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**Information technology — UPnP  
Device Architecture —**

**Part 24-11:  
Internet gateway device control  
protocol — Level 2 — Wide area  
network internet protocol v6 —  
Firewall control service**

*Technologies de l'information — Architecture de dispositif UPnP —  
Partie 24-11: Protocole de contrôle de dispositif de passerelle  
Internet — Niveau 2 — Protocole internet de réseau étendu v6 —  
Service de contrôle du pare-feu*



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## Foreword

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ISO/IEC 29341-24-11 was prepared by UPnP Forum 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 ISO/IEC 29341 series, under the general title *Information technology — UPnP Device Architecture*, can be found on the [ISO web site](#).

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### Original UPnP Document

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 and later by UPnP Forum. 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 29341-1:2008
UPnP Device Architecture Version 1.0	ISO/IEC 29341-1:2011
UPnP Device Architecture 1.1	ISO/IEC 29341-1-1:2011
UPnP Device Architecture 2.0	ISO/IEC 29341-1-2
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1:2008
UPnP AV Architecture:1	ISO/IEC 29341-3-1:2011
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:1 Device	ISO/IEC 29341-3-2
UPnP MediaRenderer:2 Device	ISO/IEC 29341-3-2:2011
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10:2008
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10:2011
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11:2008
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11:2011
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13:2008
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13:2011
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
UPnP ScheduledRecording:2	ISO/IEC 29341-4-14:2011

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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 29341-4-4:2008
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4:2011
UPnP DigitalSecurityCamera:1 Device	ISO/IEC 29341-5-1
UPnP DigitalSecurityCameraMotionImage:1 Service	ISO/IEC 29341-5-10
UPnP DigitalSecurityCameraSettings:1 Service	ISO/IEC 29341-5-11
UPnP DigitalSecurityCameraStillImage:1 Service	ISO/IEC 29341-5-12
UPnP HVAC_System:1 Device	ISO/IEC 29341-6-1
UPnP ControlValve:1 Service	ISO/IEC 29341-6-10
UPnP HVAC_FanOperatingMode:1 Service	ISO/IEC 29341-6-11
UPnP FanSpeed:1 Service	ISO/IEC 29341-6-12
UPnP HouseStatus:1 Service	ISO/IEC 29341-6-13
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
UPnP HVAC_ZoneThermostat:1 Device	ISO/IEC 29341-6-2
UPnP BinaryLight:1 Device	ISO/IEC 29341-7-1
UPnP Dimming:1 Service	ISO/IEC 29341-7-10
UPnP SwitchPower:1 Service	ISO/IEC 29341-7-11
UPnP DimmableLight:1 Device	ISO/IEC 29341-7-2
UPnP InternetGatewayDevice:1 Device	ISO/IEC 29341-8-1
UPnP LANHostConfigManagement:1 Service	ISO/IEC 29341-8-10
UPnP Layer3Forwarding:1 Service	ISO/IEC 29341-8-11
UPnP LinkAuthentication:1 Service	ISO/IEC 29341-8-12
UPnP RadiusClient:1 Service	ISO/IEC 29341-8-13

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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
UPnP WANIPConnection:1 Service	ISO/IEC 29341-8-18
UPnP WANPOTSLinkConfig:1 Service	ISO/IEC 29341-8-19
UPnP LANDevice:1 Device	ISO/IEC 29341-8-2
UPnP WANPPPConnection:1 Service	ISO/IEC 29341-8-20
UPnP WLANConfiguration:1 Service	ISO/IEC 29341-8-21
UPnP WANDevice:1 Device	ISO/IEC 29341-8-3
UPnP WANConnectionDevice:1 Device	ISO/IEC 29341-8-4
UPnP WLANAccessPointDevice:1 Device	ISO/IEC 29341-8-5
UPnP Printer:1 Device	ISO/IEC 29341-9-1
UPnP ExternalActivity:1 Service	ISO/IEC 29341-9-10
UPnP Feeder:1.0 Service	ISO/IEC 29341-9-11
UPnP PrintBasic:1 Service	ISO/IEC 29341-9-12
UPnP Scan:1 Service	ISO/IEC 29341-9-13
UPnP Scanner:1.0 Device	ISO/IEC 29341-9-2
UPnP QoS Architecture:1.0	ISO/IEC 29341-10-1
UPnP QosDevice:1 Service	ISO/IEC 29341-10-10
UPnP QosManager:1 Service	ISO/IEC 29341-10-11
UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
UPnP QoS Architecture:2	ISO/IEC 29341-11-1
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 QOS v2 Schema Files	ISO/IEC 29341-11-2

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UPnP RemoteUIClientDevice:1 Device	ISO/IEC 29341-12-1
UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP RemoteUIServerDevice:1 Device	ISO/IEC 29341-12-2
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11
UPnP ContentDirectory:3 Service	ISO/IEC 29341-14-12:2011
UPnP MediaServer:3 Device	ISO/IEC 29341-14-3:2011
UPnP ContentSync:1	ISO/IEC 29341-15-10:2011
UPnP Low Power Architecture:1	ISO/IEC 29341-16-1:2011
UPnP LowPowerProxy:1 Service	ISO/IEC 29341-16-10:2011
UPnP LowPowerDevice:1 Service	ISO/IEC 29341-16-11:2011
UPnP QoS Architecture:3	ISO/IEC 29341-17-1:2011
UPnP QoSDevice:3 Service	ISO/IEC 29341-17-10:2011
UPnP QoSManager:3 Service	ISO/IEC 29341-17-11:2011
UPnP QoSPolicyHolder:3 Service	ISO/IEC 29341-17-12:2011
UPnP QoSDevice:3 Addendum	ISO/IEC 29341-17-13:2011
UPnP RemoteAccessArchitecture:1	ISO/IEC 29341-18-1:2011
UPnP InboundConnectionConfig:1 Service	ISO/IEC 29341-18-10:2011
UPnP RADAConfig:1 Service	ISO/IEC 29341-18-11:2011
UPnP RADASync:1 Service	ISO/IEC 29341-18-12:2011
UPnP RATAConfig:1 Service	ISO/IEC 29341-18-13:2011
UPnP RAClient:1 Device	ISO/IEC 29341-18-2:2011
UPnP RAServer:1 Device	ISO/IEC 29341-18-3:2011
UPnP RADiscoveryAgent:1 Device	ISO/IEC 29341-18-4:2011
UPnP SolarProtectionBlind:1 Device	ISO/IEC 29341-19-1:2011
UPnP TwoWayMotionMotor:1 Service	ISO/IEC 29341-19-10:2011

