[MS-UPIGD]:

UPnP Device and Service Templates: Internet Gateway Device (IGD) Extensions

Revision Summary

Date	Revision History	Revision Class	Comments
12/16/2011	1.0	New	Released new document.
3/30/2012	1.0	None	No changes to the meaning, language, or formatting of the technical content.
7/12/2012	1.0	None	No changes to the meaning, language, or formatting of the technical content.
10/25/2012	1.0	None	No changes to the meaning, language, or formatting of the technical content.
1/31/2013	1.1	Minor	Clarified the meaning of the technical content.
8/8/2013	2.0	Major	Updated and revised the technical content.
11/14/2013	2.0	None	No changes to the meaning, language, or formatting of the technical content.
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6/30/2015	3.0	Major	Significantly changed the technical content.
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Table of Contents

1 Introduction

The UPnP: Device & Service Templates: Internet Gateway Device (IGD) Extensions describe extensions to the Universal Plug-n-Play (UPnP) device schema that describes an Internet gateway device.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

action: A command that is exposed by a service, as defined in [UPNPARCH1.1] section i.7.

computer name: The DNS or NetBIOS name.

interface alias: As defined in [RFC2863] section 6, a human-readable name that is associated with a network interface, and configurable by a network manager.

Internet gateway device: An interconnect device between a local area network (LAN) and a wide area network (WAN), typically providing connectivity to the Internet.

service description: A formal definition of a logical service, expressed in the UPnP Template language and written in XML syntax. A **service description** is specified by a UPnP vendor by filling in any placeholders in a UPnP Service Template (was SCPD). For more information, see [UPNPARCH1.1] section 2.6.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, https://www.rfc-editor.org/rfc/rfc2119.html

[UPNPARCH1.1] UPnP Forum, "UPnP Device Architecture 1.1", October 2008, http://www.upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.1.pdf

[UPNPWCIC] UPnP Forum, "WANCommonInterfaceConfig:1 Service Template Version 1.01", November 2001, http://www.upnp.org/specs/gw/UPnP-gw-WANCommonInterfaceConfig-v1-Service.pdf

[UPNPWIPC] UPnP Forum, "WANIPConnection:1 Service Template Version 1.01", November 2001, http://www.upnp.org/specs/gw/UPnP-gw-WANIPConnection-v1-Service.pdf

[UPNPWPPC] UPnP Forum, "WANPPPConnection:1 Service Template Version 1.01", November 2001, http://www.upnp.org/specs/gw/UPnP-gw-WANPPPConnection-v1-Service.pdf

1.2.2 Informative References

[RFC2863] McCloghrie, K., and Kastenholz, F., "The Interfaces Group MIB", RFC 2863, June 2000, http://www.ietf.org/rfc/rfc2863.txt?number=2863.txt

1.3 Overview

The **Internet gateway device** (IGD) extensions specified in this document comprise four UPnP services:

1. OSInfo is a new service implemented on an IGD that enables retrieval of information about the operating system running on the IGD.

2. The WANCommonInterfaceConfig service [UPNPWCIC] is extended to implement an **action** that returns uptime information along with usage statistics. Previously this service returned only the usage statistics, requiring the caller to use its own timestamp for rate estimation. However, using the client's timestamp of the reception of the information introduces additional uncertainty due to queuing and propagation delays that can vary by message. Including the IGD's uptime value in the data instead enables more accurate rate estimation.

3. The WANIPConnection service [UPNPWIPC] is extended to add a state variable that enables customization of the name of the **interface alias** on the WAN interface of the Internet gateway device.

4. The WANPPPConnection service [UPNPWPPC] is extended to add a state variable that enables customization of the name of the interface alias on the WAN interface of the Internet gateway device.

1.4 Relationship to Protocols and Other Structures

The interface alias of the WAN interface is manageable with either the WANIPConnection service or the WANPPPConnection service (depending on the type of WAN connection). This same state variable can also be exposed via other mechanisms, such as the Interfaces Group MIB [RFC2863].

1.5 Applicability Statement

The IGD extensions specified in this document are applicable only to an IGD that has a single WAN interface.

1.6 Versioning and Localization

There are no localization-dependent structures specified in this document.

1.7 Vendor-Extensible Fields

None.

2   Structures

Data types used in this document are specified in [UPNPARCH1.1] section 2.5.

2.1   OSInfo Service

The OSInfo Service is a service in the Internet gateway device (IGD). Its **service description** is specified as follows, in the UPnP Template Language as defined in [UPNPARCH1.1] section 2.6.

