# ISO/IEC 29341-8-1

Edition 1.0 2008-11

# INTERNATIONAL STANDARD



## Information technology – UPnP Device Architecture – Part 8-1: Internet Gateway Device Control Protocol – Internet Gateway Device



ISO/IEC 29341-8-1:2008(E)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE E

ICS 35.200

ISBN 2-8318-1009-2

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The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Universal plug and play (UPnP) architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

# ORIGINAL UPNP DOCUMENTS
(informative)

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

| UPnP Document Title | ISO/IEC 29341 Part |
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| UPnP Device Architecture 1.0 | ISO/IEC 29341-1 |
| UPnP Basic:1 Device | ISO/IEC 29341-2 |
| UPnP AV Architecture:1 | ISO/IEC 29341-3-1 |
| UPnP MediaRenderer:1 Device | ISO/IEC 29341-3-2 |
| UPnP MediaServer:1 Device | ISO/IEC 29341-3-3 |
| UPnP AVTransport:1 Service | ISO/IEC 29341-3-10 |
| UPnP ConnectionManager:1 Service | ISO/IEC 29341-3-11 |
| UPnP ContentDirectory:1 Service | ISO/IEC 29341-3-12 |
| UPnP RenderingControl:1 Service | ISO/IEC 29341-3-13 |
| UPnP MediaRenderer:2 Device | ISO/IEC 29341-4-2 |
| UPnP MediaServer:2 Device | ISO/IEC 29341-4-3 |
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| UPnP RemoteUIServer:1 Service | ISO/IEC 29341-12-11 |
| UPnP DeviceSecurity:1 Service | ISO/IEC 29341-13-10 |
| UPnP SecurityConsole:1 Service | ISO/IEC 29341-13-11 |

# 1. Overview and Scope

This device template is compliant with the UPnP Device Architecture, Version 1.0.

This document defines the REQUIRED **ROOT** device
**urn:schemas-upnp-org:device:*InternetGatewayDevice.***

The ***InternetGatewayDevice*** encapsulates all sub-devices and services for the Internet Gateway Device Control Protocol (DCP).

The Internet Gateway is an "edge" interconnect device between a residential Local Area Network (LAN) and the Wide Area Network (WAN), providing connectivity to the Internet. The gateway MAY be physically implemented as a dedicated, standalone device or modeled as a set of UPnP devices and services on a PC. This version of the DCP does not cover small business networks. Discovery and access to these services from outside the home network is not recommended, unless adequate authentication, authorization and access control mechanisms are built into the device, beyond what is currently specified within the UPnP architecture framework.

Figure 1 below is a conceptual illustration of a generic Internet Gateway device consisting of one or more physical WAN and LAN interfaces.

