This is a preview - click here to buy the full publication

ISO/IEC 29341-4-10

Edition 2.0 2011-09

INTERNATIONAL STANDARD

colour inside

Information technology – UPnP device architecture – Part 4-10: Audio Video Device Control Protocol – Level 2 – Audio Video Transport Service

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE W

ICS 35.200

ISBN 978-2-88912-680-4

This is a preview - click here to buy the full publication

CONTENTS

1 Overview and Scope....6
1.1 Introduction....6
1.2 Notation....6
1.2.1 Data Types....6
1.2.2 Strings Embedded in Other Strings....7
1.2.3 Extended Backus-Naur Form....7
1.3 Derived Data Types....8
1.3.1 Comma Separated Value (CSV) Lists....8
1.4 Management of XML Namespaces in Standardized DCPs....9
1.4.1 Namespace Prefix Requirements....12
1.4.2 Namespace Names, Namespace Versioning and Schema Versioning....13
1.4.3 Namespace Usage Examples....15
1.5 Vendor-defined Extensions....16
1.5.1 Vendor-defined Action Names....16
1.5.2 Vendor-defined State Variable Names....16
1.5.3 Vendor-defined XML Elements and attributes....16
1.5.4 Vendor-defined Property Names....16
1.6 References....16
2 Service Modeling Definitions....20
2.1 ServiceType....20
2.2 State Variables....21
2.2.1 *TransportState*....25
2.2.2 *TransportStatus*....26
2.2.3 *CurrentMediaCategory*....26
2.2.4 *PlaybackStorageMedium*....26
2.2.5 *RecordStorageMedium*....26
2.2.6 *PossiblePlaybackStorageMedia*....27
2.2.7 *PossibleRecordStorageMedia*....27
2.2.8 *CurrentPlayMode*....27
2.2.9 *TransportPlaySpeed*....27
2.2.10 *RecordMediumWriteStatus*....27
2.2.11 *CurrentRecordQualityMode*....27
2.2.12 *PossibleRecordQualityModes*....27
2.2.13 *NumberOfTracks*....28
2.2.14 *CurrentTrack*....28
2.2.15 *CurrentTrackDuration*....28
2.2.16 *CurrentMediaDuration*....29
2.2.17 *CurrentTrackMetaData*....29
2.2.18 *CurrentTrackURI*....29
2.2.19 *AVTransportURI*....29
2.2.20 *AVTransportURIMetaData*....29
2.2.21 *NextAVTransportURI*....29
2.2.22 *NextAVTransportURIMetaData*....30
2.2.23 *RelativeTimePosition*....30
2.2.24 *AbsoluteTimePosition*....30

This is a preview - click here to buy the full publication

2.2.25 *RelativeCounterPosition* 30
2.2.26 *AbsoluteCounterPosition* 31
2.2.27 *CurrentTransportActions* 31
2.2.28 *LastChange* 31
2.2.29 *DRMState* 31
2.2.30 *A_ARG_TYPE_SeekMode* 32
2.2.31 *A_ARG_TYPE_SeekTarget* 32
2.2.32 *A_ARG_TYPE_InstanceID* 33
2.2.33 *A_ARG_TYPE_DeviceUDN* 33
2.2.34 *A_ARG_TYPE_ServiceType* 33
2.2.35 *A_ARG_TYPE_ServiceID* 33
2.2.36 *A_ARG_TYPE_StateVariableValuePairs* 33
2.2.37 *A_ARG_TYPE_StateVariableList* 34
2.3 Eventing and Moderation 35
2.3.1 Event Model 35
2.4 Actions 37
2.4.1 *SetAVTransportURI()* 37
2.4.2 *SetNextAVTransportURI()* 39
2.4.3 *GetMediaInfo()* 40
2.4.4 *GetMediaInfo_Ext()* 41
2.4.5 *GetTransportInfo()* 42
2.4.6 *GetPositionInfo()* 42
2.4.7 *GetDeviceCapabilities()* 43
2.4.8 *GetTransportSettings()* 43
2.4.9 *Stop()* 44
2.4.10 *Play()* 45
2.4.11 *Pause()* 46
2.4.12 *Record()* 47
2.4.13 *Seek()* 48
2.4.14 *Next()* 50
2.4.15 *Previous()* 51
2.4.16 *SetPlayMode()* 52
2.4.17 *SetRecordQualityMode()* 53
2.4.18 *GetCurrentTransportActions()* 53
2.4.19 *GetDRMState()* 54
2.4.20 *GetStateVariables()* 55
2.4.21 *SetStateVariables()* 55
2.4.22 Common Error Codes 56
2.5 Theory of Operation 58
2.5.1 TransportState Control 58
2.5.2 Transport Settings 60
2.5.3 Navigation 60
2.5.4 AVTransportURI Concept 60
2.5.5 AVTransport Abstraction 61
2.5.6 Supporting Multiple Virtual Transports 63
2.5.7 Playlist Playback 64
3 XML Service Description 65
4 Test 78
Annex A (normative) *SetAVTransportURI()* Protocol Specifics 79