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UPnP AV Architecture:2	ISO/IEC 29341-20-1
UPnP AVTransport:3 Service	ISO/IEC 29341-20-10
UPnP ConnectionManager:3 Service	ISO/IEC 29341-20-11
UPnP ContentDirectory:4 Device	ISO/IEC 29341-20-12
UPnP RenderingControl:3 Service	ISO/IEC 29341-20-13
UPnP ScheduledRecording:2 Service	ISO/IEC 29341-20-14
UPnP MediaRenderer:3 Service	ISO/IEC 29341-20-2
UPnP MediaServer:4 Device	ISO/IEC 29341-20-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-20-4
UPnP InternetGatewayDevice:2 Device	ISO/IEC 29341-24-1
UPnP WANIPConnection:2 Service	ISO/IEC 29341-24-10
UPnP WANIPv6FirewallControl:1 Service	ISO/IEC 29341-24-11
UPnP WANConnectionDevice:2 Service	ISO/IEC 29341-24-2
UPnP WANDevice:2 Device	ISO/IEC 29341-24-3
UPnP Telephony Architecture:2	ISO/IEC 29341-26-1
UPnP CallManagement:2 Service	ISO/IEC 29341-26-10
UPnP MediaManagement:2 Service	ISO/IEC 29341-26-11
UPnP Messaging:2 Service	ISO/IEC 29341-26-12
UPnP PhoneManagement:2 Service	ISO/IEC 29341-26-13
UPnP AddressBook:1 Service	ISO/IEC 29341-26-14
UPnP Calendar:1 Service	ISO/IEC 29341-26-15
UPnP Presense:1 Service	ISO/IEC 29341-26-16
UPnP TelephonyClient:2 Device	ISO/IEC 29341-26-2
UPnP TelephonyServer:2 Device	ISO/IEC 29341-26-3
UPnP Friendly Info Update:1 Service	ISO/IEC 29341-27-1
UPnP MultiScreen MultiScreen Architecture:1	ISO/IEC 29341-28-1
UPnP MultiScreen Application Management:1 Service	ISO/IEC 29341-28-10

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UPnP MultiScreen Screen:1 Device	ISO/IEC 29341-28-2
UPnP MultiScreen Application Management:2 Service	ISO/IEC 29341-29-10
UPnP MultiScreen Screen:2 Device	ISO/IEC 29341-29-2
UPnP IoT Management and Control Architecture Overview:1	ISO/IEC 29341-30-1
UPnP DataStore:1 Service	ISO/IEC 29341-30-10
UPnP IoT Management and Control Data Model:1 Service	ISO/IEC 29341-30-11
UPnP IoT Management and Control Transport Generic:1 Service	ISO/IEC 29341-30-12
UPnP IoT Management and Control:1 Device	ISO/IEC 29341-30-2
UPnP Energy Management:1 Service	ISO/IEC 29341-31-1

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## 1 Scope

This document specifies the characteristics of the UPnP networked service named WANIPv6FirewallControl, version 1. This service definition is compliant with *UPnP Service Architecture 1.0* [1].

This service supports the management IPv6 firewall pinholes in Internet gateway devices independent of the WAN access type (PPP, DHCP, ...). It also supports access control to restrict operations to authorized control points and users. It enables UPnP control points to:

- create and delete pinholes of limited duration that allow external communication from the WAN side of the gateway to reach devices on the LAN side
- determine operational status of a pinhole

This service does not support:

- retrieving detailed information about pinholes (such as associated external port or remaining lease duration)
- outbound packet filtering
- modification of security policies of a gateway device

## 2 Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[1] *UPnP Device Architecture, Version 1.0*, UPnP Forum.

Available at: <http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf>.

[2] *InternetGatewayDevice:2*, version 1.00, UPnP Forum, December 10, 2010.

Available at <http://upnp.org/specs/gw/UPnP-gw-InternetGatewayDevice-v2-Device.pdf>.

[3] *WANDevice:2*, version 1.0, UPnP Forum, September 10, 2010.

Available at <http://upnp.org/specs/gw/UPnP-gw-WANDevice-v2-Device.pdf>.

[4] *WANConnectionDevice:2*, version 1.00, UPnP Forum, September 10, 2010.

Available at: <http://upnp.org/specs/gw/UPnP-gw-WANConnectionDevice-v2-Device.pdf>.

[5] *WANIPConnection:2*, version 1.00, UPnP Forum, September 10, 2010.

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[6] IETF RFC 6092, *Recommended Simple Security Capabilities in Customer Premises*

*Equipment (CPE) for Providing Residential IPv6 Internet Service*, J. Woodyatt, January 2011

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[12] *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>.

[13] *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>.

### 3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions given in [1] and the following apply:

#### 3.1 firewall

a hardware or software system that inspects network traffic passing through it, and either denies or permits the passage based on a set of rules. It has an "internal" interface (to a LAN) and an "external" interface (normally to a WAN, but sometimes to a different LAN).

#### 3.2 pinhole

a rule that defines an opening in a firewall packet filter to allow unsolicited packets originating from the external interface of the firewall to the corresponding internal address. Unlike IPv4 network address translation, the external address is not re-written to a mapped internal address but are in one-to-one correspondence. In IPv6, this address is typically a globally-routable IPv6 Global Unicast Address.

#### 3.3 inbound traffic

traffic going from the external to the internal interface of the firewall. For example, a remote host in the WAN sending traffic to one of the internal client in the IGD's local network.

#### 3.4 outbound traffic

traffic going from the internal to the external interface of the firewall. For example, one of the internal client in the IGD's local network sending traffic to a remote host in the WAN.

#### 3.5 inbound pinhole

a rule created in the firewall to allow inbound initiated traffic to pass through the firewall.

#### outbound pinhole

a rule created in the firewall to allow outbound initiated traffic to pass through the firewall.

#### automatic pinhole

outbound pinhole that is created automatically when outbound traffic is initiated

#### 3.6 traffic session

an exchange of outbound and inbound traffic between an internal-client interface that is identified by a transport address and a remote host for a given duration.

### 3.7 Symbols

#### 3.7.1

::

signifies a hierarchical relationship (parent::child) between the two objects separated by the double colon. This delimiter is used in multiple contexts, such as: Service::Action(), Action()::Argument, parentProperty::childProperty.

