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

ISO/IEC 29341-17-10

Edition 1.0 2011-09

INTERNATIONAL STANDARD

colour inside

Information technology – UPnP device architecture – Part 17-10: Quality of Service Device Control Protocol – Level 3 – Quality of Service Device Service

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE X

ICS 35.200

ISBN 978-2-88912-657-6

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

CONTENTS

1 Overview and Scope....5
1.1 Referenced Specifications....5
1.1.1 Normative References....5
1.1.2 Informative References....6
2 Service Modeling Definitions....6
2.1 ServiceType....6
2.2 State Variables....7
2.2.1 XML Fragments as UPnP Arguments....7
2.2.2 A_ARG_TYPE_TrafficDescriptor....8
2.2.3 A_ARG_TYPE_TrafficDescriptorsPerInterface....8
2.2.4 A_ARG_TYPE_TrafficHandle....10
2.2.5 A_ARG_TYPE_NumTrafficDescriptors....10
2.2.6 A_ARG_TYPE_QosDeviceCapabilities....10
2.2.7 A_ARG_TYPE_QosDeviceState....11
2.2.8 PathInformation....12
2.2.9 A_ARG_TYPE_QosDeviceInfo....14
2.2.10 A_ARG_TYPE_QosStateId....14
2.2.11 A_ARG_TYPE_NumRotameterObservations....14
2.2.12 A_ARG_TYPE_RotameterInformation....15
2.2.13 A_ARG_TYPE_ConfRotameterObservations....20
2.2.14 MostRecentStreamAction....21
2.2.15 A_ARG_TYPE_MaxPossibleRotameterObservations....22
2.2.16 A_ARG_TYPE_Resource....22
2.2.17 A_ARG_TYPE_AdmitTrafficQosExtendedResult....23
2.2.18 A_ARG_TYPE_ListOfAdmittedTraffic....26
2.2.19 A_ARG_TYPE_ PreferredQph....28
2.2.20 UnexpectedStreamChange....29
2.2.21 A_ARG_TYPE_PreemptingTrafficInfo....29
2.2.22 A_ARG_TYPE_ListOfMostRecentUnexpectedStreamChanges....30
2.2.23 A_ARG_TYPE_QosDeviceExtendedState....33
2.2.24 A_ARG_TYPE_Layer2Mapping....38
2.2.25 A_ARG_TYPE_AdmitTrafficQosSucceeded....38
2.2.26 A_ARG_TYPE_TrafficDescriptorsWanted....38
2.2.27 A_ARG_TYPE_SetPreferredQphResults....38
2.2.28 A_ARG_TYPE_ NumberOfUnexpectedStreamChangesRequested....39
2.2.29 A_ARG_TYPE_ NumberOfUnexpectedStreamChangesReported....39
2.2.30 A_ARG_TYPE_NewTrafficLeaseTime....39
2.2.31 A_ARG_TYPE_TrafficDescriptorContainer....39
2.2.32 A_ARG_TYPE_Layer2MappingContainer....41
2.2.33 A_ARG_TYPE_QosDeviceInfoContainer....41
2.3 Eventing and Moderation....43
2.3.1 Event Model....43
2.4 Actions....44
2.4.1 GetQosDeviceCapabilities()....45
2.4.2 GetQosState()....46

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

2.4.3 SetupTrafficQos() 47
2.4.4 ReleaseTrafficQos() 49
2.4.5 GetPathInformation 50
2.4.6 GetQosDeviceInfo() 51
2.4.7 ConfigureRotameterObservation() 52
2.4.8 GetRotameterInformation() 53
2.4.9 AdmitTrafficQos() 54
2.4.10 UpdateAdmittedQos() 62
2.4.11 ReleaseAdmittedQos() 65
2.4.12 GetExtendedQosState() 67
2.4.13 SetPreferredQph() 68
2.4.14 GetUnexpectedStreamChanges() 70
2.4.15 VerifyTrafficHandle() 71
2.4.16 UpdateTrafficLeaseTime() 71
2.4.17 SetL2Map() 72
2.4.18 Non-Standard Actions Implemented by a UPnP Vendor 73
2.4.19 Error Code Summary 73
2.4.20 Reason Code Summary 74
2.5 Theory of Operation (Informative) 75
2.5.1 Parameterized QoS 77
2.5.2 Prioritized QoS 80
2.5.3 Hybrid QoS 81
3 XML Service Descriptions 82
4 Test 88
Annex A (informative) Additional Examples for State Variables 89
A.1 Additional *PathInformation* Examples 89
A.1.1 Sample argument XML string – PC with two network interfaces that are both end point device and bridged 89
A.1.2 Sample argument XML string –Four port Ethernet Switch 89
A.1.3 Sample argument XML string – Wireless AP with one Ethernet Interface 90
A.1.4 Sample argument XML string – Bridge device between Wireless station and Ethernet 90
A.2 Additional A_ARG_TYPE_RotameterInformation Examples 91
A.2.1 Sample argument XML string – PC with two network interfaces that are both end point devices 91
A.2.2 Sample argument XML string – PC with two network interfaces that are both end point device with TrafficImportanceNumber reporting 94
A.2.3 Sample argument XML string –Four port Ethernet Switch 95
A.2.4 Sample argument XML string – Wireless AP with one Ethernet Interface 95
A.2.5 Sample argument XML string – Bridge device between Wireless station and Ethernet 96
Annex B (normative) Template for Requirements on the QosDevice Service implementation that are specific for the underlying Network Technologies 98
B.1 <Technology Name> 98
B.1.1 References 98
B.1.2 Priority Mapping 98
B.1.3 *QosSegmentId* formation 98
B.1.4 *Layer2StreamId* representation 99

