PCP Working Group
Internet-Draft
Intended status: Informational
Expires: June 5, 2014

M. Boucadair
France Telecom

December 02, 2013

PCP Deployment Models
draft-boucadair-pcp-deployment-cases-01

Abstract

This document lists a set of PCP deployment models.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on June 5, 2014.

Table of Contents

1. Introduction

This document lists a set of PCP [RFC6887] deployment models.

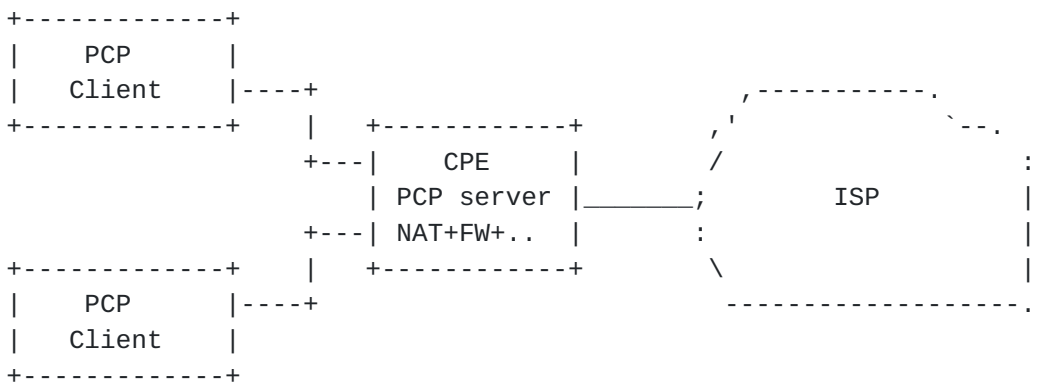
2. Terminology

This document makes use of the following terms:

- PCP server denotes a functional element that receives and processes PCP requests from a PCP client. A PCP server can be co-located with or be separated from the function (e.g., NAT, Firewall) it controls. Refer to [RFC6887].
- PCP client denotes a PCP software instance responsible for issuing PCP requests to a PCP server. Refer to [RFC6887].

3. Single Homed CPE Model: Local PCP Server

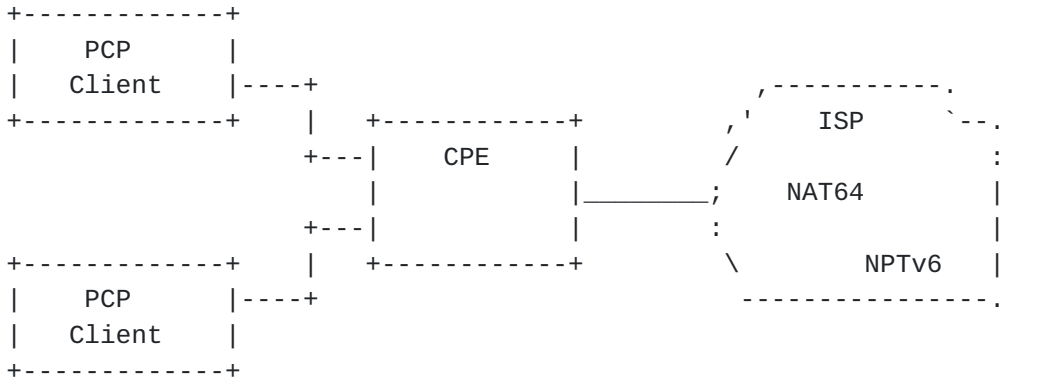
This model assumes PCP is enabled in the LAN side to control functions located in the CPE. The PCP server is reachable with the IP address of the private-faced interface.



4. Single Homed CPE Model: Multiple PCP Servers

This model assumes a customer site is connected to the same ISP's network. One or multiple PCP servers are deployed in the ISP's domain; each of them manage distinct set of functions. In the example shown in the following figure:

- o NAT64 device are used to interwork with IPv4-only devices.
- o NPTv6 function is used for engineering motivation internal to the ISP.



The use of NAT64 and NPTv6 is for illustration purposes; other functions can be enabled.

PCP clients located behind the CPE, must discover both the external IPv4 address and port numbers assigned by the NAT64 and the external IPv6 address assigned by the NPTv6. These external addresses are used for example in referrals to indicate to remote peers both the IPv4 address and IPv6 address to reach an internal server deployed in an IPv6-only domain.