### 3.8 Abbreviations

#### 3.8.1

##### **DHCP**

Dynamic Host Configuration Protocol

#### 3.8.2

##### **DNS**

Domain Name Service

#### 3.8.3

##### **GUA**

Global Unicast Address

#### 3.8.4

##### **HTTP**

HyperText Transfer Protocol

#### 3.8.5

##### **IANA**

Internet Assigned Numbers Authority

#### 3.8.6

##### **ICMPv6**

Internet Control Message Protocol version 6

#### 3.8.7

##### **IGD**

Internet Gateway Device

#### 3.8.8

##### **IPv6**

Internet Protocol version 6

#### 3.8.9

##### **LAN**

Local Area Network

#### 3.8.10

##### **MTU**

Maximum Transmission Unit

#### 3.8.11

##### **NAT**

Network Address Translation

#### 3.8.12

##### **P2P**

Peer to Peer

#### 3.8.13

##### **PMP**

Port Mapping Protocol

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### 3.8.14

#### PPP

Point to Point Protocol

### 3.8.15

#### TCP

Transmission Control Protocol

### 3.8.16

#### UDP

User Datagram Protocol

### 3.8.17

#### WAN

Wide Area Network

## 4 Notations and conventions

### 4.1 Notation

- UPnP interface names defined in [1] are styled in **green bold underlined** text.
- UPnP interface names defined outside of [1] are styled in **red italic underlined** text.
- Some additional non-interface names and terms are styled in *italic* text.
- Words that are emphasized are also styled in *italic* text. The difference between italic terms and italics for emphasis will be apparent by context.
- Strings that are to be taken literally are enclosed in “double quotes”.

### 4.2 Data types

Data type definitions come from two sources:

- All state variable and action argument data types are defined in [1].
- Basic data types for XML element and attribute values are defined in [13]. The XML data types are essential, since all communications between UPnP services and control points are encoded in XML.

For the UPnP-defined data type **boolean** (see [1]), it is strongly recommended to use the value “**0**” for false, and the value “**1**” for true. The values “**true**”, “**false**”, “**yes**” and “**no**” are deprecated—they shall not appear in output, but shall be accepted on input.

For the data type `boolean` defined in [13], it is strongly recommended to use the value “0” for false, and the value “1” for true. The values “true” and “false” are allowed, but not recommended.

### 4.3 Vendor-defined extensions

When vendors add vendor-defined state variables, actions or properties, their assigned names and XML representation shall follow the naming conventions and XML rules for non-standard vendor extensions in [1].

## 5 Service Model

### 5.1 Service Type

A service that complies with this specification shall identify itself with the URN:

urn:**schemas-upnp-org:service:WANIPv6FirewallControl:1:1**

**WANIPv6FirewallControl** service is used herein to refer to this service type.

## 5.2 Service Architecture

This service controls the firewall to create pinholes for incoming traffic and also retrieves information from the firewall. More specifically the main functionalities provided by this service are:

- a) Create pinholes with action [AddPinhole\(\)](#). Pinholes exist until their lease time expires and then are automatically deleted. If a longer duration is needed, then the control point needs to use the [UpdatePinhole\(\)](#) action or the [AddPinhole\(\)](#) action again. Control points identify pinholes by the [UniqueID](#) value that they retrieve when creating a pinhole.
- b) Update lease time of a pinhole by [UpdatePinhole\(\)](#) or [AddPinhole\(\)](#). The maximum time that a pinhole can exist without updating is one day. If a pinhole is not updated with a new lease time, then the pinhole is automatically deleted after it expires.
- c) [DeletePinhole\(\)](#)—removes pinholes.
- d) [GetOutboundPinholeTimeout\(\)](#) returns the default duration value for automatic pinholes.
- e) [GetFirewallStatus\(\)](#) lets control points know if the firewall is enabled and if pinholes can be created through UPnP.
- f) [GetPinholePackets\(\)](#) lets control points get the total number of IP packets which have been going through a certain pinhole.
- g) [CheckPinholeWorking\(\)](#) is an allowed action that enables checking if a certain pinhole allows traffic to pass through the firewall.

## 5.3 State Variables

### 5.3.1 Summary

There are two state variables that describe the status of the firewall—whether the firewall is enabled and whether pinholes may be created. All others are virtual state variables, which define the characteristics of various action arguments.

Note: For first-time reader, it might be more insightful to read the theory of operations first and then the action definitions before reading the state variable definitions.

**Table 1 — State Variables**

Variable Name	R/A	Data Type	Reference
<a href="#">FirewallEnabled</a>	<a href="#">R</a>	<a href="#">boolean</a>	See 5.3.2
<a href="#">InboundPinholeAllowed</a>	<a href="#">R</a>	<a href="#">boolean</a>	See 5.3.3
<a href="#">A_ARG_TYPE_OutboundPinholeTimeout</a>	<a href="#">A</a>	<a href="#">ui4</a>	See 5.3.4
<a href="#">A_ARG_TYPE_IPv6Address</a>	<a href="#">R</a>	<a href="#">string</a>	See 5.3.5
<a href="#">A_ARG_TYPE_Port</a>	<a href="#">R</a>	<a href="#">ui2</a>	See 5.3.6
<a href="#">A_ARG_TYPE_Protocol</a>	<a href="#">R</a>	<a href="#">ui2</a>	See 5.3.7
<a href="#">A_ARG_TYPE_LeaseTime</a>	<a href="#">R</a>	<a href="#">ui4</a>	See 5.3.8
<a href="#">A_ARG_TYPE_UniqueID</a>	<a href="#">R</a>	<a href="#">ui2</a>	See 5.3.9
<a href="#">A_ARG_TYPE_PinholePackets</a>	<a href="#">R</a>	<a href="#">ui4</a>	See 5.3.10
<a href="#">A_ARG_TYPE_Boolean</a>	<a href="#">A</a>	<a href="#">boolean</a>	See 5.3.11
<i>Non standard state variables implemented by a UPnP vendor go here</i>	<a href="#">X</a>	<a href="#">TBD</a>	<a href="#">TBD</a>

### 5.3.2 [FirewallEnabled](#)

The type of this variable is [boolean](#), and it is used to notify of changes if the firewall is enabled.

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If this variable is set to “0” (false), the firewall is not enabled and so all inbound and outbound traffic is allowed to go through the IGD. In other words, UPnP control points don't have to create pinholes to allow inbound connections.

If this variable is set to “1” (true), the firewall is enabled and so UPnP control points should check InboundPinholeAllowed state variable to know if the IGD allows UPnP control points to create inbound pinholes in the firewall.

### 5.3.3 InboundPinholeAllowed

The type of this variable is boolean, and it is used to notify of changes if UPnP control points are allowed to create pinholes.

If this variable is set to “1” (true), the IGD allows UPnP control points to create pinholes to allow inbound traffic through the AddPinhole() action.

If this variable is set to “0” (false), the IGD doesn't allow UPnP control points to create pinholes to allow inbound traffic through the AddPinhole() action. Moreover, if this variable is set to “0” (false), all pinholes created previously by any UPnP control points will be deleted by the IGD, even if their lease time has not expired yet.