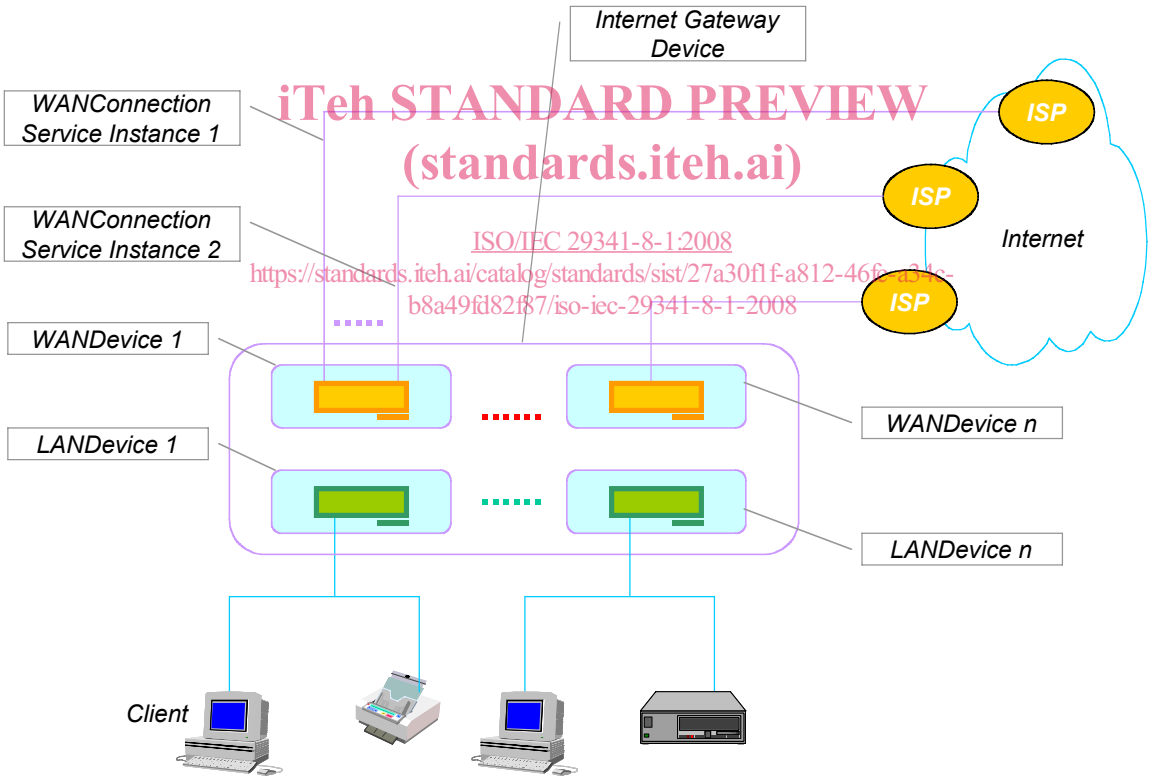



**Figure 1: *InternetGatewayDevice* with LAN and WAN Interfaces**

## 1.1. Requirements for an Internet Gateway Device

The following list of requirements has been identified on the capabilities of an Internet Gateway in coming up with the devices and services hierarchy for the gateway DCP.

- The ***InternetGatewayDevice*** MUST support 1 WAN interface, but MAY support more than one physical WAN interface to connect to the Internet.
- The ***InternetGatewayDevice*** MUST support 1 LAN interface, but MAY support more than one physical LAN interface to connect to the residential network.

An implementation MAY host the WAN interface and LAN interface (mentioned above) on the same physical network interface card (NIC).

- Each WAN interface MUST support one Internet connection, but MAY simultaneously support more than one Internet connection. Each of these connections will be modeled as instances of a service in the DCP.
- The ***InternetGatewayDevice*** must be IP addressable from the residential LAN at all times to be UPnP compliant. More specifically, in the case of gateways with broadband modems on the WAN side, the ***InternetGatewayDevice*** must be addressable
  - When the device is not configured for WAN access or does not have any WAN connectivity
  - Before, during and after modem and link configuration with a head-end device in the Internet service provider's central office.
- Connectivity on the WAN side MUST enable nodes on the residential LAN to access resources on the Internet. A gateway MAY support modems and/or connections on a modem to a service provider, not resulting in Internet connectivity – for example, POTS dial-up access to a modem bank of a home security monitoring service provider. Such connections are outside the scope and requirements of the gateway DCP.

In this document, an Internet connection implies IP connectivity to an Internet Service Provider. Figure 2 illustrates the hierarchy of devices and services in an ***InternetGatewayDevice***. A physical modem on the WAN side and a connection interface/port on the LAN side of the ***InternetGatewayDevice*** are modeled by a ***WANDevice*** and a ***LANDevice*** instance respectively. Depending on the hardware capabilities of an Internet Gateway, more than 1 instance of ***WANDevice*** and/or ***LANDevice*** are possible in an actual implementation of the gateway DCP description document. Virtual connection interfaces – such as Virtual Circuits (VC) on a DSL modem, are modeled by one or more instances of ***WANConnectionDevice***. Sub-devices and services mentioned in this document are defined in companion documents that together specify the DCP for an Internet Gateway.

