.8	Dynamic Playlists	103
B.8.1	Playlist Updating.....	103
B.8.2	Determining Playlist Rendering Capabilities.....	103
B.8.3	Submitting a Streaming Playlist	104
B.8.4	Modifying a Current Playlist.....	105
B.8.5	Submitting a Static Playlist.....	106
B.8.6	Retrieving a Current Static Playlist	107
B.9	<i>CLOCKSYNC</i> feature: Synchronized Playback	108
B.9.2	Example of <i>SyncOffset</i> State Variable	109
B.9.3	Example Scenarios for <i>SyncPlay()</i> Action	109
Annex C	(informative) Bibliography	113

List of Tables

Table 1 — EBNF Operators.....	6
Table 2 — CSV Examples.....	7
Table 3 — Namespace Definitions.....	9
Table 4 — Schema-related Information.....	11
Table 5 — Default Namespaces for the AV Specifications.....	13
Table 6 — State Variables	17
Table 7 — allowedValueList for <u>TransportState</u>	19
Table 8 — allowedValueRange for <u>TransportStatus</u>	19
Table 9 — allowedValueList for <u>CurrentMediaCategory</u>	19
Table 10 — allowedValueList for <u>PlaybackStorageMedium</u>	20
Table 11 — allowedValueList for <u>CurrentPlayMode</u>	21
Table 12 — allowedValueList for <u>RecordMediumWriteStatus</u>	22
Table 13 — allowedValueList for <u>CurrentRecordQualityMode</u>	22
Table 14 — allowedValueRange for <u>NumberOfTracks</u>	23
Table 15 — allowedValueRange for <u>CurrentTrack</u>	23
Table 16 — allowedValueList for <u>CurrentTransportActions</u>	26
Table 17 — allowedValueList for <u>DRMState</u>	27
Table 18 — allowedValueRange for <u>SyncOffset</u>	28
Table 19 — allowedValueList for <u>A_ARG_TYPE_SeekMode</u>	28
Table 20 — Format of <u>A_ARG_TYPE_SeekTarget</u>	29
Table 21 — allowedValueList for <u>A_ARG_TYPE_PlaylistStep</u>	31
Table 22 — allowedValueList for <u>A_ARG_TYPE_PlaylistType</u>	31
Table 23 — Event Moderation	36
Table 24 — Actions.....	39
Table 25 — Arguments for <u>SetAVTransportURI()</u>	41
Table 26 — Error Codes for <u>SetAVTransportURI()</u>	42
Table 27 — Arguments for <u>SetNextAVTransportURI()</u>	43
Table 28 — Error Codes for <u>SetNextAVTransportURI()</u>	44
Table 29 — Arguments for <u>GetMediaInfo()</u>	44
Table 30 — Error Codes for <u>GetMediaInfo()</u>	45
Table 31 — Arguments for <u>GetMediaInfo Ext()</u>	45
Table 32 — Error Codes for <u>GetMediaInfo Ext()</u>	45
Table 33 — Arguments for <u>GetTransportInfo()</u>	46
Table 34 — Error Codes for <u>GetTransportInfo()</u>	46
Table 35 — Arguments for <u>GetPositionInfo()</u>	46
Table 36 — Error Codes for <u>GetPositionInfo()</u>	47
Table 37 — Arguments for <u>GetDeviceCapabilities()</u>	47
Table 38 — Error Codes for <u>GetDeviceCapabilities()</u>	47
Table 39 — Arguments for <u>GetTransportSettings()</u>	47
Table 40 — Error Codes for <u>GetTransportSettings()</u>	48
Table 41 — Arguments for <u>Stop()</u>	48

Table 42 — Error Codes for <u>Stop()</u>	49
Table 43 — Arguments for <u>Play()</u>	49
Table 44 — Error Codes for <u>Play()</u>	50
Table 45 — Arguments for <u>Pause()</u>	51
Table 46 — Error Codes for <u>Pause()</u>	51
Table 47 — Arguments for <u>Record()</u>	51
Table 48 — Error Codes for <u>Record()</u>	52
Table 49 — Arguments for <u>Seek()</u>	53
Table 50 — Error Codes for <u>Seek()</u>	54
Table 51 — Arguments for <u>Next()</u>	54
Table 52 — Error Codes for <u>Next()</u>	55
Table 53 — Arguments for <u>Previous()</u>	55
Table 54 — Error Codes for <u>Previous()</u>	56
Table 55 — Arguments for <u>SetPlayMode()</u>	56
Table 56 — Error Codes for <u>SetPlayMode()</u>	57
Table 57 — Arguments for <u>SetRecordQualityMode()</u>	57
Table 58 — Error Codes for <u>SetRecordQualityMode()</u>	57
Table 59 — Arguments for <u>GetCurrentTransportActions()</u>	58
Table 60 — Error Codes for <u>GetCurrentTransportActions()</u>	58
Table 61 — Arguments for <u>GetDRMState()</u>	58
Table 62 — Error Codes for <u>GetDRMState()</u>	58
Table 63 — Arguments for <u>GetStateVariables()</u>	59
Table 64 — Error Codes for <u>GetStateVariables()</u>	59
Table 65 — Arguments for <u>SetStateVariables()</u>	60
Table 66 — Error Codes for <u>SetStateVariables()</u>	60
Table 67 — Arguments for <u>GetSyncOffset()</u>	60
Table 68 — Error Codes for <u>GetSyncOffset()</u>	61
Table 69 — Arguments for <u>SetSyncOffset()</u>	61
Table 70 — Error Codes for <u>SetSyncOffset()</u>	61
Table 71 — Arguments for <u>AdjustSyncOffset()</u>	62
Table 72 — Error Codes for <u>AdjustSyncOffset()</u>	62
Table 73 — Arguments for <u>SyncPlay()</u>	63
Table 74 — Error Codes for <u>SyncPlay()</u>	64
Table 75 — Arguments for <u>SyncStop()</u>	65
Table 76 — Error Codes for <u>SyncStop()</u>	65
Table 77 — Arguments for <u>SyncPause()</u>	66
Table 78 — Error Codes for <u>SyncPause()</u>	66
Table 79 — Arguments for <u>SetStaticPlaylist()</u>	67
Table 80 — Error Codes for <u>SetStaticPlaylist()</u>	68
Table 81 — Arguments for <u>SetStreamingPlaylist()</u>	68
Table 82 — Error Codes for <u>SetStreamingPlaylist()</u>	69
Table 83 — Arguments for <u>GetPlaylistInfo()</u>	69
Table 84 — Error Codes for <u>GetPlaylistInfo()</u>	70

Table 85 — Common Error Codes	71
Table B.1 — Allowed AVTransportURIs	99
Table B.2 — Example mappings of resources type to track sequences.....	100
Table B.3 — Example seek modes, play modes and transport actions, per resource type.....	101

List of Figures

Figure B.1 — <u>TransportState</u> Transitions - INFORMATIVE	97
Figure B.2 — <u>SyncPlay()</u> with past presentation time	110
Figure B.3 — <u>SyncPlay()</u> with future presentation time.....	111
Figure B.4 — <u>SyncPlay()</u> with future presentation time and reference positioning	112