### 5.3.4 A ARG TYPE OutboundPinholeTimeout

Table 2 — allowedValueRange for A ARG TYPE OutboundPinholeTimeout

Subelement	Value	R/A
minimum	<i>Vendor-defined</i> (recommended value is 120)	<i>R</i>
maximum	<i>Vendor-defined</i>	<i>R</i>
default	N/A	N/A

This variable is of type ui2 and determines the lifetime in seconds of an inbound "automatic" firewall pinhole created by an outbound traffic initiation.

This document recommends 120 seconds as the minimum value (as defined in REC-12 of [6], 3.2.2).

### 5.3.5 A ARG TYPE IPv6Address

This variable is of type string and represents the source or the destination of inbound IPv6 packets. This variable can be defined as either literal presentation of IPv6 address as defined in [8], as domain name defined in [10] or as a wildcard (an empty string).

### 5.3.6 A ARG TYPE Port

This variable is of type ui2 and represents the source or destination port of the transport protocol used in pinhole. Value “0” is used to describe any value. Value “0” is the wildcard value for this variable.

### 5.3.7 A ARG TYPE Protocol

This variable is of type ui2 and its value enumerates the protocol of the pinhole. The specific values shall be according to the Internet Assigned Numbers Authority [IANA protocol]. Values below 256 are reserved for IANA defined usage, values greater than 255 are left undefined at this moment, except, 65535 which is reserved for presenting any possible protocol. 65535 is the wildcard value for this variable.

### 5.3.8 A ARG TYPE LeaseTime

Table 3 — allowedValueRange for A ARG TYPE LeaseTime

Subelement	Value	R/A
minimum	<u>1</u>	<i>R</i>
maximum	<u>86400</u>	<i>R</i>
default	N/A	N/A

This variable determines the lifetime in seconds of a pinhole and indicates the duration after which a pinhole will be removed, unless a control point refreshes it.

A lease time greater than or equal to 3600 is recommended by this service.

**5.3.9 A ARG TYPE UniqueID**

This variable is of type **ui2** and it gives unique identifier of the pinhole corresponding to the address, port and protocol.

**5.3.10 A ARG TYPE PinholePackets**

This variable is of type **ui4** represents the cumulative counter for total number of IP packets which have been going through a specified inbound pinhole. The count rolls over to 0 after it reaching the maximum value  $(2^{32}) - 1$ .

**5.3.11 A ARG TYPE Boolean**

This **boolean** type argument is used to carry **boolean** type information as arguments.

**5.3.12 Relationships among State Variables**

The relationships between firewall state variables are:

- **FirewallEnabled** value impacts to other state variables by controlling whether firewall as such is working or it can be controlled;
- **InboundPinholeAllowed** value impacts to other state variables by controlling whether firewall as such can be controlled by UPnP control points.

**5.4 Eventing and Moderation**

**5.4.1 Summary**

**Table 4 — Eventing and Moderation**

Variable Name	Evented	Moderated	Criteria
<b><u>FirewallEnabled</u></b>	<b><u>YES</u></b>	<b><u>NO</u></b>	N/A
<b><u>InboundPinholeAllowed</u></b>	<b><u>YES</u></b>	<b><u>NO</u></b>	N/A

**5.4.2 Eventing of FirewallEnabled**

This variable is evented everytime the state variable is updated. There is no moderation defined.

**5.4.3 Eventing of InboundPinholeAllowed**

This variable is evented everytime the state variable is updated. There is no moderation defined.

**5.5 Actions**

**5.5.1 Summary**

**Table 5 — Actions**

Name	Service Support R/A	Control Point Support R/A
<b><u>GetFirewallStatus()</u></b>	<b><u>R</u></b>	<b><u>A</u></b>
<b><u>GetOutboundPinholeTimeout()</u></b>	<b><u>A</u></b>	<b><u>A</u></b>
<b><u>AddPinhole()</u></b>	<b><u>R</u></b>	<b><u>R</u></b>
<b><u>UpdatePinhole()</u></b>	<b><u>R</u></b>	<b><u>R</u></b>
<b><u>DeletePinhole()</u></b>	<b><u>R</u></b>	<b><u>A</u></b>
<b><u>GetPinholePackets()</u></b>	<b><u>R</u></b>	<b><u>A</u></b>

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Name	Service Support R/A	Control Point Support R/A
<a href="#"><u>CheckPinholeWorking()</u></a>	A	A
<i>Non-standard actions implemented by an UPnP vendor go here.</i>	X	X

### 5.5.2 [GetFirewallStatus\(\)](#)

#### 5.5.2.1 Description

This action is to detect if the firewall is active and allows creating pinholes by control points.

#### 5.5.2.2 Arguments

Table 6 — Arguments for [GetFirewallStatus\(\)](#)

Argument	Direction	relatedStateVariable
<a href="#"><u>FirewallEnabled</u></a>	<a href="#"><u>OUT</u></a>	<a href="#"><u>FirewallEnabled</u></a>
<a href="#"><u>InboundPinholeAllowed</u></a>	<a href="#"><u>OUT</u></a>	<a href="#"><u>InboundPinholeAllowed</u></a>

#### 5.5.2.3 Argument Descriptions

[FirewallEnabled](#) has type **boolean** and informs if the firewall is active.

[InboundPinholeAllowed](#) has type **boolean** and it informs if inbound pinhole can be created through UPnP.

#### 5.5.2.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 [Action not authorized](#) error code (defined in [1]). [2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

#### 5.5.2.5 Control Point Requirements When Calling The Action

Before invoking this action, a control point should verify that it has sufficient permission.

#### 5.5.2.6 Dependency on Service State

None.

#### 5.5.2.7 Effect on Service State

None.

#### 5.5.2.8 Errors

Table 7 — Error Codes for [GetFirewallStatus\(\)](#)

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<a href="#"><u>Action not authorized</u></a>	The action requested requires authorization and the sender was not authorized.

### 5.5.3 [GetOutboundPinholeTimeout\(\)](#)

#### 5.5.3.1 Description

This action returns the outbound pinhole timeout for the "automatic pinhole" defined by arguments. The returned value may be specific to the [Protocol](#), [RemoteHost](#), [RemotePort](#),

*InternalClient* and *InternalPort*, but this behavior depends on the implementation of the firewall. For instance, time-out value can be different for well-known ports(<1024) than higher ports for UDP protocol as defined in REC-14 and REC-15 of [6]. By using a smaller timeout for well-known ports, the IGD vendor can:

- better protect the internal clients against attacks;
- facilitate the operation of IANA-registered service assigned to the port in question.