The use of a PCP anycast address ([I-D.ietf-pcp-anycast]) is not recommended for this deployment case because two state entries must be created in both NAT64 and NPTv6. Explicit means such as [I-D.ietf-pcp-dhcp] must be used instead to provision IP addresses of available PCP servers.

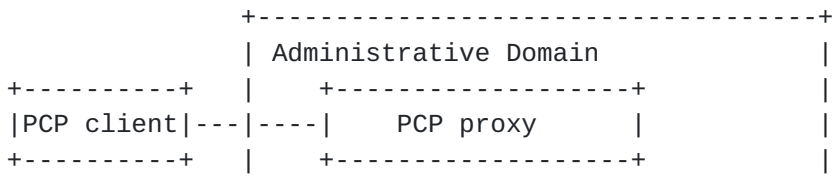
[I-D.ietf-pcp-dhcp] may be used to provision the IP addresses of these PCP servers, or the CPE must embed a PCP proxy function that must follow [I-D.ietf-pcp-server-selection] to contact all PCP servers.

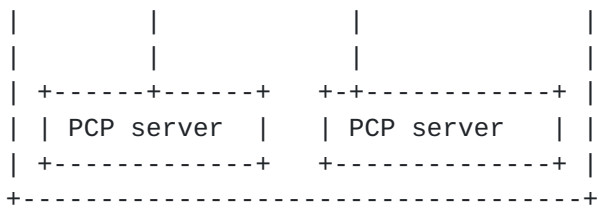
5. Hide PCP Servers Model

5.1. PCP Proxy Model

In order to hide PCP servers deployed within an administrative domain, an administrative entity may decide to deploy in front of PCP clients PCP Proxies [I-D.ietf-pcp-proxy] that are responsible for relaying PCP requests to the appropriate PCP servers:

- In order to prevent single failure scenarios, multiple PCP proxies can be hosted within an administrative domain.
- A PCP proxy can be configured with one or multiple PCP servers.
- Multiple PCP Proxies can be enabled; each of them manages a set of PCP servers.
- A PCP proxy can be configured with the logic indicating how it should proceed to contact upstream PCP servers. The PCP proxy will then follow the procedure defined in [I-D.ietf-pcp-server-selection] to contact those servers.
- Internal PCP clients may be configured with the IP address(es) of the appropriate PCP proxy (e.g., [I-D.ietf-pcp-dhcp]).
  - If all PCP Proxies interact with the same PCP server(s), the same IP address can be provisioned to PCP clients.
  - If PCP Proxies do not interact with the same set of PCP server(s), appropriate IP address(es) are to be returned to each requesting PCP client.





The use of anycast address ([I-D.ietf-pcp-anycast]) is not convenient in this model if available PCP servers do not manage the same set of state entries. Deterministic means should be used instead.

If the PCP proxy is reachable using the PCP anycast address, available PCP servers must not be reachable using the same PCP anycast address.

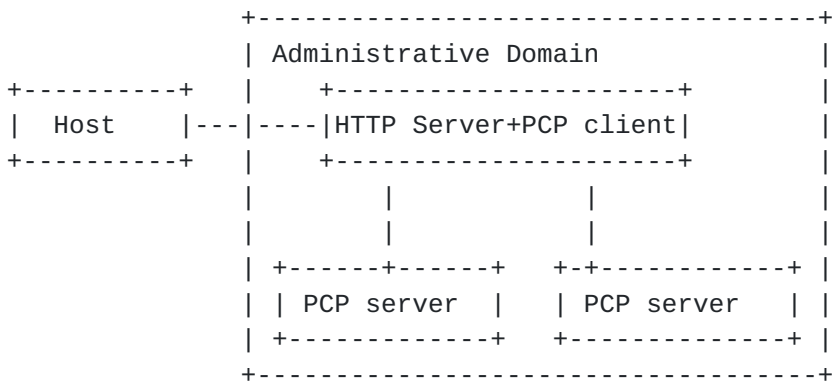
5.2. HTTP-Triggered PCP Client Model

Another deployment model to hide the identity of back-end PCP servers is to relay on HTTP to invoke the PCP service. This model can also be used by operators to accommodate cases where a PCP client implementation is not available at the customer side (e.g., unmanaged CPE model).

The deployment model relies on the following:

- An HTTP administration based interface is provided to the user to create flow-bases forwarding rules.
- The HTTP GUI can be part of a CPE management interface or be provided as part of the customer care portal.
- HTTP requests are translated into appropriate PCP requests in order to install the requested state. The HTTP server embeds also a PCP client.
- The PCP client uses THIRD_PARTY option.
- The PCP client should be configured with PCP server that controls the on-path PCP-controlled device for that user.
- One or multiple PCP servers can be deployed. The logic of contacting these PCP servers may also be explicitly configured. The procedure defined in [I-D.ietf-pcp-server-selection] is used to contact those servers.