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
   <action>
      <name>MagicOn</name>
   </action>
  </actionList>
  <serviceStateTable>
    <stateVariable>
      <name>OSMajorVersion</name>
      <dataType>i4</dataType>
    </stateVariable>
    <stateVariable>
      <name>OSMinorVersion</name>
      <dataType>i4</dataType>
    </stateVariable>
    <stateVariable>
      <name>OSBuildNumber</name>
      <dataType>i4</dataType>
    </stateVariable>
    <stateVariable>
      <name>OSMachineName</name>
      <dataType>string</dataType>
    </stateVariable>
  </serviceStateTable>
</scpd>
```

The following **action** is defined in the service description above:

MagicOn: A placeholder action created solely to provide a properly formed UPnP service description. The MagicOn action provides no functionality and always returns success.

The following state variables are defined in the service description above:

OSMajorVersion: The major version of the operating system.

OSMinorVersion: The minor version of the operating system.

OSBuildNumber: The build number of the operating system.

OSMachineName: The **computer name** of the Internet gateway device.

2.2   WANCommonInterfaceConfig Extensions

The WANCommonInterfaceConfig service is specified in [UPNPWCIC]. Its **service description** is extended as follows, in the UPnP Template Language.

```
<actionList>
<action>
    <name>X_GetICSStatistics</name>
      <argumentList>
        <argument>
          <name>TotalBytesSent</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesSent</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalBytesReceived</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesReceived</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalPacketsSent</name>
          <direction>out</direction>
          <relatedStateVariable>TotalPacketsSent</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalPacketsReceived</name>
          <direction>out</direction>
          <relatedStateVariable>TotalPacketsReceived</relatedStateVariable>
        </argument>
        <argument>
          <name>Layer1DownstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>Layer1DownstreamMaxBitRate</relatedStateVariable>
        </argument>
        <argument>
          <name>Uptime</name>
          <direction>out</direction>
          <relatedStateVariable>X Uptime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
</actionList>
<serviceStateTable>
    <stateVariable sendEvents="no">
      <name>X_PersonalFirewallEnabled</name>
      <dataType>boolean</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>X_Uptime</name>
      <dataType>ui4</dataType>
    </stateVariable>
</serviceStateTable>
```

The following **action** is defined in the service description above:

X_GetICSStatistics: Provides the ability to retrieve uptime information for an Internet gateway device. This action uses the following errors:

Value	Meaning
402	Invalid Args, as defined in [UPNPWCIC] section 2.4.1.4.
501	Action Failed, as defined in [UPNPWCIC] section 2.4.1.4.

The following state variables are defined in the service description above:

X_Uptime: The number of seconds since the IGD has started. This is the same value as the *Uptime* variable in the WANIPConnection or WANPPPConnection service.

X_PersonalFirewallEnabled: If the WAN interface on the Internet gateway device is protected by a firewall, this SHOULD<1> be set to TRUE; otherwise FALSE.

2.3   WANIPConnection Extensions

The WANIPConnection service is specified in [UPNPWIPC]. Its **service description** is extended as follows, in the UPnP Template Language.

```
<serviceStateTable>
  <stateVariable sendEvents="yes">
    <name>X_Name</name>
    <dataType>string</dataType>
  </stateVariable>
</serviceStateTable>
```

The following state variable is defined in the service description above:

X_Name: The interface alias of the external (WAN) interface of the Internet gateway device.

2.4   WANPPPConnection Extensions

The WANPPPConnection service is specified in [UPNPWPPC]. Its **service description** is extended as follows, in the UPnP Template Language.

```
<serviceStateTable>
  <stateVariable sendEvents="yes">
    <name>X_Name</name>
    <dataType>string</dataType>
  </stateVariable>
</serviceStateTable>
```

The following state variable is defined in the service description above:

X_Name: The interface alias of the external (WAN) interface of the Internet gateway device.

3   Structure Examples

3.1   OSInfo

In this example, the IGD is named "SAMPLE-IGD", and a client retrieves operating system information. It does so as follows.

1. The client discovers the XML schema for the OS info service as specified in [UPNPARCH1.1] section 1.

2. The IGD responds with the OSInfo **service description** specified in section 2.1.

3. The client then invokes the MagicOn **action** on the OSInfo service.

4. The IGD responds with the following data.