### 5.5.3.2 Arguments

Table 8 — Arguments for *GetOutboundPinholeTimeout()*

Argument	Direction	relatedStateVariable
<i>RemoteHost</i>	IN	A_ARG_TYPE_IPv6Address
<i>RemotePort</i>	IN	A_ARG_TYPE_Port
<i>InternalClient</i>	IN	A_ARG_TYPE_IPv6Address
<i>InternalPort</i>	IN	A_ARG_TYPE_Port
<i>Protocol</i>	IN	A_ARG_TYPE_Protocol
<i>OutboundPinholeTimeout</i>	OUT	A_ARG_TYPE_OutboundPinholeTimeout

### 5.5.3.3 Argument descriptions

*RemoteHost* is **string** type variable that describes source address for the outbound pinhole. This can be wildcarded.

*RemotePort* is **ui2** type variable that describes source port for the outbound pinhole. This can be wildcarded.

*InternalClient* is **string** type variable that describes destination address for the outbound pinhole. This can be wildcarded.

*InternalPort* is **ui2** type variable that describes destination port for the outbound pinhole. This can be wildcarded.

*Protocol* is **ui2** type variable that describes the protocol for the outbound pinhole. This can be wildcarded.

*OutboundPinholeTimeout* is **ui4** type variable that defines outbound pinhole timeout for "automatic pinhole".

### 5.5.3.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 *Action not authorized* error code (defined in [1]). [2] recommends access control requirements and authentication levels to be applied by default for this action. However, services may choose a different security policy.

If this action has been implemented, it is required to return values for UDP and UDPLite. Support for other protocols is allowed. If the requested protocol is not supported, service shall return error 705 *ProtocolNotSupported*.

If wildcard values are used then it is required that shortest timeout value is returned.

### 5.5.3.5 Control Point Requirements When Calling The Action

Before invoking this action, a control point should verify that it has sufficient permission.

### 5.5.3.6 Dependency on Service State

*FirewallEnabled* shall be true indicating that firewall is active.

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### 5.5.3.7 Effect on Service State

None.

### 5.5.3.8 Errors

**Table 9 — Error Codes for GetOutboundPinholeTimeout()**

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<u>Action not authorized</u>	The action requested requires authorization and the sender was not authorized.
702	<u>FirewallDisabled</u>	Firewall is disabled and this action is disabled.
705	<u>ProtocolNotSupported</u>	Specified protocol is not supported by this action.

### 5.5.4 AddPinhole()

#### 5.5.4.1 Description

This action allows a control point to create a new pinhole that allows incoming traffic to pass through firewall.

This action can also be used by a control point to extend the lease time of an existing pinhole.

#### 5.5.4.2 Arguments

**Table 10 — Arguments for AddPinhole()**

Argument	Direction	relatedStateVariable
<u>RemoteHost</u>	<u>IN</u>	<u>A_ARG_TYPE_IPv6Address</u>
<u>RemotePort</u>	<u>IN</u>	<u>A_ARG_TYPE_Port</u>
<u>InternalClient</u>	<u>IN</u>	<u>A_ARG_TYPE_IPv6Address</u>
<u>InternalPort</u>	<u>IN</u>	<u>A_ARG_TYPE_Port</u>
<u>Protocol</u>	<u>IN</u>	<u>A_ARG_TYPE_Protocol</u>
<u>LeaseTime</u>	<u>IN</u>	<u>A_ARG_TYPE_LeaseTime</u>
<u>UniqueID</u>	<u>OUT</u>	<u>A_ARG_TYPE_UniqueID</u>

#### 5.5.4.3 Argument Descriptions

RemoteHost is string type variable that describes source address for the pinhole. This can be wildcarded.

RemotePort is ui2 type variable that describes source port for the pinhole. This can be wildcarded.

InternalClient is string type variable that describes destination address for the pinhole. This can not be wildcarded.

InternalPort is ui2 type variable that describes destination port for the pinhole. This can be wildcarded. This service recommends the wildcard support however a service is allowed to return an error code if it does not support it.

Protocol is ui2 type variable that describes the protocol that uses this pinhole. This can be wildcarded. This service recommends the wildcard support however a service is allowed to return an error code if it does not support it.

LeaseTime is ui4 type variable that defines expiration time of the pinhole.

UniqueID is ui2 type variable that identifies the firewall pinhole.

#### 5.5.4.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 *Action not authorized* error code (defined in [1]).

[2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

In particular, [2] recommends that unauthenticated and unauthorized control points are only allowed to invoke this action with:

- *InternalPort* value greater than or equal to 1024,
- *InternalClient* value equals to the control point's IP address.

It is required that *InternalClient* cannot be one of IPv6 addresses used by the gateway.

In cases where the *RemoteHost*, *RemotePort*, *InternalPort*, *InternalClient* and *Protocol* are the same than an existing pinhole, but *LeaseTime* is different, the service shall extend the existing pinhole's lease time and return the *UniqueID* of the existing pinhole.

If an inbound pinhole is created and an inbound traffic is initiated, it is required that all the incoming and outgoing traffic will be allowed for the duration of this traffic session.

If an outbound pinhole is created and an outbound traffic is initiated, it is required that all the incoming and outgoing traffic will be allowed for the duration of this traffic session.

#### 5.5.4.5 Control Point Requirements When Calling The Action

Before invoking this action, a control point should verify that it has sufficient permission.

Control points that have not been authenticated and authorized as defined in [2] should use their IPv6 GUA when calling this action.

#### 5.5.4.6 Dependency on Service State

*FirewallEnabled shall* be true indicating that firewall is active.

*InboundPinholeAllowed shall* be true indicating that UPnP control points can create inbound pinhole.

Also, the control point needs to have appropriate access rights to complete this action.

#### 5.5.4.7 Effect on Service State

A new firewall pinhole is created.

#### 5.5.4.8 Errors

Table 11 — Error Codes for *AddPinhole()*

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<i>Action not authorized</i>	The action requested requires authorization and the sender was not authorized. This error can be returned e.g. if a control point is not authorized for the operation because of its IP address or because it tries to use well-known ports.
701	<i>PinholeSpaceExhausted</i>	Firewall cannot accommodate more pinholes at this moment.
702	<i>FirewallDisabled</i>	Firewall is disabled and this action is disabled.

