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Information technology – OFnA Device Architecture VIEW Part 11-1: Quality of Service Device Control Protocol – Level 2 – Quality of Service Architecture

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INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

Part 11-1: Quality of Service Device Control Protocol – Level 2 – Quality of Service Architecture

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5 956 487 / US; 6 170 007 / US; 6 <u>1739/177 L/US;161529:9368</u>/ US; 6 470 339 / US; 6 571 388 / US; 6 205 466 / US https://standards.iteh.ai/catalog/standards/sist/27696ee9-c140-4c42-9097on mou/be_obtained_from: 080335ac9b83/iso-iec-29341-11-1-2008

Information may be obtained from:

Hewlett Packard Company 1501 Page Mill Road USA – Palo Alto, CA 94304

Samsung Electronics Co. Ltd. has informed IEC and ISO that it has patent applications or granted patents.

Information may be obtained from:

Digital Media Business, Samsung Electronics Co. Ltd. 416 Maetan-3 Dong, Yeongtang-Gu, KR – Suwon City 443-742

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 29341-11-1 was prepared by UPnP Implementers Corporation and adopted, under the PAS procedure, by joint technical committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

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

LIDeD Device Architecture 1.0	
UPhP Device Architecture 1.0	150/IEC 29341-1
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1
LIPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
Upp Media Convert Device	
	150/IEC 29341-3-3
UPhP AV Transport: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
UDnD MediaDenderor:2 Device	ISO/IEC 20041 4 2
	130/IEC 29341-4-2
UPhP 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
LIPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
	150/IEC 29341-4-13
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
UPnP DigitalSecurityCamera:1 Device	ISO/IEC 29341-5-1
UPnP DigitalSecurityCameraMotionImage:1 Service	ISO/IEC 29341-5-10
UPnP DigitalSecurityCameraSettings1 Service	ISO/IEC 29341-5-11
	ISO/IEC 20241 5 12
UP IP Digital Security Camera Stillin mage. I Service	150/IEC 29341-5-12
UPNP HVAC_System 1 Device	ISO/IEC 29341-6-1
UPnP HVAC_ZoneThermostat:1 Device	ISØ/IEC 29341-6-2
UPnP ControlValve:1 Service	ISO/IEC 29341-6-10
UPnP HVAC FanOperatingMode: 1 Service 11 1:2008	ISO/IEC 29341-6-11
IIPnP FanSpeed:1 Service	ISO/IEC 203/1-6-12
https://standards.iteb.al/catalog/standards/sist/27696e	e
UP P House Status: I Service	150/IEC 29341-6-13
UPnP HVAC_SetpointSchedule:1-Service-29341-11-1-	-4SO/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
Uppp Binanyl ight:1 Dovice	ISO/IEC 20041 7 1
	130/IEC 29341-7-1
UPnP DimmableLight:1 Device	ISO/IEC 29341-7-2
UPnP Dimming:1 Service	ISO/IEC 29341-7-10
UPnP SwitchPower:1 Service	ISO/IEC 29341-7-11
UPnP InternetGatewayDevice 1 Device	ISO/IEC 29341-8-1
	ISO/IEC 203/1-8-2
	100/100 20044 0.2
UPhP wandevice: I Device	150/IEC 29341-8-3
UPnP WANConnectionDevice:1 Device	ISO/IEC 29341-8-4
UPnP WLANAccessPointDevice:1 Device	ISO/IEC 29341-8-5
UPnP LANHostConfigManagement:1 Service	ISO/IEC 29341-8-10
UPnP Laver3Forwarding:1 Service	ISO/IEC 29341-8-11
UDnD LinkAuthentiestien:1 Service	ISO/IEC 20041 0 11
	130/120 29341-0-12
UPnP RadiusClient:1 Service	ISO/IEC 29341-8-13
UPnP WANCableLinkConfig:1 Service	ISO/IEC 29341-8-14
UPnP WANCommonInterfaceConfig:1 Service	ISO/IEC 29341-8-15
UPnP WANDSLLinkConfig:1 Service	ISO/IEC 29341-8-16
UPnP WANEthernetLinkConfig 1 Service	ISO/IEC 29341-8-17
UDnD WANIDConnection:1 Service	ISO/IEC 20241 9 19
	130/IEC 29341-6-16
UPhP WANPOI SLINKCONTIG: 1 Service	ISO/IEC 29341-8-19
UPnP WANPPPConnection:1 Service	ISO/IEC 29341-8-20
UPnP WLANConfiguration:1 Service	ISO/IEC 29341-8-21
UPnP Printer:1 Device	ISO/IEC 29341-9-1
LIPnP Scanner: 1 0 Device	ISO/IEC 29341-9-2
Upp External Activity 1 Sancias	100/12020071-0-2
	100/100 20244 0 40
UPhP Feeder: 1.0 Service	ISO/IEC 29341-9-10
UPnP PrintBasic:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11
	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12
UPnP Scan:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13
UPnP Scan:1 Service UPnP QoS Architecture:1.0	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-9-13
UPnP Scan:1 Service UPnP QoS Architecture:1.0 UPnP QosDevice:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-10-1 ISO/IEC 29341-10-10
UPnP Scan:1 Service UPnP QoS Architecture:1.0 UPnP QosDevice:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-10-1 ISO/IEC 29341-10-10
UPnP Scan:1 Service UPnP QoS Architecture:1.0 UPnP QosDevice:1 Service UPnP QosManager:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-10-1 ISO/IEC 29341-10-11 ISO/IEC 29341-10-11
UPnP Scan:1 Service UPnP QoS Architecture:1.0 UPnP QosDevice:1 Service UPnP QosManager:1 Service UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-9-13 ISO/IEC 29341-10-1 ISO/IEC 29341-10-11 ISO/IEC 29341-10-12
UPnP Scan:1 Service UPnP QoS Architecture:1.0 UPnP QosDevice:1 Service UPnP QosManager:1 Service UPnP QosPolicyHolder:1 Service UPnP QoS Architecture:2	ISO/IEC 29341-9-10 ISO/IEC 29341-9-11 ISO/IEC 29341-9-12 ISO/IEC 29341-9-13 ISO/IEC 29341-9-13 ISO/IEC 29341-10-1 ISO/IEC 29341-10-10 ISO/IEC 29341-10-12 ISO/IEC 29341-11-1