```
<?xml version="1.0"?>
<e:propertyset xmlns:e="urn:schemas-upnp-org:event-1-0">
<e:property><OSMajorVersion xmlns:dt="urn:schemas-microsoft-com:datatypes"
dt:dt="i4">6</OSMajorVersion></e:property>
<e:property><OSMinorVersion xmlns:dt="urn:schemas-microsoft-com:datatypes"
dt:dt="i4">1</OSMinorVersion></e:property>
<e:property><OSBuildNumber xmlns:dt="urn:schemas-microsoft-com:datatypes"
dt:dt="i4">7600</OSBuildNumber></e:property>
<e:property><OSMachineName xmlns:dt="urn:schemas-microsoft-com:datatypes"
dt:dt="string">SAMPLE-IGD</OSMachineName></e:property>
</e:propertyset>
```

3.2   WANCommonInterfaceConfig

In the example below, the client computes rate information across a 5-second period of time.

1. The client invokes the WANCommonInterfaceConfig service with **action** X_GetICSStatistics.

2. The IGD returns statistics, including an uptime in the X_Uptime variable.

3. The client remembers the first set of results, and waits for 5 seconds.

4. The client again invokes WANCommonInterfaceConfig service with action X_GetICSStatistics.

5. The IGD returns statistics, including an uptime in the X_Uptime variable.

6. The client then uses the two sets of information to compute rate information. For example, incoming bandwidth usage would be (currrent TotalBytesReceived – previous TotalBytesReceived) / (current X_Uptime – previous X_Uptime).

4 Security

4.1 Security Considerations for Implementers

This document has the same security considerations as those defined in [UPNPARCH1.1].

Note that the OS_MachineName could be considered private information. Also operating system version number information could be used to fingerprint the device in order to identify potential vulnerabilities.

4.2 Index of Security Fields

None.

5   Appendix A: XML schema

The full **service description** for the OSInfo service appears in section 2.1. The full service descriptions for the services extended are given in the following sections.

5.1   WAN Common Interface Config

```xml
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
<specVersion>
<major>1</major>
<minor>0</minor>
</specVersion>
<actionList>
    <action>
      <name>GetCommonLinkProperties</name>
      <argumentList>
        <argument>
          <name>NewWANAccessType</name>
          <direction>out</direction>
          <relatedStateVariable>WANAccessType</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLayer1UpstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>Layer1UpstreamMaxBitRate</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLayer1DownstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>Layer1DownstreamMaxBitRate</relatedStateVariable>
        </argument>
        <argument>
          <name>NewPhysicalLinkStatus</name>
          <direction>out</direction>
          <relatedStateVariable>PhysicalLinkStatus</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTotalBytesSent</name>
      <argumentList>
        <argument>
          <name>NewTotalBytesSent</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesSent</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTotalBytesReceived</name>
      <argumentList>
        <argument>
          <name>NewTotalBytesReceived</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesReceived</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTotalPacketsSent</name>
      <argumentList>
        <argument>
          <name>NewTotalPacketsSent</name>
          <direction>out</direction>
```

```xml
          <relatedStateVariable>TotalPacketsSent</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTotalPacketsReceived</name>
      <argumentList>
        <argument>
          <name>NewTotalPacketsReceived</name>
          <direction>out</direction>
         <relatedStateVariable>TotalPacketsReceived</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>X_GetICSStatistics</name>
      <argumentList>
        <argument>
          <name>TotalBytesSent</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesSent</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalBytesReceived</name>
          <direction>out</direction>
          <relatedStateVariable>TotalBytesReceived</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalPacketsSent</name>
          <direction>out</direction>
          <relatedStateVariable>TotalPacketsSent</relatedStateVariable>
        </argument>
        <argument>
          <name>TotalPacketsReceived</name>
          <direction>out</direction>
          <relatedStateVariable>TotalPacketsReceived</relatedStateVariable>
        </argument>
        <argument>
          <name>Layer1DownstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>Layer1DownstreamMaxBitRate</relatedStateVariable>
        </argument>
        <argument>
          <name>Uptime</name>
          <direction>out</direction>
          <relatedStateVariable>X Uptime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
</actionList>
<serviceStateTable>
<stateVariable sendEvents="no">
<name>WANAccessType</name>
<dataType>string</dataType>
<allowedValueList>
<allowedValue>DSL</allowedValue>
<allowedValue>POTS</allowedValue>
<allowedValue>Cable</allowedValue>
<allowedValue>Ethernet</allowedValue>
<allowedValue>Other</allowedValue>
</allowedValueList>
</stateVariable>
<stateVariable sendEvents="no">
<name>Layer1UpstreamMaxBitRate</name>
<dataType>ui4</dataType>
</stateVariable>
<stateVariable sendEvents="no">
<name>Layer1DownstreamMaxBitRate</name>
<dataType>ui4</dataType>
```