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ErrorCode	errorDescription	Description
703	<a href="#"><u>InboundPinholeNotAllowed</u></a>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
705	<a href="#"><u>ProtocolNotSupported</u></a>	Specified protocol is not supported by this action.
706	<a href="#"><u>InternalPortWildcardingNotAllowed</u></a>	Gateway does not allow wildcarding <a href="#"><u>InternalPort</u></a> value.
707	<a href="#"><u>ProtocolWildcardingNotAllowed</u></a>	Gateway does not allow wildcarding <a href="#"><u>Protocol</u></a> value.
708	<a href="#"><u>WildCardNotPermittedInSrcIP</u></a>	The source IP address cannot be wild-carded ( <a href="#"><u>InternalClient</u></a> equals to an empty string).

### 5.5.5 [UpdatePinhole\(\)](#)

#### 5.5.5.1 Description

This action updates a pinhole's lease time.

#### 5.5.5.2 Arguments

Table 12 — Arguments for [UpdatePinhole\(\)](#)

Argument	Direction	relatedStateVariable
<a href="#"><u>UniqueID</u></a>	<a href="#"><u>IN</u></a>	<a href="#"><u>A_ARG_TYPE UniqueID</u></a>
<a href="#"><u>NewLeaseTime</u></a>	<a href="#"><u>IN</u></a>	<a href="#"><u>A_ARG_TYPE LeaseTime</u></a>

#### 5.5.5.3 Argument Descriptions

[UniqueID](#) argument gives unique identifier assigned earlier by the gateway. Type is [ui2](#).

[NewLeaseTime](#) defines how long pinhole will exist. Type is [ui4](#).

#### 5.5.5.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 [Action not authorized](#) error code (defined in [1]). [2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

In particular, [2] recommends that unauthenticated and unauthorized control points are only allowed to update pinholes which have:

- [InternalPort](#) value greater than or equal to 1024,
- [InternalClient](#) value equals to the control point's IP address.

If an inbound pinhole is created and an inbound traffic is initiated, it is required that all the incoming and outgoing traffic will be allowed for the duration of this traffic session.

If an outbound pinhole is created and an outbound traffic is initiated, it is required that all the incoming and outgoing traffic will be allowed for the duration of this traffic session.

#### 5.5.5.5 Control Point Requirements When Calling The Action

Before invoking this action, a control point should verify that it has sufficient permission.

Control points that have not been authenticated and authorized as defined in [2] should use their IPv6 GUA when updating a firewall pinhole.

#### 5.5.5.6 Dependency on Service State

[FirewallEnabled](#) shall be true indicating that firewall is active.

[InboundPinholeAllowed](#) shall be true indicating that UPnP control points can create and update inbound pinhole.

The control point shall have sufficient access rights to update pinhole.

**5.5.5.7 Effect on Service State**

The effect is that the pinhole's lease time is extended.

**5.5.5.8 Errors****Table 13 — Error Codes for UpdatePinhole()**

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<u>Action not authorized</u>	The action requested requires authorization and the sender was not authorized. This error can be returned e.g. if a control point is not authorized for the operation because of its IP address or because it tries to use well-known ports.
702	<u>FirewallDisabled</u>	Firewall is disabled and this action is disabled.
703	<u>InboundPinholeNotAllowed</u>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
704	<u>NoSuchEntry</u>	There is no pinhole with the specified <u>UniqueID</u> .

**5.5.6 DeletePinhole()****5.5.6.1 Description**

This action removes a pinhole.

**5.5.6.2 Arguments****Table 14 — Arguments for DeletePinhole()**

Argument	Direction	relatedStateVariable
<u>UniqueID</u>	<u>IN</u>	<u>A_ARG_TYPE UniqueID</u>

**5.5.6.3 Argument Descriptions**

This argument gives unique identifier assigned earlier by the gateway. Type is ui2.

**5.5.6.4 Service Requirements**

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 Action not authorized error code (defined in [1]).

[2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

In particular, [2] recommends that unauthenticated and unauthorized control points are only allowed to delete pinholes which have:

- InternalPort value greater than or equal to 1024,
- InternalClient value equals to the control point's IP address.

**5.5.6.5 Control Point Requirements When Calling The Action**

Before invoking this action, a control point should verify that it has sufficient permission.

Control points that have not been authenticated and authorized as defined in [2] should use their IPv6 GUA when deleting a firewall pinhole.

**5.5.6.6 Dependency on Service State**

FirewallEnabled shall be true indicating that firewall is active.

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InboundPinholeAllowed shall be true indicating that UPnP control points can create and delete inbound pinhole.

The control point shall have sufficient access rights to delete pinhole.

### 5.5.6.7 Effect on Service State

The effect is that specified pinhole is deleted and traffic can no more pass the firewall.

### 5.5.6.8 Errors

Table 15 — Error Codes for DeletePinhole()

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<u>Action not authorized</u>	The action requested requires authorization and the sender was not authorized. This error can be returned e.g. if a control point is not authorized for the operation because of its IP address or because it tries to use well-known ports.
702	<u>FirewallDisabled</u>	Firewall is disabled and this action is disabled.
703	<u>InboundPinholeNotAllowed</u>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
704	<u>NoSuchEntry</u>	There is no pinhole with the specified <u>UniqueID</u> .

### 5.5.7 GetPinholePackets()

#### 5.5.7.1 Description

This action allows a control point to get the total number of IP packets which have been going through the specified pinhole.

This action could be used by a control point to know if a certain pinhole is "working". In fact, if the PinholePackets value is greater than zero, it means that the pinhole had worked, at least once. Moreover, if the control point retrieves the PinholePackets value at a later time, and the value has increased, the control point can suppose that the pinhole is still working.

Note: The major limitation of this action is that outbound traffic is needed, otherwise this action will always return zero. Moreover, another limitation is that some services specify that all established and related network packets should pass automatically the firewall. As a result, with those services, the PinholePackets value will not increase even if there is packets going through the service as only the first packet will go through the pinhole.

#### 5.5.7.2 Arguments

Table 16 — Arguments for GetPinholePackets()

Argument	Direction	relatedStateVariable
<u>UniqueID</u>	<u>IN</u>	<u>A_ARG_TYPE UniqueID</u>
<u>PinholePackets</u>	<u>OUT</u>	<u>A_ARG_TYPE PinholePackets</u>

#### 5.5.7.3 Argument Descriptions

UniqueID is unique identifier for a pinhole returned by AddPinhole() action. Type is ui2.

PinholePackets is a ui4 type variable describing how many IP packets have been going through the specified pinhole.

#### 5.5.7.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control

point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 *Action not authorized* error code (defined in [1]). [2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

In particular, [2] recommends that unauthenticated and unauthorized control points are only allowed to check pinholes which have:

- *InternalPort* value greater than or equal to 1024,
- *InternalClient* value equals to the control point's IP address.

**5.5.7.5 Control Point Requirements When Calling The Action**

Before invoking this action, a control point should verify that it has sufficient permission.

