

ISO/IEC 29341-4-13:2011-09 (E)

Information technology - UPnP Device Architecture - Part 4-13: Audio Video Device Control Protocol - Level 2 - Rendering Control Service

Contents

Page

1	Overview and Scope.....	6
1.1	Introduction	6
1.2	Multi-input Devices	6
1.3	Notation	6
1.3.1	Data Types	7
1.3.2	Strings Embedded in Other Strings.....	7
1.3.3	Extended Backus-Naur Form.....	8
1.4	Derived Data Types	8
1.4.1	Comma Separated Value (CSV) Lists	8
1.5	Management of XML Namespaces in Standardized DCPs.....	9
1.5.1	Namespace Prefix Requirements.....	12
1.5.2	Namespace Names, Namespace Versioning and Schema Versioning.....	13
1.5.3	Namespace Usage Examples	15
1.6	Vendor-defined Extensions	15
1.6.1	Vendor-defined Action Names	15
1.6.2	Vendor-defined State Variable Names	16
1.6.3	Vendor-defined XML Elements and attributes	16
1.6.4	Vendor-defined Property Names.....	16
1.7	References.....	16
2	Service Modeling Definitions.....	19
2.1	Service Type	19
2.2	State Variables.....	20
2.2.1	<u>LastChange</u>	23
2.2.2	<u>PresetNameList</u>	24
2.2.3	<u>Brightness</u>	24
2.2.4	<u>Contrast</u>	25
2.2.5	<u>Sharpness</u>	25
2.2.6	<u>RedVideoGain</u>	25
2.2.7	<u>GreenVideoGain</u>	25
2.2.8	<u>BlueVideoGain</u>	25
2.2.9	<u>RedVideoBlackLevel</u>	25
2.2.10	<u>GreenVideoBlackLevel</u>	25
2.2.11	<u>BlueVideoBlackLevel</u>	26
2.2.12	<u>ColorTemperature</u>	26
2.2.13	<u>HorizontalKeystone</u>	26
2.2.14	<u>VerticalKeystone</u>	26
2.2.15	<u>Mute</u>	27
2.2.16	<u>Volume</u>	27
2.2.17	<u>VolumeDB</u>	27
2.2.18	<u>Loudness</u>	28
2.2.19	<u>A_ARG_TYPE_Channel</u>	28
2.2.20	<u>A_ARG_TYPE_InstanceID</u>	29
2.2.21	<u>A_ARG_TYPE_PresetName</u>	29
2.2.22	<u>A_ARG_TYPE_DeviceUDN</u>	29
2.2.23	<u>A_ARG_TYPE_ServiceType</u>	29

2.2.24	<u>A_ARG_TYPE_ServiceID</u>	29
2.2.25	<u>A_ARG_TYPE_StateVariableValuePairs</u>	29
2.2.26	<u>A_ARG_TYPE_StateVariableList</u>	30
2.2.27	Relationships between State Variables	30
2.3	Eventing and Moderation	31
2.3.1	Event Model	32
2.4	Actions	32
2.4.1	<u>ListPresets()</u>	34
2.4.2	<u>SelectPreset()</u>	34
2.4.3	<u>GetBrightness()</u>	35
2.4.4	<u>SetBrightness()</u>	35
2.4.5	<u>GetContrast()</u>	36
2.4.6	<u>SetContrast()</u>	36
2.4.7	<u>GetSharpness()</u>	37
2.4.8	<u>SetSharpness()</u>	37
2.4.9	<u>GetRedVideoGain()</u>	38
2.4.10	<u>SetRedVideoGain()</u>	38
2.4.11	<u>GetGreenVideoGain()</u>	39
2.4.12	<u>SetGreenVideoGain()</u>	39
2.4.13	<u>GetBlueVideoGain()</u>	40
2.4.14	<u>SetBlueVideoGain()</u>	40
2.4.15	<u>GetRedVideoBlackLevel()</u>	41
2.4.16	<u>SetRedVideoBlackLevel()</u>	41
2.4.17	<u>GetGreenVideoBlackLevel()</u>	42
2.4.18	<u>SetGreenVideoBlackLevel()</u>	42
2.4.19	<u>GetBlueVideoBlackLevel()</u>	43
2.4.20	<u>SetBlueVideoBlackLevel()</u>	43
2.4.21	<u>GetColorTemperature()</u>	44
2.4.22	<u>SetColorTemperature()</u>	44
2.4.23	<u>GetHorizontalKeystone()</u>	45
2.4.24	<u>SetHorizontalKeystone()</u>	45
2.4.25	<u>GetVerticalKeystone()</u>	46
2.4.26	<u>SetVerticalKeystone()</u>	46
2.4.27	<u>GetMute()</u>	47
2.4.28	<u>SetMute()</u>	47
2.4.29	<u>GetVolume()</u>	48
2.4.30	<u>SetVolume()</u>	48
2.4.31	<u>GetVolumeDB()</u>	49
2.4.32	<u>SetVolumeDB()</u>	49
2.4.33	<u>GetVolumeDBRange()</u>	50
2.4.34	<u>GetLoudness()</u>	51
2.4.35	<u>SetLoudness()</u>	51
2.4.36	<u>GetStateVariables()</u>	52
2.4.37	<u>SetStateVariables()</u>	53
2.4.38	Relationships Between Actions	53
2.4.39	Common Error Codes	54
2.5	Theory of Operation	54
2.5.1	Multi-input Devices	54
2.5.2	Presets	56