This is a preview - click here to buy the full publication

A.1 Application to HTTP Streaming 79
A.1.1 *AVTransportURI* Definition 79
A.1.2 Control Point Behavior for *SetAVTransportURI()* 79
A.1.3 Implementation of *SetAVTransportURI()* 79
A.1.4 Cleanup 79
A.2 Application to RTSP/RTP/UDP Streaming 79
A.2.1 *AVTransportURI* Definition 79
A.2.2 Control Point behavior for *SetAVTransportURI()* 80
A.2.3 Implementation of *SetAVTransportURI()* 80
A.2.4 Cleanup 80
A.2.5 Implementation of Transport Controls 81
A.3 Application to Internal Streaming 81
A.3.1 *AVTransportURI* Definition 81
A.3.2 Implementation of *SetAVTransportURI()* 81
A.3.3 Cleanup 81
A.4 Application to IEC61883 Streaming 81
A.4.1 *AVTransportURI* Definition 81
A.4.2 Implementation of *SetAVTransportURI()* 82
A.4.3 Cleanup 82
A.5 Application to Vendor-specific Streaming 82
A.5.1 *AVTransportURI* Definition 82
A.5.2 Implementation of *SetAVTransportURI()* 82
A.5.3 Cleanup 82

Figure 1: *TransportState* Transitions - INFORMATIVE 59

Table 1-1 — EBNF Operators 7
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 2-6 — State Variables 21
Table 2-7 — allowedValueList for *TransportState* 22
Table 2-8 — allowedValueList for *CurrentMediaCategory* 22
Table 2-9 — allowedValueList for *PlaybackStorageMedium* and *RecordStorageMedium* 23
Table 2-10 — allowedValueList for *CurrentPlayMode* 24
Table 2-11 — allowedValueList for *RecordMediumWriteStatus* 24
Table 2-12 — allowedValueList for *CurrentRecordQualityMode* 24
Table 2-13 — allowedValueRange for *NumberOfTracks* 24
Table 2-14 — allowedValueRange for *CurrentTrack* 24
Table 2-15 — allowedValueList for *CurrentTransportActions* 25
Table 2-16 — allowedValueList for *DRMState* 25
Table 2-17 — allowedValueList for *A_ARG_TYPE_SeekMode* 25
Table 2-18 — Format of *A_ARG_TYPE_SeekTarget* 33
Table 2-19 — Event Moderation 35