```
    </stateVariable>
<stateVariable sendEvents="yes">
<name>PhysicalLinkStatus</name>
<dataType>string</dataType>
        <allowedValueList>
          <allowedValue>Up</allowedValue>
          <allowedValue>Down</allowedValue>
          <allowedValue>Initializing</allowedValue>
          <allowedValue>Unavailable</allowedValue>
        </allowedValueList>
</stateVariable>
    <stateVariable sendEvents="no">
      <name>WANAccessProvider</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>MaximumActiveConnections</name>
      <dataType>ui2</dataType>
      <allowedValueRange>
        <minimum>1</minimum>
        <maximum></maximum>
        <step>1</step>
      </allowedValueRange>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>TotalBytesSent</name>
      <dataType>ui4</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>TotalBytesReceived</name>
      <dataType>ui4</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>TotalPacketsSent</name>
      <dataType>ui4</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>TotalPacketsReceived</name>
      <dataType>ui4</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>X PersonalFirewallEnabled</name>
      <dataType>boolean</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>X Uptime</name>
      <dataType>ui4</dataType>
    </stateVariable>
</serviceStateTable>
</scpd>
```

5.2   WAN IP Connection

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
      <name>SetConnectionType</name>
      <argumentList>
        <argument>
          <name>NewConnectionType</name>
          <direction>in</direction>
```

```xml
          <relatedStateVariable>ConnectionType</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetConnectionTypeInfo</name>
      <argumentList>
        <argument>
         <name>NewConnectionType</name>
         <direction>out</direction>
         <relatedStateVariable>ConnectionType</relatedStateVariable>
        </argument>
        <argument>
         <name>NewPossibleConnectionTypes</name>
         <direction>out</direction>
         <relatedStateVariable>PossibleConnectionTypes</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>RequestConnection</name>
    </action>
    <action>
      <name>ForceTermination</name>
    </action>
    <action>
     <name>GetStatusInfo</name>
      <argumentList>
        <argument>
          <name>NewConnectionStatus</name>
          <direction>out</direction>
          <relatedStateVariable>ConnectionStatus</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLastConnectionError</name>
          <direction>out</direction>
          <relatedStateVariable>LastConnectionError</relatedStateVariable>
        </argument>
        <argument>
          <name>NewUptime</name>
          <direction>out</direction>
          <relatedStateVariable>Uptime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetNATRSIPStatus</name>
      <argumentList>
        <argument>
          <name>NewRSIPAvailable</name>
          <direction>out</direction>
          <relatedStateVariable>RSIPAvailable</relatedStateVariable>
        </argument>
        <argument>
          <name>NewNATEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>NATEnabled</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetGenericPortMappingEntry</name>
      <argumentList>
        <argument>
          <name>NewPortMappingIndex</name>
          <direction>in</direction>
          <relatedStateVariable>PortMappingNumberOfEntries</relatedStateVariable>
        </argument>
        <argument>
```

```xml
          <name>NewRemoteHost</name>
          <direction>out</direction>
          <relatedStateVariable>RemoteHost</relatedStateVariable>
        </argument>
        <argument>
          <name>NewExternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>ExternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewProtocol</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>InternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalClient</name>
          <direction>out</direction>
          <relatedStateVariable>InternalClient</relatedStateVariable>
        </argument>
        <argument>
          <name>NewEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
        </argument>
        <argument>
          <name>NewPortMappingDescription</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingDescription</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLeaseDuration</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetSpecificPortMappingEntry</name>
      <argumentList>
        <argument>
          <name>NewRemoteHost</name>
          <direction>in</direction>
          <relatedStateVariable>RemoteHost</relatedStateVariable>
        </argument>
        <argument>
          <name>NewExternalPort</name>
          <direction>in</direction>
          <relatedStateVariable>ExternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewProtocol</name>
          <direction>in</direction>
          <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>InternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalClient</name>
          <direction>out</direction>
          <relatedStateVariable>InternalClient</relatedStateVariable>
        </argument>
```

```xml
          <argument>
            <name>NewEnabled</name>
            <direction>out</direction>
            <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
          </argument>
          <argument>
            <name>NewPortMappingDescription</name>
            <direction>out</direction>
            <relatedStateVariable>PortMappingDescription</relatedStateVariable>
          </argument>
          <argument>
            <name>NewLeaseDuration</name>
            <direction>out</direction>
            <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
      <action>
        <name>AddPortMapping</name>
        <argumentList>
          <argument>
            <name>NewRemoteHost</name>
            <direction>in</direction>
            <relatedStateVariable>RemoteHost</relatedStateVariable>
          </argument>
          <argument>
            <name>NewExternalPort</name>
            <direction>in</direction>
            <relatedStateVariable>ExternalPort</relatedStateVariable>
          </argument>
          <argument>
            <name>NewProtocol</name>
            <direction>in</direction>
            <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
          </argument>