UPnP Document Title

UPnP (QosDevice:2 Service
UPnP (QosManager:2 Service
UPnP (QosPolicyHolder:2 Service
UPnP I	RemoteUIClientDevice:1 Device
UPnP I	RemoteUIServerDevice:1 Device
UPnP I	RemoteUIClient:1 Service
UPnP I	RemoteUIServer:1 Service
UPnP I	DeviceSecurity:1 Service
UPnP \$	SecurityConsole:1 Service

ISO/IEC 29341 Part

ISO/IEC 29341-11-10
ISO/IEC 29341-11-11
ISO/IEC 29341-11-12
ISO/IEC 29341-12-1
ISO/IEC 29341-12-2
ISO/IEC 29341-12-10
ISO/IEC 29341-12-11
ISO/IEC 29341-13-10
ISO/IEC 29341-13-11

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>ISO/IEC 29341-11-1:2008</u> https://standards.iteh.ai/catalog/standards/sist/27696ee9-c140-4c42-9097-080335ac9b83/iso-iec-29341-11-1-2008

1. Glossary

Access Domain

A set of LAN or MAN stations together with interconnecting data transmission media and related equipment (e.g., connectors, repeaters), in which the LAN or MAN stations use the same MAC protocol to establish the sequence of stations that are in temporary control of the shared transmission media.

Access Priority

The Access Priority is a parameter that indicates the priority handling when accessing the communication resource. The range of access priorities is defined by the layer 2 networking technology.

AV Control Point

A Control Point that is used in an AV scenario and utilizes UPnP AV.

Best Effort

Best effort is a service of the Internet Protocol; i.e. it makes almost no guarantees about a packet other than attempting to transmit it. At the destination, the packet may arrive damaged, it may be out of order (compared to other packets sent between the same hosts), it may be duplicated, or it may be dropped entirely. If reliability is needed, it is provided by upper level protocols transported using IP.

With the introduction of IEEE 802.1D priority tagging the priority associated with untagged packets is also called "Best Effort".

Bridge

(standards.iteh.ai)

A functional unit that interconnects two or more LANs that use the same Data Link layer protocols above the MAC sublayer, but can use different MAC protocols 29341-11-1:2008

https://standards.iteh.ai/catalog/standards/sist/27696ee9-c140-4c42-9097-080335ac9b83/iso-iec-29341-11-1-2008

Hub080335ac9b83/iso-iec-29341-11-1-2008A device, with two or more physical ports, that forwards all traffic received on any individual port to all other
ports. This device is also referred to as a "repeater". In a home network, a hub connects networks segments of the
same physical medium.

IGD

Internet Gateway Device: a border device that physically connects the Home Network with a WAN. This device performs routing. QoS mechanisms associated with routing are not addressed by this architecture; the IGD may present a QosDevice interface on the Home Network.

Intermediate Device

An intermediate device is physically connected between the Source and Sink device data flow. There may be more than one intermediate device in the Source to Sink connection.

Path

A path is the physical course that traffic will flow on from source to sink. For UPnP QoS, a path must reside within a single IP subnet, but a path may comprise multiple segments.

Packet Priority

The Packet Priority is a layer 2 parameter that indicates the priority handling requested by the originating service. Typically this parameter is part of a packet header and indicates the relative importance of the packet compared to other packets. It is used to differentiate packets to determine which are given preferential access to the communication medium. This parameter is typically mapped to an Access Priority value supported by the network device.