This is a preview - click here to buy the full publication

Table 2-20 — Actions 37
Table 2-21 — Arguments for *SetAVTransportURI()* 38
Table 2-22 — Error Codes for *SetAVTransportURI()* 38
Table 2-23 — Arguments for *SetNextAVTransportURI()* 39
Table 2-24 — Error Codes for *SetNextAVTransportURI()* 40
Table 2-25 — Arguments for *GetMediaInfo()* 40
Table 2-26 — Error Codes for *GetMediaInfo()* 41
Table 2-27 — Arguments for *GetMediaInfo_Ext()* 41
Table 2-28 — Error Codes for *GetMediaInfo_Ext()* 41
Table 2-29 — Arguments for *GetTransportInfo()* 42
Table 2-30 — Error Codes for *GetTransportInfo()* 42
Table 2-31 — Arguments for *GetPositionInfo()* 42
Table 2-32 — Error Codes for *GetPositionInfo()* 43
Table 2-33 — Arguments for *GetDeviceCapabilities()* 43
Table 2-34 — Error Codes for *GetDeviceCapabilities()* 43
Table 2-35 — Arguments for *GetTransportSettings()* 44
Table 2-36 — Error Codes for *GetTransportSettings()* 44
Table 2-37 — Arguments for *Stop()* 44
Table 2-38 — Error Codes for *Stop()* 45
Table 2-39 — Arguments for *Play()* 45
Table 2-40 — Error Codes for *Play()* 46
Table 2-41 — Arguments for *Pause()* 47
Table 2-42 — Error Codes for *Pause()* 47
Table 2-43 — Arguments for *Record()* 47
Table 2-44 — Error Codes for *Record()* 48
Table 2-45 — Arguments for *Seek()* 49
Table 2-46 — Error Codes for *Seek()* 50
Table 2-47 — Arguments for *Next()* 50
Table 2-48 — Error Codes for *Next()* 51
Table 2-49 — Arguments for *Previous()* 51
Table 2-50 — Error Codes for *Previous()* 52
Table 2-51 — Arguments for *SetPlayMode()* 52
Table 2-52 — Error Codes for *SetPlayMode()* 53
Table 2-53 — Arguments for *SetRecordQualityMode()* 53
Table 2-54 — Error Codes for *SetRecordQualityMode()* 53
Table 2-55 — Arguments for *GetCurrentTransportActions()* 54
Table 2-56 — Error Codes for *GetCurrentTransportActions()* 54
Table 2-57 — Arguments for *GetDRMState()* 54
Table 2-58 — Error Codes for *GetDRMState()* 54
Table 2-59 — Arguments for *GetStateVariables()* 55
Table 2-60 — Error Codes for *GetStateVariables()* 55
Table 2-61 — Arguments for *SetStateVariables()* 56
Table 2-62 — Error Codes for *SetStateVariables()* 56

This is a preview - click here to buy the full publication

Table 2-63 — Common Error Codes 57
Table 2-64 — Allowed AVTransportURIs 61
Table 2-65 — Example mappings of resources type to track sequences 62
Table 2-66 — Example seek modes, play modes and transport actions, per resource type 63

This is a preview - click here to buy the full publication

INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

Part 4-10: Audio Video Device Control Protocol – Level 2 – Audio Video Transport Service

FOREWORD

1) ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards. Their preparation is entrusted to technical committees; any ISO and IEC member body interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with ISO and IEC also participate in this preparation.

2) In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

3) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO member bodies.

4) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

5) In order to promote international uniformity, IEC and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.

6) ISO and IEC provide no marking procedure to indicate their approval and cannot be rendered responsible for any equipment declared to be in conformity with an ISO/IEC publication.

7) All users should ensure that they have the latest edition of this publication.

8) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.

9) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

10) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 29341-4-10 was prepared by UPnP Forum Steering committee[1], was adopted, under the fast track procedure, by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This International Standard replaces ISO/IEC 29341-4-10, first edition, published in 2008, and constitutes a technical revision.

The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Information technology – UPnP device architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

---

1 UPnP Forum Steering committee, UPnP Forum, 3855 SW 153rd Drive, Beaverton, Oregon 97006 USA. See also "Introduction".

This is a preview - click here to buy the full publication

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

This is a preview - click here to buy the full publication

1 Overview and Scope

1.1 Introduction

This service definition is compliant with the UPnP Device Architecture version 1.0.