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

B.1.5 Mapping of UPnP-QoS Parameters to *<technology>* Parameters 99
B.1.6 Blocking traffic stream identification 100
B.1.7 Responsibility for QoS Setup 100
B.1.8 Mapping of *<technology>* Returned Parameters to *ProtoTspec* Parameters 101
B.1.9 Mapping of *<technology>* Returned Parameters to *AdmitTrafficQosExtendedResult and AllocatedResources* Parameters 102

Figure 2-1 — Relationship between ROPeriod and MonitorResolutionPeriod 16
Figure 2-2 — PC with Two Network Interfaces 18
Figure 2-3 — Example of a PC connected to an active network 19
Figure 2-4 — Relationship between End-to-End Delay and QoS Segment Delay 57
Figure 2-5 — Relationship between QoS Segment Delay And MaxCommittedDelay. 58
Figure 2-6 — Components of *MaxCommittedDelay* 59
Figure 2-7 — Containers and How They Nest 78
Figure A.1 — Example of a PC connected to an active network 91

Table 2-1 — State Variables 7
Table 2-2 — Reason Codes For AdmissionStatusNet 24
Table 2-3 — Reason Codes For AdmissionStatusDev 25
Table 2-4 — Containers In Which A Parameter Can Appear 34
Table 2-5 — Reason Codes For *A_ARG_TYPE_SetPreferredQphResults* 39
Table 2-6 — Event Moderation 43
Table 2-7 — Actions 45
Table 2-8 — Arguments for *GetQosDeviceCapabilities()* 45
Table 2-9 — Error Codes for *GetQosDeviceCapabilities()* 46
Table 2-10 — Arguments for *GetQosState()* 46
Table 2-11 — Error Codes for *GetQosState()* 47
Table 2-12 — Arguments for *SetupTrafficQos()* 47
Table 2-13 — Error Codes for *SetupTrafficQos()* 49
Table 2-14 — Arguments for *ReleaseTrafficQos()* 49
Table 2-15 — Error Codes for *ReleaseTrafficQos()* 50
Table 2-16 — Arguments for *GetPathInformation()* 50
Table 2-17 — Error Codes for Get*PathInformation* 50
Table 2-18 — Arguments for *GetQosDeviceInfo()* 51
Table 2-19 — Error Codes for *GetQosDeviceInfo()* 51
Table 2-20 — Arguments for *ConfigureRotameterObservation()* 52
Table 2-21 — Error Codes for *ConfigureRotameterObservation()* 53
Table 2-22 — Arguments for *GetRotameterInformation()* 53
Table 2-23 — Error Codes for *GetRotameterInformation()* 54
Table 2-24 — Arguments for *AdmitTrafficQos()* 54
Table 2-25 — Error Codes for *AdmitTrafficQos()* 61
Table 2-26 — Reason Codes for *AdmitTrafficQos()* 61
Table 2-27 — Arguments for *UpdateAdmittedQos()* 62

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

Table 2-28 — Error Codes for *UpdateAdmittedQos()* 65
Table 2-29 — Reason Codes for *UpdateAdmittedQos()* 65
Table 2-30 — Arguments for *ReleaseAdmittedQos()* 65
Table 2-31 — Error Codes for *ReleaseAdmittedQos()* 67
Table 2-32 — Arguments for *GetExtendedQosState()* 67
Table 2-33 — Error Codes for *GetExtendedQosState()* 68
Table 2-34 — Arguments for *SetPreferredQph()* 68
Table 2-35 — *SetPreferredQphResults* for *SetPreferredQph()* 69
Table 2-36 — Arguments for *GetUnexpectedStreamChanges()* 70
Table 2-37 — Error Codes for *GetUnexpectedStreamChanges()* 70
Table 2-38 — Arguments for *VerifyTrafficHandle()* 71
Table 2-39 — Error Codes for *VerifyTrafficHandle()* 71
Table 2-40 — Arguments for *UpdateTrafficLeaseTime()* 72
Table 2-41 — Error Codes for *UpdateTrafficLeaseTime()* 72
Table 2-42 — Arguments for *SetL2Map()* 73
Table 2-43 — Error Codes for *SetL2Map()* 73
Table 2-44 — Error Code Summary 73
Table 2-45 — Common Reason Codes 75
Table 2-46 — Actions in Version 3 and Version 2 76
Table 2-47 — State Variables in Version 3 and Version 2 77
Table B.1 — Priority Mapping 98
Table B.2 — Traffic Specification Parameters 100
Table B.3 — ProtoTspec Parameters 102
Table B.4 — AllocatedResources Parameters 103

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

INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

Part 17-10: Quality of Service Device Control Protocol – Level 3 – Quality of Service Device 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 29341-17-10 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.