Policy Management

A function that makes decisions on the traffic streams allowed to use network resources.

Prioritized Services

Prioritized services refer to a general methodology for providing QoS by differentiating traffic. Messages types are grouped by order of importance and assigned a priority. Message types assigned a higher priority are given preferential access to the communications medium.

Quality of Service (QoS)

The term QoS refers to a broad collection of networking capabilities and techniques. The goal of QoS is to improve the user experience of a network's ability to deliver predictable results for sensitive applications such as audio, video, and voice applications. Elements of network performance within the scope of QoS often include bandwidth (throughput), latency (delay), and error rate. There are two broad classes of QoS: data reliability and temporal reliability. Each makes different demands on network technologies. This architecture is primarily concerned with delivering temporal reliability

Router

A device, with two or more physical ports, that makes port to port traffic forwarding decisions based on layer 3 information (source and destination IP addresses).

Segment

A segment refers to a section of a network that shares a common physical medium. The boundaries of a network segment are established by devices capable of regulating the flow of traffic into and out of the segment. This includes routers, bridges, hubs, switches, and adapters (e.g., PCI, PCCard, or USB NICs). With particular relevance to UPnP QoS, a segment is typically a physically distinct portion of a larger network that is in turn defined logically by devices residing on a common IP subnet. PREVIEW

Sink Device

A Sink device provides media data receiving, playback, storage, or rendering capabilities. Some examples include TV monitors, Stereo and Home Theaters, PDAs, Wireless Monitors, DVD Recorders, and Printers. ISO/IEC 29341-11-1:2008

Source Device https://standards.iteh.ai/catalog/standards/sist/27696ee9-c140-4c42-9097-

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A Source device provides media transmission and data sourcing capabilities. Examples include STBs, PVRs, PCs, Music Servers, Broadcast Tuners and Video Imaging Capture Devices. A source device acts as the source of a traffic stream, regardless of other functions on the device.

Subnet

Subnet as defined in IETF RFC 3927 [RFC3927].

Traffic Class

The Traffic Class indicates the kind of traffic in the traffic stream. The Traffic Class is used to distinguish, for example, audio from video. The distinction is at the application layer and the Traffic Class is mapped into the applicable layer 2 representations for the technology bearing the stream. An example is the mapping in IEEE 802.1D, Annex G.

Traffic Identifier (TID)

A Traffic Identifier is a set of information that uniquely identifies a set of data packets as belonging to a traffic stream. This information is typically used by a packet classifier function to associate a Traffic Specification's QoS contract to the service provided to the Traffic stream. Other technologies may refer to this as a Filter Spec (RFC2205) or Traffic Classifier (IEEE 802.11e).

Traffic Specification (TSPEC)

A Traffic Specification contains a set of parameters that define the characteristics of the traffic stream. The TSPEC may be used to define the operating requirement for carrying the traffic stream and may define the operation of the packet scheduling function.

Traffic Stream (TS)

Traffic Stream is a unidirectional flow of data that originates at a source device and terminates at one or more sink device(s).

2. Introduction

This architecture document describes the motivation, use and interaction of the three services that comprise the UPnP QoS Framework:

- 10 -

- QosDevice
- QosPolicyHolder
- QosManager

It should be noted that while UPnP QoS defines three services (listed above), it does not define a new device type.

Since Quality of Service issues need to be solved for multiple usage scenarios, it is expected that vendors may use any UPnP device as a container for the services defined by UPnP QoS. The Control Points and QoS Management Entities must look for UPnP QoS Services embedded in all UPnP device types.

The UPnP QoS Framework is compliant with the UPnP Device Architecture version 1.0.

2.1. 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.

[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. Standards. Item.al)

[XML] – *Extensible Markup Language (XML) 1.0 (Second Edition)*, T. Bray, J.Paoli, C. M. Sperberg-McQueen, E Maler, eds. W3C Recommendations, 6 October 2009₃₄₁₋₁₁₋₁:2008

[QM] – UPnP QosManager: 2 Service Document: 080335ac9b83/iso-iec-29341-11-1-2008

[QD] – UPnP QosDevice:2 Service Document:

[QPH] – UPnP QosPolicyHolder:2 Service Document:

[AV] – UPnP AV Architecture Document V0.83

[DEVICE] - <u>UPnP Device Architecture, version 1.0</u>.

[DSCP] - <u>IETF RFC 2474</u>, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*, K. Nichols, Cisco Systems, S. Blake, Torrent Networking Technologies, F. Baker, Cisco Systems, D.Black, EMC Corporation, December 1998.

[RFC3927] IETF RFC 3927, Dynamic Configuration of IPv4 Link-Local Addresses.

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

[RFC2474] - Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers. http://www.ietf.org/rfc/rfc2474.txt