This service type enables control over the transport of audio and video streams. The service type defines a common model for A/V transport control suitable for a generic user interface. It can be used to control a wide variety of disc, tape and solid-state based media devices such as CD players, VCRs and MP3 players. A minimal implementation of this service can be used to control tuners.

The service type is related to the ConnectionManager service type, which describes A/V connection setup procedures, and the ContentDirectory service, which offers meta-information about the resource stored on the media. AVTransport also offers an action to retrieve any meta-data embedded in the resource itself.

This service type does not offer *scheduled* recording.

1.2 Notation

- In this document, features are described as Required, Recommended, or Optional as follows:

  The keywords “MUST,” “MUST NOT,” “REQUIRED,” “SHALL,” “SHALL NOT,” “SHOULD,” “SHOULD NOT,” “RECOMMENDED,” “MAY,” and “OPTIONAL” in this specification are to be interpreted as described in [RFC 2119].

  In addition, the following keywords are used in this specification:

  PROHIBITED – The definition or behavior is prohibited by this specification. Opposite of REQUIRED.

  CONDITIONALLY REQUIRED – The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is REQUIRED, otherwise it is PROHIBITED.

  CONDITIONALLY OPTIONAL – The definition or behavior depends on a condition. If the specified condition is met, then the definition or behavior is OPTIONAL, otherwise it is PROHIBITED.

  These keywords are thus capitalized when used to unambiguously specify requirements over protocol and application features and behavior that affect the interoperability and security of implementations. When these words are not capitalized, they are meant in their natural-language sense.
- Strings that are to be taken literally are enclosed in “double quotes”.
- Words that are emphasized are printed in *italic*.
- Keywords that are defined by the UPnP AV Working Committee are printed using the *forum* character style.
- Keywords that are defined by the UPnP Device Architecture specification are printed using the **arch** character style [DEVICE].
- A double colon delimiter, “::”, signifies a hierarchical parent-child (parent::child) relationship between the two objects separated by the double colon. This delimiter is used in multiple contexts, for example: Service::Action(), Action()::Argument, parentProperty::childProperty.

This is a preview - click here to buy the full publication

1.6 References

This clause lists the normative references used in the UPnP AV specifications and includes the tag inside square brackets that is used for each such reference:

This is a preview - click here to buy the full publication

[AVARCH] – *AVArchitecture:1*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-AVArchitecture-v1-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-AVArchitecture-v1.pdf.

[AVDT] – *AV DataStructure Template:1*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-AVDataStructure-v1-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-AVDataStructure-v1.pdf.

[AVDT-XSD] – XML Schema for UPnP AV Datastructure Template:1, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/avdt-v1-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/avdt-v1.xsd.

[AV-XSD] – *XML Schema for UPnP AV Common XML Data Types*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/av-v2-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/av-v2.xsd.

[AVS-XSD] – *XML Schema for UPnP AV Common XML Structures*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/avs-v2-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/avs-v2.xsd.

[AVT] – *AVTransport:2*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-AVTransport-v2-Service-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-AVTransport-v2-Service.pdf.

[AVT-EVENT-XSD] – *XML Schema for AVTransport:2 LastChange Eventing*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/avt-event-v2-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/avt-event-v2.xsd.

[CDS] – *ContentDirectory:3*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-ContentDirectory-v3-Service-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-ContentDirectory-v3-Service.pdf.

[CDS-EVENT-XSD] – XML Schema for ContentDirectory:3 LastChange Eventing, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/cds-event-v1-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/cds-event-v1.xsd.

[CM] – *ConnectionManager:2*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-ConnectionManager-v2-Service-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-ConnectionManager-v2-Service.pdf.

[DC-XSD] – XML Schema for UPnP AV Dublin Core. Available at: http://www.dublincore.org/schemas/xmls/simpledc20020312.xsd.