          <argument>
            <name>NewInternalPort</name>
            <direction>in</direction>
            <relatedStateVariable>InternalPort</relatedStateVariable>
          </argument>
          <argument>
            <name>NewInternalClient</name>
            <direction>in</direction>
            <relatedStateVariable>InternalClient</relatedStateVariable>
          </argument>
          <argument>
            <name>NewEnabled</name>
            <direction>in</direction>
            <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
          </argument>
          <argument>
            <name>NewPortMappingDescription</name>
            <direction>in</direction>
            <relatedStateVariable>PortMappingDescription</relatedStateVariable>
          </argument>
          <argument>
            <name>NewLeaseDuration</name>
            <direction>in</direction>
            <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
      <action>
        <name>DeletePortMapping</name>
        <argumentList>
          <argument>
            <name>NewRemoteHost</name>
            <direction>in</direction>
            <relatedStateVariable>RemoteHost</relatedStateVariable>
```

```xml
            </argument>
            <argument>
              <name>NewExternalPort</name>
              <direction>in</direction>
              <relatedStateVariable>ExternalPort</relatedStateVariable>
            </argument>
            <argument>
              <name>NewProtocol</name>
              <direction>in</direction>
              <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
            </argument>
          </argumentList>
      </action>
      <action>
      <name>GetExternalIPAddress</name>
        <argumentList>
          <argument>
            <name>NewExternalIPAddress</name>
            <direction>out</direction>
          <relatedStateVariable>ExternalIPAddress</relatedStateVariable>
          </argument>
        </argumentList>
      </action>
  </actionList>
  <serviceStateTable>
    <stateVariable sendEvents="no">
      <name>ConnectionType</name>
      <dataType>string</dataType>
      <defaultValue>Unconfigured</defaultValue>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>PossibleConnectionTypes</name>
      <dataType>string</dataType>
      <allowedValueList>
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        <allowedValue>IP Routed</allowedValue>
        <allowedValue>IP_Bridged</allowedValue>
      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>ConnectionStatus</name>
      <dataType>string</dataType>
      <defaultValue>Unconfigured</defaultValue>
      <allowedValueList>
        <allowedValue>Unconfigured</allowedValue>
      <allowedValue>Connecting</allowedValue>
      <allowedValue>Authenticating</allowedValue>
        <allowedValue>PendingDisconnect</allowedValue>
        <allowedValue>Disconnecting</allowedValue>
        <allowedValue>Disconnected</allowedValue>
        <allowedValue>Connected</allowedValue>
      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>Uptime</name>
      <dataType>ui4</dataType>
      <defaultValue>0</defaultValue>
      <allowedValueRange>
        <minimum>0</minimum>
        <maximum></maximum>
        <step>1</step>
      </allowedValueRange>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>RSIPAvailable</name>
      <dataType>boolean</dataType>
      <defaultValue>0</defaultValue>
    </stateVariable>
    <stateVariable sendEvents="no">
```

```
      <name>NATEnabled</name>
      <dataType>boolean</dataType>
      <defaultValue>1</defaultValue>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>X Name</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>LastConnectionError</name>
      <dataType>string</dataType>
      <defaultValue>ERROR_NONE</defaultValue>
      <allowedValueList>
        <allowedValue>ERROR_NONE</allowedValue>
        <allowedValue>ERROR_ISP_TIME_OUT</allowedValue>
        <allowedValue>ERROR_COMMAND_ABORTED</allowedValue>
        <allowedValue>ERROR_NOT_ENABLED_FOR_INTERNET</allowedValue>
        <allowedValue>ERROR_BAD_PHONE_NUMBER</allowedValue>
        <allowedValue>ERROR_USER_DISCONNECT</allowedValue>
        <allowedValue>ERROR_ISP_DISCONNECT</allowedValue>
        <allowedValue>ERROR_IDLE_DISCONNECT</allowedValue>
        <allowedValue>ERROR_FORCED_DISCONNECT</allowedValue>
        <allowedValue>ERROR_SERVER_OUT_OF_RESOURCES</allowedValue>
        <allowedValue>ERROR_RESTRICTED_LOGON_HOURS</allowedValue>
        <allowedValue>ERROR_ACCOUNT_DISABLED</allowedValue>
        <allowedValue>ERROR_ACCOUNT_EXPIRED</allowedValue>
        <allowedValue>ERROR_PASSWORD_EXPIRED</allowedValue>
        <allowedValue>ERROR_AUTHENTICATION_FAILURE</allowedValue>
        <allowedValue>ERROR_NO_DIALTONE</allowedValue>
        <allowedValue>ERROR_NO_CARRIER</allowedValue>
        <allowedValue>ERROR_NO_ANSWER</allowedValue>
        <allowedValue>ERROR_LINE_BUSY</allowedValue>
        <allowedValue>ERROR_UNSUPPORTED_BITSPERSECOND</allowedValue>
        <allowedValue>ERROR_TOO_MANY_LINE_ERRORS</allowedValue>
        <allowedValue>ERROR_IP_CONFIGURATION</allowedValue>
        <allowedValue>ERROR_UNKNOWN</allowedValue>
      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>ExternalIPAddress</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>RemoteHost</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>ExternalPort</name>
      <dataType>ui2</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>InternalPort</name>
      <dataType>ui2</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>PortMappingProtocol</name>
      <dataType>string</dataType>
      <allowedValueList>
        <allowedValue>TCP</allowedValue>
        <allowedValue>UDP</allowedValue>
      </allowedValueList>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>InternalClient</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>PortMappingDescription</name>
      <dataType>string</dataType>
```

```xml
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>PortMappingEnabled</name>
          <dataType>boolean</dataType>
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>PortMappingLeaseDuration</name>
          <dataType>ui4</dataType>
        </stateVariable>
        <stateVariable sendEvents="yes">
          <name>PortMappingNumberOfEntries</name>
          <dataType>ui2</dataType>
        </stateVariable>
      </serviceStateTable>
    </scpd>
```