- The use of a well-known address ([I-D.ietf-pcp-anycast]) to reach internal PCP servers is not be convenient if all PCP server do not manage the same set of state entries (e.g., NAT64, NPTv6, IPv6 firewall, etc.).



6. Separated PCP Server & PCP-controlled Device Model

This model assumes the PCP server is not co-located with the PCP-controlled device. Moreover:

- In order to prevent single failure scenarios, multiple PCP servers can be hosted within an administrative domain.

- A PCP server can control one or many PCP-controlled devices.

- Multiple PCP servers can be enabled; each of them manages a set of PCP-controlled devices.

- Internal PCP clients are configured with the IP address(es) of the appropriate PCP server.

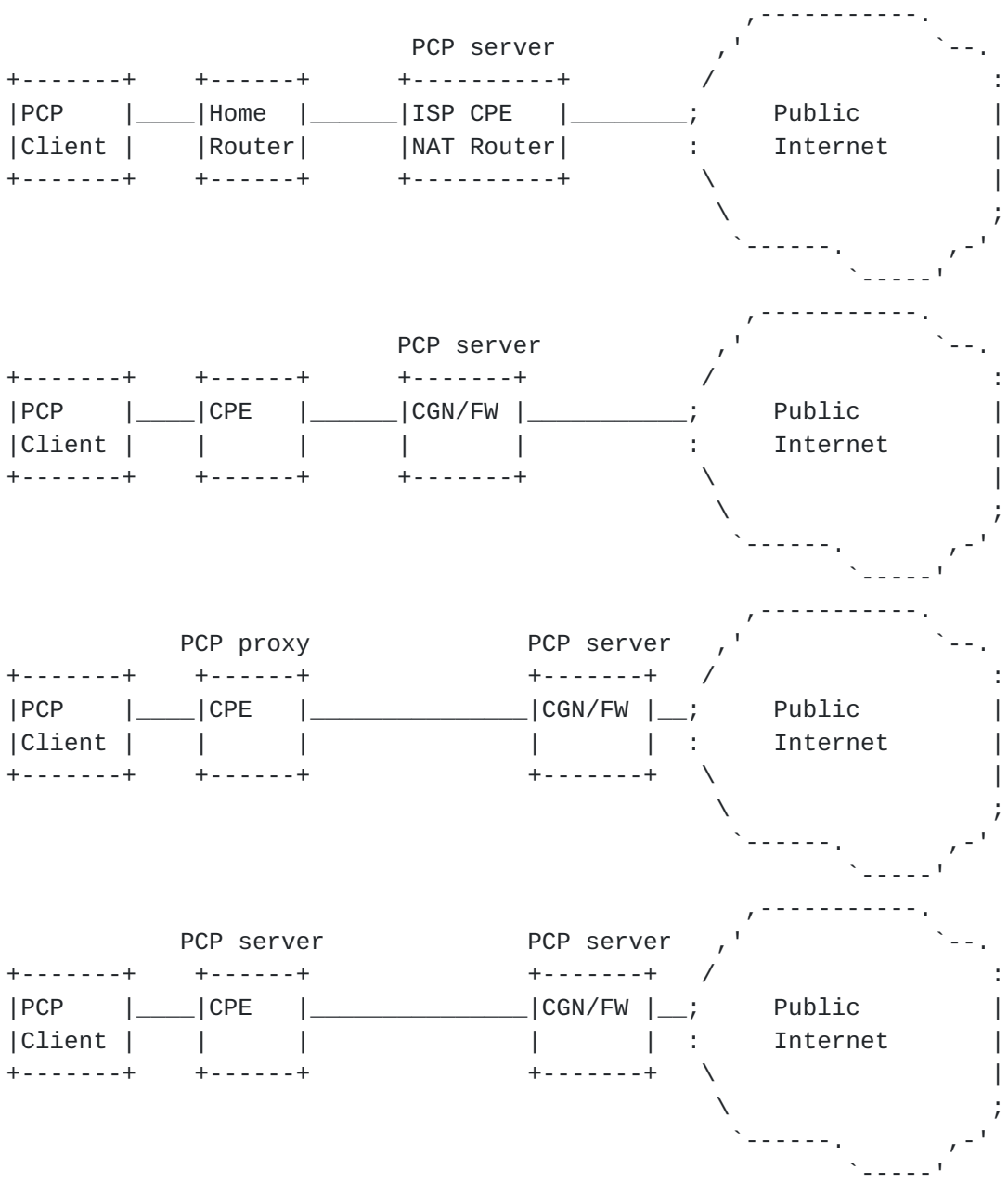
  * If all PCP servers interact with the same PCP-controlled devices., the same IP address can be provisioned to PCP clients.