[DC-TERMS] – DCMI term declarations represented in XML schema language. Available at: http://www.dublincore.org/schemas/xmls.

[DEVICE] – *UPnP Device Architecture, version 1.0*, UPnP Forum, July 20, 2006. Available at: http://www.upnp.org/specs/architecture/UPnP-DeviceArchitecture-v1.0-20060720.htm. Latest version available at: http://www.upnp.org/specs/architecture/UPnP-DeviceArchitecture-v1.0.htm.

[DIDL] – ISO/IEC CD 21000-2:2001**,** Information Technology - Multimedia Framework - Part 2: Digital Item Declaration, July 2001.

This is a preview - click here to buy the full publication

[DIDL-LITE-XSD] – XML Schema for ContentDirectory:3 Structure and Metadata (DIDL-Lite), UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/didl-lite-v2-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/didl-lite-v2.xsd.

[EBNF] – ISO/IEC 14977, Information technology - Syntactic metalanguage - Extended BNF, December 1996.

[HTTP/1.1] – *HyperText Transport Protocol – HTTP/1.1*, R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, June 1999. Available at: http://www.ietf.org/rfc/rfc2616.txt.

IEC 61883] – IEC 61883 Consumer Audio/Video Equipment – Digital Interface - Part 1 to 5. Available at: http://www.iec.ch.

[IEC-PAS 61883] – IEC-PAS 61883 Consumer Audio/Video Equipment – Digital Interface - Part 6. Available at: http://www.iec.ch.

[ISO 8601] – Data elements and interchange formats – Information interchange -- Representation of dates and times, International Standards Organization, December 21, 2000. Available at: ISO 8601:2000.

[MIME] – IETF RFC 1341, MIME (Multipurpose Internet Mail Extensions), N. Borenstein, N. Freed, June 1992. Available at: http://www.ietf.org/rfc/rfc1341.txt.

[MR] – *MediaRenderer:2*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-MediaRenderer-v2-Device-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-AV-MediaRenderer-v2-Device.pdf.

[MS] – *MediaServer:3*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-MediaServer-v3-Device-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-AV-MediaServer-v3-Device.pdf.

[RCS] – *RenderingControl:2*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-RenderingControl-v2-Service-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-RenderingControl-v2-Service.pdf.

[RCS-EVENT-XSD] –XML Schema for RenderingControl:2 LastChange Eventing, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/rcs-event-v1-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/rcs-event-v1.xsd.

[RFC 1738] – *IETF RFC 1738*, *Uniform Resource Locators (URL)*, Tim Berners-Lee, et. Al., December 1994. Available at: http://www.ietf.org/rfc/rfc1738.txt.

[RFC 2045] – IETF RFC 2045, Multipurpose Internet Mail Extensions (MIME) Part 1:Format of Internet Message Bodies, N. Freed, N. Borenstein, November 1996. Available at: http://www.ietf.org/rfc/rfc2045.txt.

[RFC 2119] – IETF RFC 2119, Key words for use in RFCs to Indicate Requirement Levels, S. Bradner, 1997. Available at: http://www.faqs.org/rfcs/rfc2119.html.

[RFC 2396] – IETF RFC 2396, Uniform Resource Identifiers (URI): Generic Syntax, Tim Berners-Lee, et al, 1998. Available at: http://www.ietf.org/rfc/rfc2396.txt.

[RFC 3339] – *IETF RFC 3339, Date and Time on the Internet: Timestamps*, G. Klyne, Clearswift Corporation, C. Newman, Sun Microsystems, July 2002. Available at: http://www.ietf.org/rfc/rfc3339.txt.

This is a preview - click here to buy the full publication

[RTP] – *IETF RFC 1889, Realtime Transport Protocol (RTP)*, H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson, January 1996. Available at: http://www.ietf.org/rfc/rfc1889.txt.

[RTSP] – *IETF RFC 2326, Real Time Streaming Protocol (RTSP)*, H. Schulzrinne, A. Rao, R. Lanphier, April 1998. Available at: http://www.ietf.org/rfc/rfc2326.txt.