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

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

This service-type enables modeling of the 'QosDevice' function capabilities. The QosDevice:3 Service is a function typically implemented in source, sink and intermediate network. The *QosDevice* Service is responsible for providing the appropriate network resources to traffic streams and information about the state of the device as requested by the QosManager as defined in the QosManager:3 Service. [QM]

Several L2 Technologies were considered during the design of UPnP-QoS v3. These technologies are described in UPnP QosDevice:3 Underlying Technology Interface Addendum [QD_Add] . Every attempt was made to ensure that the design of version 3 would accommodate other L2 Technologies as well. Each L2 Technology on which UPnP-QoS version 3 is implemented is recommended to have a document that is compliant to the template in Annex B which specifies how the L2 Technology defines certain state variables, maps parameters, etc.

This document does not address the procedures for end-to-end set up of a new traffic stream or end-to-end revocation of an existing traffic stream. This procedure is defined in the UPnP QosManager:3 Service Document [QM] .

1.1 Referenced Specifications

Unless explicitly stated otherwise herein, implementation of the mandatory provisions of any standard referenced by this specification shall be mandatory for compliance with this specification.

1.1.1 Normative References

This clause lists the normative references used in this document and includes the tag inside square brackets that is used for each sub reference:

[Annex_G] – IEEE 802.1D-2004, Annex G, IEEE Standard for Information technology - Telecommunications and information exchange between systems - IEEE standard for local and metropolitan area networks - Common specifications - Media access control (MAC) Bridges, 2004.

[XML] – *Extensible Markup Language (XML) 1.0 (Second Edition)*, T. Bray, J. Paoli, C. M. Sperberg-McQueen, E. Maler, eds. W3C Recommendations, 6 October 2000.

[QM] – UPnP QosManager:3 Service Document: This reference is informative except for the definitions of the following state variables, which are normative: *A_ARG_TYPE_TrafficDescriptor*, *A_ARG_TYPE_NumTrafficDescriptors* and *A_ARG_TYPE_TrafficHandle*.
Available at: http://www.upnp.org/specs/qos/UPnP-qos-QosManager-v3-Service-20081130.pdf
Latest version available at: http://www.upnp.org/specs/qos/UPnP-qos-QosManager-v3-Service.pdf

[QPH] - *UPnP QosPolicyHolder:3* Service Document
Available at: http://www.upnp.org/specs/qos/UPnP-qos-QosPolicyHolder-v3-Service-20081130.pdf
Latest version available at: http://www.upnp.org/specs/qos/UPnP-qos-QosPolicyHolder-v3-Service.pdf

[DEVICE] - *UPnP Device Architecture, version 1.0*.

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

[RFC3339] – Date and Time on the Internet: Timestamps, G. Klyne, July 2002. http://www.ietf.org/rfc/rfc3339.txt

[IANA] - IANA Interface Type (IANAifType)-MIB http://www.iana.org/assignments/ianaiftype-mib

[QD_Add] –*UPnP QosDevice:3* Underlying Technology Interface Addendum Available at: http://www.upnp.org/specs/qos/UPnP-qos-QosDevice-v3-Addendum-20081130.pdf
Latest version available at: http://www.upnp.org/specs/qos/UPnP-qos-QosDevice-v3-Addendum.pdf

1.1.2 Informative References

This clause lists the informative references used in this document and includes the tag inside square brackets that is used for each sub reference:

[QoS Architecture] – *UPnP QoS Architecture V3.0* Available at: http://www.upnp.org/specs/qos/UPnP-qos-Architecture-v3-20081130.pdf
Latest version available at: http://www.upnp.org/specs/qos/UPnP-qos-Architecture-v3.pdf

[HomePlug AV] – HomePlug AV Specification, version 1.1.00, Homeplug Powerline Alliance, www.HomePlug.org.

[MoCA1.0] MoCA MAC/PHY SPECIFICATION v1.0, 2006.

[MoCA1.1] MoCA MAC/PHY SPECIFICATION v1.1 EXTENSIONS. 2007.

[IEEE802.3] – IEEE Standard for Information technology— Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications IEEE Std 802.3™-2005. http://standards.ieee.org/getieee802/802.3.html

[IEEE11] - 802.11-2007 IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks— Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications http://shop.ieee.org/ieeestore/Product.aspx?product_no=SS95708

[DSCP] - IETF RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers, K. Nichols et al., December 1998. Available at: http://www.ietf.org/rfc/rfc2474.txt