5.3   WAN PPP Connection

```xml
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
      <name>SetConnectionType</name>
      <argumentList>
        <argument>
          <name>NewConnectionType</name>
          <direction>in</direction>
          <relatedStateVariable>ConnectionType</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetConnectionTypeInfo</name>
      <argumentList>
        <argument>
          <name>NewConnectionType</name>
          <direction>out</direction>
          <relatedStateVariable>ConnectionType</relatedStateVariable>
        </argument>
        <argument>
          <name>NewPossibleConnectionTypes</name>
          <direction>out</direction>
          <relatedStateVariable>PossibleConnectionTypes</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>RequestConnection</name>
    </action>
    <action>
      <name>ForceTermination</name>
    </action>
    <action>
     <name>GetStatusInfo</name>
      <argumentList>
        <argument>
          <name>NewConnectionStatus</name>
          <direction>out</direction>
          <relatedStateVariable>ConnectionStatus</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLastConnectionError</name>
```

```xml
          <direction>out</direction>
          <relatedStateVariable>LastConnectionError</relatedStateVariable>
        </argument>
        <argument>
          <name>NewUptime</name>
          <direction>out</direction>
          <relatedStateVariable>Uptime</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetNATRSIPStatus</name>
      <argumentList>
        <argument>
          <name>NewRSIPAvailable</name>
          <direction>out</direction>
          <relatedStateVariable>RSIPAvailable</relatedStateVariable>
        </argument>
        <argument>
          <name>NewNATEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>NATEnabled</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetLinkLayerMaxBitRates</name>
      <argumentList>
        <argument>
          <name>NewUpstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>UpstreamMaxBitRate</relatedStateVariable>
        </argument>
        <argument>
          <name>NewDownstreamMaxBitRate</name>
          <direction>out</direction>
          <relatedStateVariable>DownstreamMaxBitRate</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetGenericPortMappingEntry</name>
      <argumentList>
        <argument>
          <name>NewPortMappingIndex</name>
          <direction>in</direction>
          <relatedStateVariable>PortMappingNumberOfEntries</relatedStateVariable>
        </argument>
        <argument>
          <name>NewRemoteHost</name>
          <direction>out</direction>
          <relatedStateVariable>RemoteHost</relatedStateVariable>
        </argument>
        <argument>
          <name>NewExternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>ExternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewProtocol</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>InternalPort</relatedStateVariable>
        </argument>
        <argument>
```

```xml
          <name>NewInternalClient</name>
          <direction>out</direction>
          <relatedStateVariable>InternalClient</relatedStateVariable>
        </argument>
        <argument>
          <name>NewEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
        </argument>
        <argument>
          <name>NewPortMappingDescription</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingDescription</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLeaseDuration</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>GetSpecificPortMappingEntry</name>
      <argumentList>
        <argument>
          <name>NewRemoteHost</name>
          <direction>in</direction>
          <relatedStateVariable>RemoteHost</relatedStateVariable>
        </argument>
        <argument>
          <name>NewExternalPort</name>
          <direction>in</direction>
          <relatedStateVariable>ExternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewProtocol</name>
          <direction>in</direction>
          <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalPort</name>
          <direction>out</direction>
          <relatedStateVariable>InternalPort</relatedStateVariable>
        </argument>
        <argument>
          <name>NewInternalClient</name>
          <direction>out</direction>
          <relatedStateVariable>InternalClient</relatedStateVariable>
        </argument>
        <argument>
          <name>NewEnabled</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
        </argument>
        <argument>