Control points that have not been authenticated and authorized as defined in [2] should use their IPv6 GUA when getting the packets for a firewall pinhole.

**5.5.7.6 Dependency on Service State**

*FirewallEnabled* shall be true indicating that firewall is active.

*InboundPinholeAllowed* shall be true indicating that UPnP control points can create pinhole.

**5.5.7.7 Effect on Service State**

None.

**5.5.7.8 Errors**

**Table 17 — Error Codes for *GetPinholePackets()***

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<i>Action not authorized</i>	The action requested requires authorization and the sender was not authorized.
702	<i>FirewallDisabled</i>	Firewall is disabled and this action is disabled.
703	<i>InboundPinholeNotAllowed</i>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
704	<i>NoSuchEntry</i>	There is no pinhole with the specified <i>UniqueID</i> .

**5.5.8 *CheckPinholeWorking()***

**5.5.8.1 Description**

This action allows a control point to verify if a certain pinhole allows traffic to pass through the firewall. It is possible that other pinholes created by non-UPnP means effectively render specified pinhole obsolete and no traffic can pass through. Logic and implementation of this action are left to implementers. This action returns a *boolean* value indicating if traffic can pass through the firewall.

Note: It could be very difficult to know if a pinhole is working before any traffic is actually received from the remote host. As a result, vendors may decide to implement this function by returning true if some traffic was received and processed through the specified pinhole. As a result, the service may return the 709 *NoTrafficReceived* error code if no traffic corresponding to the specified pinhole was received.

5.5.8.2 Arguments

Table 18 — Arguments for CheckPinholeWorking()

Argument	Direction	relatedStateVariable
<u>UniqueID</u>	<u>IN</u>	<u>A_ARG_TYPE UniqueID</u>
<u>IsWorking</u>	<u>OUT</u>	<u>A_ARG_TYPE Boolean</u>

5.5.8.3 Argument Descriptions

UniqueID is unique identifier for a pinhole returned by AddPinhole() action. Type is ui2.

IsWorking is a boolean type variable describing if specified pinhole will allow traffic to pass.

5.5.8.4 Service Requirements

Before processing the action request, the service shall apply the chosen security policy, and authenticate and authorize the control point as required by the security policy. If the control point does not have the necessary permission to perform the action with the requested parameters, the service shall return the 606 Action not authorized error code (defined in [1]).

[2] recommends access control requirements and authentication levels to be applied by *default* for this action. However, services may choose a different security policy.

In particular, [2] recommends that unauthenticated and unauthorized control points are only allowed to check pinholes which have:

- InternalPort value greater than or equal to 1024,
- InternalClient value equals to the control point's IP address.

5.5.8.5 Control Point Requirements When Calling The Action

Before invoking this action, a control point should verify that it has sufficient permission.

Control points that have not been authenticated and authorized as defined in [2] should use their IPv6 GUA when checking a firewall pinhole.

Dependency on Service State

FirewallEnabled shall be true indicating that firewall is active.

InboundPinholeAllowed shall be true indicating that UPnP control points can create pinhole.

5.5.8.6 Effect on Service State

None.

5.5.8.7 Errors

Table 19 — Error Codes for CheckPinholeWorking()

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<u>Action not authorized</u>	The action requested requires authorization and the sender was not authorized.
702	<u>FirewallDisabled</u>	Firewall is disabled and this action is disabled.
703	<u>InboundPinholeNotAllowed</u>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
704	<u>NoSuchEntry</u>	There is no pinhole with the specified <u>UniqueID</u> .
709	<u>NoTrafficReceived</u>	No traffic corresponding to this pinhole has been received by the gateway.

**5.5.9 Relationships Between Actions**

The relationship between actions are:

AddPinhole() creates pinholes that allow incoming traffic through the firewall.

UpdatePinhole() allows extending life time of a pinhole with UniqueID returned by AddPinhole().

Pinholes are automatically deleted:

- after their LeaseTime expires;
- by DeletePinhole() action.

**5.5.10 Error Code Summary**

Table 20 lists error codes common to actions for this service type. If an action results in multiple errors, the most specific error should be returned.

**Table 20 — Error Code Summary**

ErrorCode	errorDescription	Description
400-499	TBD	See Control clause in [1].
500-599	TBD	See Control clause in [1].
600-699	TBD	See Control clause in [1].
606	<u>Action not authorized</u>	The action requested requires authorization and the sender was not authorized. This error can be returned e.g. if a control point is not authorized for the operation because of its IP address or because it tries to use well-known ports.
700		Reserved for future extensions.
701	<u>PinholeSpaceExhausted</u>	Firewall cannot accommodate more pinholes at this moment.
702	<u>FirewallDisabled</u>	Firewall is disabled and this action is disabled.
703	<u>InboundPinholeNotAllowed</u>	Creation of inbound pinholes by UPnP control points are not allowed and this action is disabled.
704	<u>NoSuchEntry</u>	There is no pinhole with the specified <u>UniqueID</u> .
705	<u>ProtocolNotSupported</u>	Specified protocol is not supported by this action.
706	<u>InternalPortWildcardingNotAllowed</u>	Gateway does not allow wildcarding <u>InternalPort</u> value.
707	<u>ProtocolWildcardingNotAllowed</u>	Gateway does not allow wildcarding <u>Protocol</u> value.
708	<u>WildcardNotPermittedInSrcIP</u>	The source IP address cannot be wild-carded ( <u>InternalClient</u> equals to an empty string).
709	<u>NoTrafficReceived</u>	No traffic corresponding to this pinhole has been received by the gateway.

Note: 800-899 Error Codes are not permitted for standard actions. See Control clause in [1] for more details.

**5.6 Service Behavioral Model**

It is recommended that, at least, the following ICMPv6 traffic related to a traffic session is allowed to go through the firewall as specified in [9], 4.3.1, and REC-18, REC-36, REC-41, REC-45 of [6]:

- Destination Unreachable (Type 1) – All codes
- Packet Too Big (Type 2)

It is recommended that, at least, the following ICMPv6 traffic related to a traffic session is allowed to go through the firewall as specified in [9], 4.3.1:

- Time Exceeded (Type 3) – Code 0 only

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- Parameter Problem (Type 4) – Codes 1 and 2 only
- Echo Request (Type 128)
- Echo Response (Type 129)

Note: Destination Unreachable and Packet Too Big messages shall be allowed to go through as they are used in some mechanisms to discover path MTU.

It is recommended that this service deploys access control as defined in [2] and use it by default. Note that the vendor is free to use a different default or to enable the user to change the default.

It is recommended that firewall controlled by this API deploys endpoint independent filtering as specified in REC-17 and REC-33 of [6].