[SRS] – *ScheduledRecording:2*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/specs/av/UPnP-av-ScheduledRecording-v2-Service-20080930.pdf. Latest version available at: http://www.upnp.org/specs/av/UPnP-av-ScheduledRecording-v2-Service.pdf.

[SRS-XSD] – XML Schema for ScheduledRecording:2 Metadata and Structure, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/srs-v2-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/srs-v2.xsd.

[SRS-EVENT-XSD] – XML Schema for ScheduledRecording:2 LastChange Eventing, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/srs-event-v1-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/srs-event-v1.xsd.

[UAX 15] – Unicode Standard Annex #15, Unicode Normalization Forms, version 4.1.0, revision 25, M. Davis, M. Dürst, March 25, 2005. Available at: http://www.unicode.org/reports/tr15/tr15-25.html.

[UNICODE COLLATION] – Unicode Technical Standard #10, Unicode Collation Algorithm version 4.1.0, M. Davis, K. Whistler, May 5, 2005. Available at: http://www.unicode.org/reports/tr10/tr10-14.html.

[UPNP-XSD] – *XML Schema for ContentDirectory:3 Metadata*, UPnP Forum, September 30, 2008. Available at: http://www.upnp.org/schemas/av/upnp-v3-20080930.xsd. Latest version available at: http://www.upnp.org/schemas/av/upnp-v3.xsd.

[UTS 10] – Unicode Technical Standard #10, Unicode Collation Algorithm, version 4.1.0, revision 14, M. Davis, K. Whistler, May 5, 2005. Available at: http://www.unicode.org/reports/tr10/tr10-14.html.

[UTS 35] – Unicode Technical Standard #35, Locale Data Markup Language, version 1.3R1, revision 5,.M. Davis, June 2, 2005. Available at: http://www.unicode.org/reports/tr35/tr35-5.html.

[XML] – *Extensible Markup Language (XML) 1.0 (Third Edition)*, François Yergeau, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler, eds., W3C Recommendation, February 4, 2004. Available at: http://www.w3.org/TR/2004/REC-xml-20040204.

[XML-NS] – *The "xml:" Namespace*, November 3, 2004. Available at: http://www.w3.org/XML/1998/namespace.

[XML-XSD] – XML Schema for the "xml:" Namespace. Available at: http://www.w3.org/2001/xml.xsd.

[XML-NMSP] – *Namespaces in XML*, Tim Bray, Dave Hollander, Andrew Layman, eds., W3C Recommendation, January 14, 1999. Available at: http://www.w3.org/TR/1999/REC-xml-names-19990114.

[XML SCHEMA-1] – *XML Schema Part 1: Structures, Second Edition*, Henry S. Thompson, David Beech, Murray Maloney, Noah Mendelsohn, W3C Recommendation, 28 October 2004. Available at: http://www.w3.org/TR/2004/REC-xmlschema-1-20041028.

This is a preview - click here to buy the full publication

[XML SCHEMA-2] – *XML Schema Part 2: Data Types, Second Edition*, Paul V. Biron, Ashok Malhotra, W3C Recommendation, 28 October 2004. Available at: http://www.w3.org/TR/2004/REC-xmlschema-2-20041028.

[XMLSCHEMA-XSD] – XML Schema for XML Schema. Available at: http://www.w3.org/2001/XMLSchema.xsd.

[XPATH20] – *XML Path Language (XPath) 2.0*. Anders Berglund, Scott Boag, Don Chamberlin, Mary F. Fernandez, Michael Kay, Jonathan Robie, Jerome Simeon. W3C Recommendation, 21 November 2006. Available at: http://www.w3.org/TR/xpath20.

[XQUERY10] – *XQuery 1.0 An XML Query Language*. W3C Recommendation, 23 January 2007. Available at: http://www.w3.org/TR/2007/REC-xquery-20070123.