2.5.3	Controlling the Display of Visual Content	56
2.5.4	Controlling Audio Content	56
3	XML Service Description.....	58
4	Test	73
Figure 1:	Horizontal Keystone	26
Figure 2:	Vertical Keystone	27
Figure 3:	Relationship between <u>Volume</u> and <u>VolumeDB</u>	31
Figure 4:	Virtual Instances of RCS	55
Figure 5:	6-channel Volume Control	57
Table 1-1	— EBNF Operators.....	8
Table 1-2	— CSV Examples	9
Table 1-3	— Namespace Definitions.....	11
Table 1-4	— Schema-related Information	12
Table 1-5	— Default Namespaces for the AV Specifications.....	13
Table 2-1	— State Variables	20
Table 2-2	— allowedValueRange for <u>Brightness</u>	20
Table 2-3	— allowedValueRange for <u>Contrast</u>	21
Table 2-4	— allowedValueRange for <u>Sharpness</u>	21
Table 2-5	— allowedValueRange for <u>RedVideoGain</u>	21
Table 2-6	— allowedValueRange for <u>GreenVideoGain</u>	21
Table 2-7	— allowedValueRange for <u>BlueVideoGain</u>	21
Table 2-8	— allowedValueRange for <u>RedVideoBlackLevel</u>	21
Table 2-9	— allowedValueRange for <u>GreenVideoBlackLevel</u>	21
Table 2-10	— allowedValueRange for <u>BlueVideoBlackLevel</u>	21
Table 2-11	— allowedValueRange for <u>ColorTemperature</u>	22
Table 2-12	— allowedValueRange for <u>HorizontalKeystone</u>	22
Table 2-13	— allowedValueRange for <u>VerticalKeystone</u>	22
Table 2-14	— allowedValueRange for <u>Volume</u>	22
Table 2-15	— allowedValueRange for <u>VolumeDB</u>	22
Table 2-16	— allowedValueList for <u>A_ARG_TYPE_Channel</u>	23
Table 2-17	— allowedValueList for <u>A_ARG_TYPE_PresetName</u>	23
Table 2-18	— Predefined Names of Some Common Presets	29
Table 2-19	— Event moderation	31
Table 2-20	— Actions	33
Table 2-21	— Arguments for <u>ListPresets()</u>	34
Table 2-22	— Error Codes for <u>ListPresets()</u>	34
Table 2-23	— Arguments for <u>SelectPreset()</u>	34
Table 2-24	— Error Codes for <u>SelectPreset()</u>	35
Table 2-25	— Arguments for <u>GetBrightness()</u>	35
Table 2-26	— Error Codes for <u>GetBrightness()</u>	35
Table 2-27	— Arguments for <u>SetBrightness()</u>	35