### 6 XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
      <name>GetFirewallStatus</name>
      <argumentList>
        <argument>
          <name>FirewallEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>
            FirewallEnabled
          </relatedStateVariable>
        </argument>
        <argument>
          <name>InboundPinholeAllowed</name>
          <direction>out</direction>
          <relatedStateVariable>
            InboundPinholeAllowed
          </relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetOutboundPinholeTimeout</name>
      <argumentList>
        <argument>
          <name>RemoteHost</name>
          <direction>in</direction>
          <relatedStateVariable>
            A ARG TYPE IPv6Address
          </relatedStateVariable>
        </argument>
        <argument>
          <name>RemotePort</name>
          <direction>in</direction>
          <relatedStateVariable>
            A ARG TYPE Port
          </relatedStateVariable>
        </argument>
        <argument>

```

```

    <name>InternalClient</name>
    <direction>in</direction>
    <relatedStateVariable>
      A ARG TYPE IPv6Address
    </relatedStateVariable>
  </argument>

  <argument>
    <name>InternalPort</name>
    <direction>in</direction>
    <relatedStateVariable>
      A ARG TYPE Port
    </relatedStateVariable>
  </argument>

  <argument>
    <name>Protocol</name>
    <direction>in</direction>
    <relatedStateVariable>
      A ARG TYPE Protocol
    </relatedStateVariable>
  </argument>

  <argument>
    <name>OutboundPinholeTimeout</name>
    <direction>out</direction>
    <relatedStateVariable>
      A ARG TYPE OutboundPinholeTimeout
    </relatedStateVariable>
  </argument>
</argumentList>
</action>

<action>
  <name>AddPinhole</name>
  <argumentList>
    <argument>
      <name>RemoteHost</name>
      <direction>in</direction>
      <relatedStateVariable>
        A ARG TYPE IPv6Address
      </relatedStateVariable>
    </argument>
    <argument>
      <name>RemotePort</name>
      <direction>in</direction>
      <relatedStateVariable>
        A ARG TYPE Port
      </relatedStateVariable>
    </argument>
    <argument>
      <name>InternalClient</name>
      <direction>in</direction>
      <relatedStateVariable>
        A ARG TYPE IPv6Address
      </relatedStateVariable>
    </argument>
    <argument>
      <name>InternalPort</name>
      <direction>in</direction>
      <relatedStateVariable>
        A ARG TYPE Port
      </relatedStateVariable>
    </argument>
    <argument>

```

```

        <name>Protocol</name>
        <direction>in</direction>
        <relatedStateVariable>
            A ARG TYPE Protocol
        </relatedStateVariable>
    </argument>

    <argument>
        <name>LeaseTime</name>
        <direction>in</direction>
        <relatedStateVariable>
            A ARG TYPE LeaseTime
        </relatedStateVariable>
    </argument>

    <argument>
        <name>UniqueID</name>
        <direction>out</direction>
        <relatedStateVariable>
            A ARG TYPE UniqueID
        </relatedStateVariable>
    </argument>
</argumentList>
</action>

<action>
    <name>UpdatePinhole</name>
    <argumentList>
        <argument>
            <name>UniqueID</name>
            <direction>in</direction>
            <relatedStateVariable>
                A ARG TYPE UniqueID
            </relatedStateVariable>
        </argument>

        <argument>
            <name>NewLeaseTime</name>
            <direction>in</direction>
            <relatedStateVariable>
                A ARG TYPE LeaseTime
            </relatedStateVariable>
        </argument>
    </argumentList>
</action>

<action>
    <name>DeletePinhole</name>
    <argumentList>
        <argument>
            <name>UniqueID</name>
            <direction>in</direction>
            <relatedStateVariable>
                A ARG TYPE UniqueID
            </relatedStateVariable>
        </argument>
    </argumentList>
</action>

<action>
    <name>GetPinholePackets</name>
    <argumentList>
        <argument>
            <name>UniqueID</name>
            <direction>in</direction>
            <relatedStateVariable>
                A ARG TYPE UniqueID
            </relatedStateVariable>
        </argument>
    </argumentList>
</action>

```

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```

    <argument>
      <name>PinholePackets</name>
      <direction>out</direction>
      <relatedStateVariable>
        A ARG TYPE PinholePackets
      </relatedStateVariable>
    </argument>
  </argumentList>
</action>

<action>
  <name>CheckPinholeWorking</name>
  <argumentList>
    <argument>
      <name>UniqueID</name>
      <direction>in</direction>
      <relatedStateVariable>
        A ARG TYPE UniqueID
      </relatedStateVariable>
    </argument>

    <argument>
      <name>IsWorking</name>
      <direction>out</direction>
      <relatedStateVariable>
        A ARG TYPE Boolean
      </relatedStateVariable>
    </argument>
  </argumentList>
</action>

</actionList>

<serviceStateTable>

  <stateVariable sendEvents="yes">
    <name>FirewallEnabled</name>
    <dataType>boolean</dataType>
  </stateVariable>

  <stateVariable sendEvents="yes">
    <name>InboundPinholeAllowed</name>
    <dataType>boolean</dataType>
  </stateVariable>

  <stateVariable sendEvents="no">
    <name>A ARG TYPE OutboundPinholeTimeout</name>
    <dataType>ui4</dataType>
    <allowedValueRange>
      <minimum>Vendor-defined</minimum>
      <maximum>Vendor-defined</maximum>
    </allowedValueRange>
  </stateVariable>

  <stateVariable sendEvents="no">
    <name>A ARG TYPE IPv6Address</name>
    <dataType>string</dataType>
  </stateVariable>

  <stateVariable sendEvents="no">
    <name>A ARG TYPE Port</name>
    <dataType>ui2</dataType>
  </stateVariable>

  <stateVariable sendEvents="no">
    <name>A ARG TYPE Protocol</name>
    <dataType>ui2</dataType>
  </stateVariable>

```

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```
</stateVariable>

<stateVariable sendEvents="no">
  <name>A ARG TYPE LeaseTime</name>
  <dataType>ui4</dataType>
  <allowedValueRange>
    <minimum>1</minimum>
    <maximum>86400</maximum>
  </allowedValueRange>
</stateVariable>

<stateVariable sendEvents="no">
  <name>A ARG TYPE UniqueID</name>
  <dataType>ui2</dataType>
</stateVariable>

<stateVariable sendEvents="no">
  <name>A ARG TYPE PinholePackets</name>
  <dataType>ui4</dataType>
</stateVariable>

<stateVariable sendEvents="no">
  <name>A ARG TYPE Boolean</name>
  <dataType>boolean</dataType>
</stateVariable>

</serviceStateTable>
</scpd>
```

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