ISO/IEC 29341-10-11

INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture –
Part 10-11: Quality of Service Device Control Protocol – Quality of Service Manager Service

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The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Universal plug and play (UPnP) 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.

ORIGINAL UPNP DOCUMENTS
(informative)

Reference may be made in this document to original UPnP documents. These references are retained in order to maintain consistency between the specifications as published by ISO/IEC and by UPnP Implementers Corporation. The following table indicates the original UPnP document titles and the corresponding part of ISO/IEC 29341:

UPnP Document Title	ISO/IEC 29341 Part
UPnP Device Architecture 1.0	ISO/IEC 29341-1
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1
UPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
UPnP AVTransport:1 Service	ISO/IEC 29341-3-10
UPnP ConnectionManager:1 Service	ISO/IEC 29341-3-11
UPnP ContentDirectory:1 Service	ISO/IEC 29341-3-12
UPnP RenderingControl:1 Service	ISO/IEC 29341-3-13
UPnP MediaRenderer:2 Device	ISO/IEC 29341-4-2
UPnP MediaServer:2 Device	ISO/IEC 29341-4-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
UPnP DigitalSecurityCamera:1 Device	ISO/IEC 29341-5-1
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UPnP DigitalSecurityCameraStillImage:1 Service	ISO/IEC 29341-5-12
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UPnP HVAC_ZoneThermostat:1 Device	ISO/IEC 29341-6-2
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UPnP HVAC_SetpointSchedule:1 Service	ISO/IEC 29341-6-14
UPnP TemperatureSensor:1 Service	ISO/IEC 29341-6-15
UPnP TemperatureSetpoint:1 Service	ISO/IEC 29341-6-16
UPnP HVAC_UserOperatingMode:1 Service	ISO/IEC 29341-6-17
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UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
UPnP QoS Architecture:2	ISO/IEC 29341-11-1
UPnP QOS v2 Schema Files	ISO/IEC 29341-11-2

UPnP Document Title	ISO/IEC 29341 Part
UPnP QosDevice:2 Service	ISO/IEC 29341-11-10
UPnP QosManager:2 Service	ISO/IEC 29341-11-11
UPnP QosPolicyHolder:2 Service	ISO/IEC 29341-11-12
UPnP RemoteUIClientDevice:1 Device	ISO/IEC 29341-12-1
UPnP RemoteUIServerDevice:1 Device	ISO/IEC 29341-12-2
UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11

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816d37795f61/iso-iec-29341-10-11-2008

1.   Overview and Scope

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

This service-type enables modeling of 'Quality of Service Manager' function capabilities. QosManager function is a combination of QosManager service and a control point functionality that discovers and controls QosDevice and QosPolicyHolder services running on the network. QosManager function is responsible for requesting, updating, releasing and in general controlling the Quality of Service assigned by networking devices to various traffic streams. The QosManager service will be invoked from a UPnP Control Point to perform the functions related to setting up Quality of Service for that traffic. Once the network is configured with respect to the Quality of Service for the upcoming traffic stream, the QosManager service will hand back control to the control point. This service provides a mechanism for Control Points to:

- Be agnostic of the Quality of Service capabilities and associated details about the various devices on the network.

- Hand-over the tasks of setting up, modifying and revoking the Quality of Service associated with every traffic stream

- Hand-over the task of control point functionality with respect to the UPnP QosDevice service – its discovery, control and eventing.

- Hand-over the task of control point functionality with respect to the UPnP QosPolicyHolder service – its discovery, control and eventing.

Thus, a QosManager is a dual-role entity in the sense that it exposes QosManager service to the Control Point while acting as a Control Point for the QosPolicyHolder and QosDevice services running on the network. This document describes the components of the UPnP QosManager service.

- This service template does not address:

The control point functionality within a QosManager. However, useful information about the control point functionality in the QosManager can be found in the following documents:

- UPnP QoS Architecture document
- UPnP QosDevice Service Definition Document
- UPnP QosPolicyHolder Service Definition Document

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.

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

[IEEE] - 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.

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

[POLICY HOLDER] – UPnP QosPolicyHolder:1 Service Document.

[QOS DEVICE] – UPnP QosDevice:1 Service Document.

2. Service Modeling Definitions

2.1. ServiceType

The following service type identifies a service that is compliant with this template:

xmlns="urn:schemas-upnp-org:service:QosManager:1"

xmlns=http://www.upnp.org/schemas/TrafficDescriptorv1.xsd

2.2. State Variables

Reader Note: For first-time reader, it may be more insightful to read the action definitions before reading the state variable definitions.

2.2.1.1. XML Fragments as UPnP Arguments

The UPnP QoS Framework often uses XML Fragments as arguments in UPnP actions. The containing UPnP data type is a string. This places restrictions on a string's content; it has to represent a well-formed XML fragment (this includes a complete XML document).

The XML schemas used in UPnP-QoS are defined in the respective files located on `http://www.upnp.org/schemas/`

In their XML fragments, implementations may use an explicit reference to appropriate name spaces.

At several places in the XML schemas there is room for vendor differentiation through the use of the "any"-tag. When extending UPnP-QoS with their own XML tags, vendors should use a name space to prevent collisions of their tags with those of other vendors. It is recommended that implementations are not required to retrieve the corresponding schemas from the Internet.