Table 2-28 — Error Codes for <u>SetBrightness()</u>	36
Table 2-29 — Arguments for <u>GetContrast()</u>	36
Table 2-30 — Error Codes for <u>GetContrast()</u>	36
Table 2-31 — Arguments for <u>SetContrast()</u>	36
Table 2-32 — Error Codes for <u>SetContrast()</u>	37
Table 2-33 — Arguments for <u>GetSharpness()</u>	37
Table 2-34 — Error Codes for <u>GetSharpness()</u>	37
Table 2-35 — Arguments for <u>SetSharpness()</u>	37
Table 2-36 — Error Codes for <u>SetSharpness()</u>	38
Table 2-37 — Arguments for <u>GetRedVideoGain()</u>	38
Table 2-38 — Error Codes for <u>GetRedVideoGain()</u>	38
Table 2-39 — Arguments for <u>SetRedVideoGain()</u>	38
Table 2-40 — Error Codes for <u>SetRedVideoGain()</u>	39
Table 2-41 — Arguments for <u>GetGreenVideoGain()</u>	39
Table 2-42 — Error Codes for <u>GetGreenVideoGain()</u>	39
Table 2-43 — Arguments for <u>SetGreenVideoGain()</u>	39
Table 2-44 — Error Codes for <u>SetGreenVideoGain()</u>	40
Table 2-45 — Arguments for <u>GetBlueVideoGain()</u>	40
Table 2-46 — Error Codes for <u>GetBlueVideoGain()</u>	40
Table 2-47 — Arguments for <u>SetBlueVideoGain()</u>	40
Table 2-48 — Error Codes for <u>SetBlueVideoGain()</u>	41
Table 2-49 — Arguments for <u>GetRedVideoBlackLevel()</u>	41
Table 2-50 — Error Codes for <u>GetRedVideoBlackLevel()</u>	41
Table 2-51 — Arguments for <u>SetRedVideoBlackLevel()</u>	41
Table 2-52 — Error Codes for <u>SetRedVideoBlackLevel()</u>	42
Table 2-53 — Arguments for <u>GetGreenVideoBlackLevel()</u>	42
Table 2-54 — Error Codes for <u>GetGreenVideoBlackLevel()</u>	42
Table 2-55 — Arguments for <u>SetGreenVideoBlackLevel()</u>	42
Table 2-56 — Error Codes for <u>SetGreenVideoBlackLevel()</u>	43
Table 2-57 — Arguments for <u>GetBlueVideoBlackLevel()</u>	43
Table 2-58 — Error Codes for <u>GetBlueVideoBlackLevel()</u>	43
Table 2-59 — Arguments for <u>SetBlueVideoBlackLevel()</u>	43
Table 2-60 — Error Codes for <u>SetBlueVideoBlackLevel()</u>	44
Table 2-61 — Arguments for <u>GetColorTemperature()</u>	44
Table 2-62 — Error Codes for <u>GetColorTemperature()</u>	44
Table 2-63 — Arguments for <u>SetColorTemperature()</u>	44
Table 2-64 — Error Codes for <u>SetColorTemperature()</u>	45
Table 2-65 — Arguments for <u>GetHorizontalKeystone()</u>	45
Table 2-66 — Error Codes for <u>GetHorizontalKeystone()</u>	45
Table 2-67 — Arguments for <u>SetHorizontalKeystone()</u>	45
Table 2-68 — Error Codes for <u>SetHorizontalKeystone()</u>	46
Table 2-69 — Arguments for <u>GetVerticalKeystone()</u>	46
Table 2-70 — Error Codes for <u>GetVerticalKeystone()</u>	46

Table 2-71 — Arguments for <u>SetVerticalKeystone()</u>	46
Table 2-72 — Error Codes for <u>SetVerticalKeystone()</u>	47
Table 2-73 — Arguments for <u>GetMute()</u>	47
Table 2-74 — Error Codes for <u>GetMute()</u>	47
Table 2-75 — Arguments for <u>SetMute()</u>	47
Table 2-76 — Error Codes for <u>SetMute()</u>	48
Table 2-77 — Arguments for <u>GetVolume()</u>	48
Table 2-78 — Error Codes for <u>GetVolume()</u>	48
Table 2-79 — Arguments for <u>SetVolume()</u>	48
Table 2-80 — Error Codes for <u>SetVolume()</u>	49
Table 2-81 — Arguments for <u>GetVolumeDB()</u>	49
Table 2-82 — Error Codes for <u>GetVolumeDB()</u>	49
Table 2-83 — Arguments for <u>SetVolumeDB()</u>	50
Table 2-84 — Error Codes for <u>SetVolumeDB()</u>	50
Table 2-85 — Arguments for <u>GetVolumeDBRange()</u>	50
Table 2-86 — Error Codes for <u>GetVolumeDBRange()</u>	51
Table 2-87 — Arguments for <u>GetLoudness()</u>	51
Table 2-88 — Error Codes for <u>GetLoudness()</u>	51
Table 2-89 — Arguments for <u>SetLoudness()</u>	51
Table 2-90 — Error Codes for <u>SetLoudness()</u>	52
Table 2-91 — Arguments for <u>GetStateVariables()</u>	52
Table 2-92 — Error Codes for <u>GetStateVariables()</u>	52
Table 2-93 — Arguments for <u>SetStateVariables()</u>	53
Table 2-94 — Error Codes for <u>SetStateVariables()</u>	53
Table 2-95 — Common Error Codes	54