          <name>NewPortMappingDescription</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingDescription</relatedStateVariable>
        </argument>
        <argument>
          <name>NewLeaseDuration</name>
          <direction>out</direction>
          <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
        </argument>
      </argumentList>
    </action>
    <action>
      <name>AddPortMapping</name>
      <argumentList>
```

```xml
      <argument>
        <name>NewRemoteHost</name>
        <direction>in</direction>
        <relatedStateVariable>RemoteHost</relatedStateVariable>
      </argument>
      <argument>
        <name>NewExternalPort</name>
        <direction>in</direction>
        <relatedStateVariable>ExternalPort</relatedStateVariable>
      </argument>
      <argument>
        <name>NewProtocol</name>
        <direction>in</direction>
        <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
      </argument>
      <argument>
        <name>NewInternalPort</name>
        <direction>in</direction>
        <relatedStateVariable>InternalPort</relatedStateVariable>
      </argument>
      <argument>
        <name>NewInternalClient</name>
        <direction>in</direction>
        <relatedStateVariable>InternalClient</relatedStateVariable>
      </argument>
      <argument>
        <name>NewEnabled</name>
        <direction>in</direction>
        <relatedStateVariable>PortMappingEnabled</relatedStateVariable>
      </argument>
      <argument>
        <name>NewPortMappingDescription</name>
        <direction>in</direction>
        <relatedStateVariable>PortMappingDescription</relatedStateVariable>
      </argument>
      <argument>
        <name>NewLeaseDuration</name>
        <direction>in</direction>
        <relatedStateVariable>PortMappingLeaseDuration</relatedStateVariable>
      </argument>
    </argumentList>
  </action>
  <action>
    <name>DeletePortMapping</name>
    <argumentList>
      <argument>
        <name>NewRemoteHost</name>
        <direction>in</direction>
        <relatedStateVariable>RemoteHost</relatedStateVariable>
      </argument>
      <argument>
        <name>NewExternalPort</name>
        <direction>in</direction>
        <relatedStateVariable>ExternalPort</relatedStateVariable>
      </argument>
      <argument>
        <name>NewProtocol</name>
        <direction>in</direction>
        <relatedStateVariable>PortMappingProtocol</relatedStateVariable>
      </argument>
    </argumentList>
  </action>
  <action>
<name>GetExternalIPAddress</name>
  <argumentList>
    <argument>
      <name>NewExternalIPAddress</name>
      <direction>out</direction>
    <relatedStateVariable>ExternalIPAddress</relatedStateVariable>
```

```xml
            </argument>
          </argumentList>
        </action>
      </actionList>
      <serviceStateTable>
        <stateVariable sendEvents="no">
          <name>ConnectionType</name>
          <dataType>string</dataType>
          <defaultValue>Unconfigured</defaultValue>
        </stateVariable>
        <stateVariable sendEvents="yes">
          <name>PossibleConnectionTypes</name>
          <dataType>string</dataType>
          <defaultValue>Unconfigured</defaultValue>
        </stateVariable>
        <stateVariable sendEvents="yes">
          <name>ConnectionStatus</name>
          <dataType>string</dataType>
          <defaultValue>Unconfigured</defaultValue>
          <allowedValueList>
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            <allowedValue>Connecting</allowedValue>
            <allowedValue>Authenticating</allowedValue>
            <allowedValue>PendingDisconnect</allowedValue>
            <allowedValue>Disconnecting</allowedValue>
            <allowedValue>Disconnected</allowedValue>
            <allowedValue>Connected</allowedValue>
          </allowedValueList>
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>Uptime</name>
          <dataType>ui4</dataType>
          <defaultValue>0</defaultValue>
          <allowedValueRange>
            <minimum>0</minimum>
            <maximum></maximum>
            <step>1</step>
          </allowedValueRange>
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>UpstreamMaxBitRate</name>
          <dataType>ui4</dataType>
          <defaultValue>0</defaultValue>
          <allowedValueRange>
            <minimum>0</minimum>
            <maximum></maximum>
            <step></step>
          </allowedValueRange>
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>DownstreamMaxBitRate</name>
          <dataType>ui4</dataType>
          <defaultValue>0</defaultValue>
          <allowedValueRange>