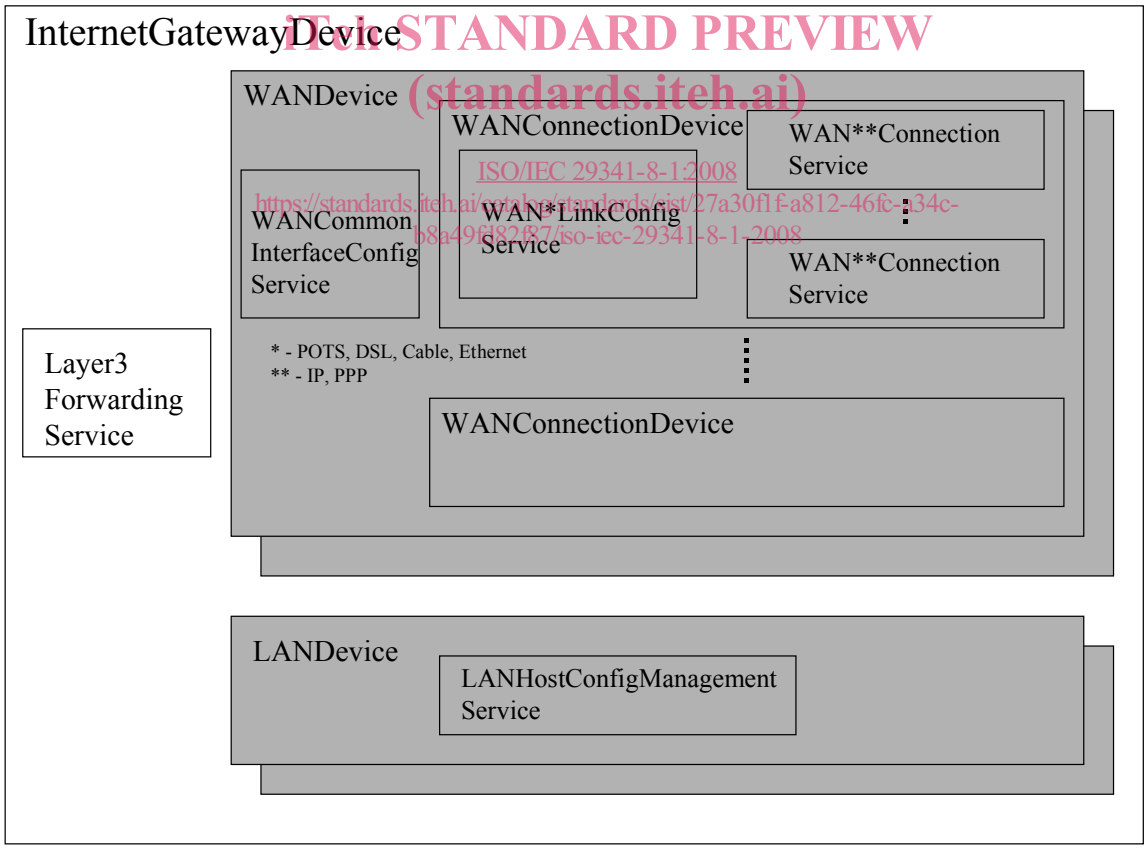




**Figure 2: *InternetGatewayDevice* Devices and Services Hierarchy**

## 1.2. Focus and Goals for DCP version 1.0

The Gateway Working Committee (IGD WC) agreed to focus on the following set of requirements in coming up with the hierarchy of devices and services for DCP v1.0.

- Sharing and configurable initiation of Internet data access among networked devices in the residential network.
- Richer end-user experience for UPnP enabled devices
  - Provide status and events on connections
  - Control of initiation and termination of connections
- Management of host configuration services
  - DHCP, Dynamic DNS (DDNS)
- Preserve ability of non-UPnP devices to initiate and/or share Internet access.

## 1.3. Non-Goals for DCP version 1.0

The following work items were discussed and considered to be beyond the scope of this version of the DCP.

- Configuration and connection management services for an ISDN modem
- Access control and user/device authentication services
- Advanced routing mechanisms across multiple, simultaneous, active connections on multiple WAN interfaces
- LAN interface physical layer services
- Fine-grained configuration and management of features specific to Ethernet bridging across multiple LAN segments / subnets and/or between LAN segments and WAN Internet connection(s).
- VPN services (outside-in or a VPN client initiating from the Internet Gateway)
- Services enabling bandwidth management on active Internet connections
- Exclusivity on initiation and sharing of active connections
- Modeling of firewall features
  - Too many technologies and component layers makes it hard to model
  - May be offered as vendor extensions
- Issues that come up in the context of multiple, simultaneously active Internet Gateway devices – for example, default gateway conflict resolution, load balancing and fail over
- Other non-connectivity related gateway functions
  - Multimedia translation and caching
  - Interfacing to "service" gateways