Finally, an XML fragment, in adherence to the UPnP Device Architecture 1.0 [DEVICE] , needs to be escaped by using the normal XML rules, [XML] Section 2.4 Character Data and Markup, before embedding it in a SOAP request or response message. The XML escaping rules are summarized from the [XML] reference mentioned above:

- The (<) character is encoded as (<)
- The (>) character is encoded as (>)
- The (&) character is encoded as (&)
- The (") character is encoded as (")
- The (') character is encoded as (')

Table 2-1: State Variables

Variable Name	Req. or Opt.[1]	Data Type	Allowed Value [2]	Default Value [2]	Eng. Units
A_ARG_TYPE_TrafficDescriptor	R	string	Escaped XML fragment of trafficDescriptor Schema (See Appendix A for details).	n/a	n/a
A_ARG_TYPE_TrafficHandle	R	string		n/a	n/a
A_ARG_TYPE_NumTrafficDescriptors	R	integer	Non-negative integer.	n/a	n/a
A_ARG_TYPE_NumPolicyHolders	R	integer	Non-negative integer.	n/a	n/a
A_ARG_TYPE_ ListOfTrafficDescriptors	R	string	Escaped XML fragment	n/a	n/a

[1] R = Required, O = Optional, X = Non-standard.

[2] Values listed in this column are required. To specify standard optional values or to delegate assignment of values to the vendor, you must reference a specific instance of an appropriate table below.

2.2.2. A_ARG_TYPE_TrafficDescriptor

This state variable contains information about a particular traffic stream. A Traffic Descriptor consists of an XML structure consisting of:

- TrafficHandle
- TrafficID
- AvailableOrderedTspecList
- QosBoundarySourceAddress
- TrafficImportanceNumber
- QosBoundaryDestinationAddress
- UserName
- CpName
- VendorApplicationName
- PortName
- ServiceProviderServiceName
- TrafficLeaseTime

Please refer to the detailed TrafficDescriptor XML schema in Appendix A. Here are some details about information in Traffic Descriptor:

Tspec

Tspec contains a description of Content QoS Requirements. Tspec is represented in the form of a XML structure. In UPnP AV scenario, this information is extracted from the Content Directory Service of the Media Server. In the Content Directory Service, Tspec is represented either as a string containing escaped XML structure, or an URI pointing to the escaped XML structure. UPnP AV Control Point uses CDS:Browse and/or CDS:Search action calls to acquire the Tspec(s) associated with the content and creates an AvailableOrderedTspecList field in the Traffic Descriptor.

Tspec XML structure consists of the following:

- TspecIndex: Unique numerical index associated with a particular Tspec. The value of Tspecindex indicates preference (as defined by the application or the end user). A Tspec with smaller Index is more preferred compared to a Tspec with larger Index.
- AVTransportURI: This string field contains a unique URI associated with the UPnP AV content item for which QoS is being requested.

❑ AVTransportInstanceID: This integer field contains a unique Instance ID associated with the UPnP AV Transport service associated with the content item for which QoS is being requested.

❑ TrafficClass: The traffic class associated with the traffic stream. This is an enumerated variable that can be assigned to one of the following list of values:
  o Network Control
  o Streaming Control
  o Voice
  o AV
  o Data
  o Audio
  o Image
  o Gaming
  o Other
  o Background

TspecIndex must be filled in by the Control Point. Other Tspec parameters may be omitted if they are not known. TspecIndexs need not be consecutive numbers. The Tspec with lower TspecIndex is more preferred than a higher TspecIndex. In this example, the Tspec with 2 is more preferred than that with 300. The order of Tspec structures in the AvailableOrderedTspecList is not relevant. All Tspecs must have unique TspecIndex value within an AvailableOrderedTspecList.

```
<AvailableOrderedTspecList>
    <Tspec>
        <TspecIndex>300</TspecIndex>
        <TrafficClass>AV</TrafficClass>
    </Tspec>
    <Tspec>
        <TspecIndex>2</TspecIndex>
        <TrafficClass>Audio</TrafficClass>
    </Tspec>
</AvailableOrderedTspecList>
```

TrafficHandle

TrafficHandle is a unique identifier associated with a particular instance of TrafficDescriptor; i.e. a particular traffic stream. It is a unique string generated by the QosManager and provided to the Control Point in response to the RequestTrafficQos action. The QosManager must insure that the generated Traffic Handle string is unique for all Traffic Descriptors on the network. In all subsequent communication between the CP and the QosManager service, TrafficHandle is used to reference a particular traffic stream.

AvailableOrderedTspecList

Contains one or more Tspec components. The Tspec index reflects the order of preference. Tspecs with smaller index values are more preferred. AvailableOrderedTspecList is required. A Tspec may be defined via any combination of its components.

ActiveTspecIndex

Active TspecIndex contains an integer which indicates the index of the current active Tspec from the TspecList. Tspec and Tspec List are defined above.

QosBoundarySourceAddress

If a traffic stream originates outside the home network (e.g. on the Internet), the CP application must provide the QoS boundary point IP address. This address will be treated as the QoS termination point for UPnP QoS. Optional, because it is applicable only to traffic streams originating outside the home network. It should be noted that this address is not part of traffic identifier, because the IP packets will carry the IP address of the actual source address. QosBoundarySourceAddress is used by QosManager for decisions related to path determination and device selection.