            <minimum>0</minimum>
            <maximum></maximum>
            <step></step>
          </allowedValueRange>
        </stateVariable>
        <stateVariable sendEvents="no">
          <name>LastConnectionError</name>
          <dataType>string</dataType>
          <defaultValue>ERROR NONE</defaultValue>
          <allowedValueList>
            <allowedValue>ERROR NONE</allowedValue>
            <allowedValue>ERROR_ISP_TIME_OUT</allowedValue>
            <allowedValue>ERROR_COMMAND_ABORTED</allowedValue>
            <allowedValue>ERROR_NOT_ENABLED_FOR_INTERNET</allowedValue>
            <allowedValue>ERROR_BAD_PHONE_NUMBER</allowedValue>
```

```xml
      <allowedValue>ERROR_USER_DISCONNECT</allowedValue>
      <allowedValue>ERROR_ISP_DISCONNECT</allowedValue>
      <allowedValue>ERROR_IDLE_DISCONNECT</allowedValue>
      <allowedValue>ERROR_FORCED_DISCONNECT</allowedValue>
      <allowedValue>ERROR_SERVER_OUT_OF_RESOURCES</allowedValue>
      <allowedValue>ERROR_RESTRICTED_LOGON_HOURS</allowedValue>
      <allowedValue>ERROR_ACCOUNT_DISABLED</allowedValue>
      <allowedValue>ERROR_ACCOUNT_EXPIRED</allowedValue>
      <allowedValue>ERROR_PASSWORD_EXPIRED</allowedValue>
      <allowedValue>ERROR_AUTHENTICATION_FAILURE</allowedValue>
      <allowedValue>ERROR_NO_DIALTONE</allowedValue>
      <allowedValue>ERROR_NO_CARRIER</allowedValue>
      <allowedValue>ERROR_NO_ANSWER</allowedValue>
      <allowedValue>ERROR_LINE_BUSY</allowedValue>
      <allowedValue>ERROR_UNSUPPORTED_BITSPERSECOND</allowedValue>
      <allowedValue>ERROR_TOO_MANY_LINE_ERRORS</allowedValue>
      <allowedValue>ERROR_IP_CONFIGURATION</allowedValue>
      <allowedValue>ERROR_UNKNOWN</allowedValue>
    </allowedValueList>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>RSIPAvailable</name>
    <dataType>boolean</dataType>
    <defaultValue>0</defaultValue>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>NATEnabled</name>
    <dataType>boolean</dataType>
    <defaultValue>1</defaultValue>
  </stateVariable>
  <stateVariable sendEvents="yes">
    <name>X_Name</name>
    <dataType>string</dataType>
  </stateVariable>
  <stateVariable sendEvents="yes">
    <name>ExternalIPAddress</name>
    <dataType>string</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>RemoteHost</name>
    <dataType>string</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>ExternalPort</name>
    <dataType>ui2</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>InternalPort</name>
    <dataType>ui2</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>PortMappingProtocol</name>
    <dataType>string</dataType>
    <allowedValueList>
      <allowedValue>TCP</allowedValue>
      <allowedValue>UDP</allowedValue>
    </allowedValueList>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>InternalClient</name>
    <dataType>string</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>PortMappingDescription</name>
    <dataType>string</dataType>
  </stateVariable>
  <stateVariable sendEvents="no">
    <name>PortMappingEnabled</name>
    <dataType>boolean</dataType>
```

```
      </stateVariable>
      <stateVariable sendEvents="no">
        <name>PortMappingLeaseDuration</name>
        <dataType>ui4</dataType>
      </stateVariable>
      <stateVariable sendEvents="yes">
        <name>PortMappingNumberOfEntries</name>
        <dataType>ui2</dataType>
      </stateVariable>
    </serviceStateTable>
  </scpd>
```

6   Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Windows XP operating system

- Windows Server 2003 operating system

- Windows Vista operating system

- Windows Server 2008 operating system

- Windows 7 operating system

- Windows Server 2008 R2 operating system

- Windows 8 operating system

- Windows Server 2012 operating system

- Windows 8.1 operating system

- Windows Server 2012 R2 operating system

- Windows 10 operating system

- Windows Server 2016 operating system

- Windows Server 2019 operating system

- Windows Server 2022 operating system

- Windows 11 operating system

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

<1> Section 2.2: Windows XP and Windows Server 2003 set X_PersonalFirewallEnabled to TRUE, if the Internet connection firewall is enabled on the WAN interface of the gateway device. If any other firewall is used, X_PersonalFirewallEnabled is set to FALSE. All other versions of Windows always set X_PersonalFirewallEnabled to FALSE.

7   Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Description	Revision class
6 Appendix B: Product Behavior	Updated for this version of Windows Client.	Major

8 Index