  * If PCP servers do not interact with the same set of PCP-controlled devices, appropriate IP address(es) are to be returned to each requesting PCP client.

Note, PCP is not used as interface between the PCP server and the PCP-controlled device. Other protocols (e.g., H.248) can be used for that purpose.

7. Cascaded PCP-controlled Nodes Model

This model assumes cascaded PCP-controlled devices are deployed. A typical example is provided below.



This model requires a PCP proxy function [I-D.ietf-pcp-proxy] be deployed in intermediate PCP-controlled devices:

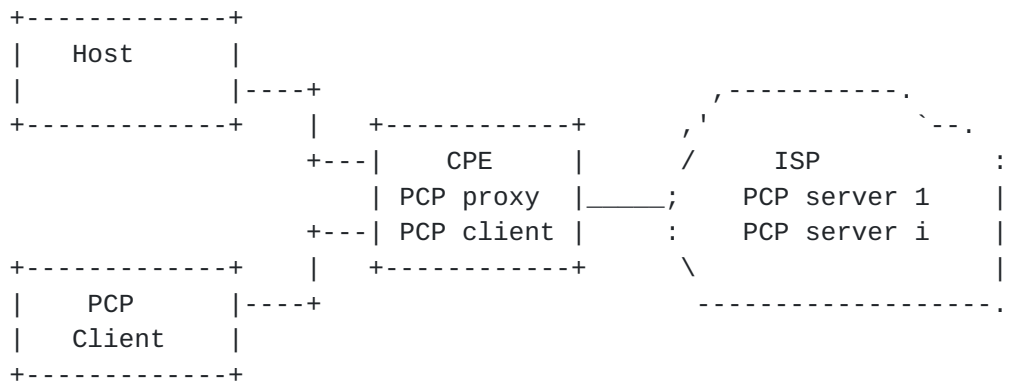
- The PCP client is not aware of the presence of more than one level of PCP servers.
- Each intermediate PCP proxy must contact the appropriate next hop PCP server.

o Because of the statefull nature of PCP, the use of PCP anaycast address may not be appropriate when the PCP server is co-located with the PCP-controlled device.

7.1. Single Homed CPE Model: PCP Proxy Model

This model assumes no PCP-controlled function is located in the CPE (e.g., DS-Lite case). The ultimate PCP server is located in ISP side. The PCP server can be deduced from other provisioning parameters (e.g., use the IP address of the AFTR as PCP server); otherwise the IP address (s) must be discovered by other means.

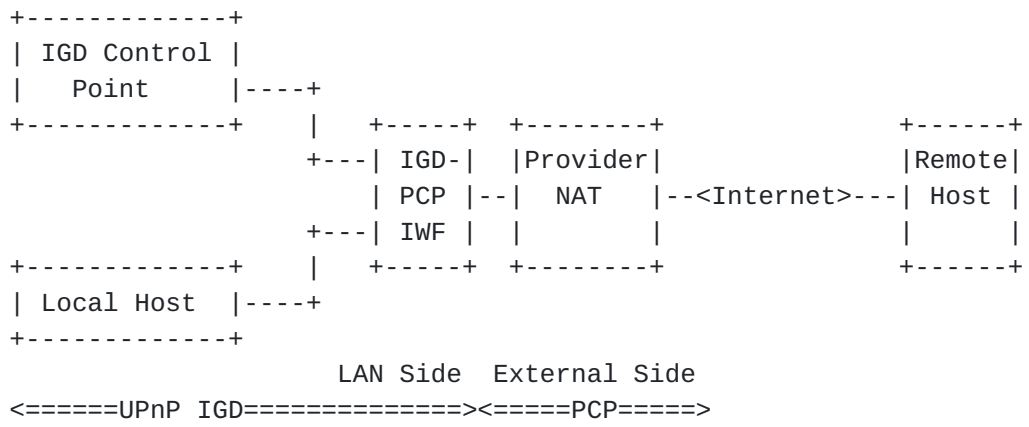
The use of an anycast-based model may not be convenient in some cases (e.g., multiple PCP-controlled devices are deployed; each of them manage a subset of services and state).



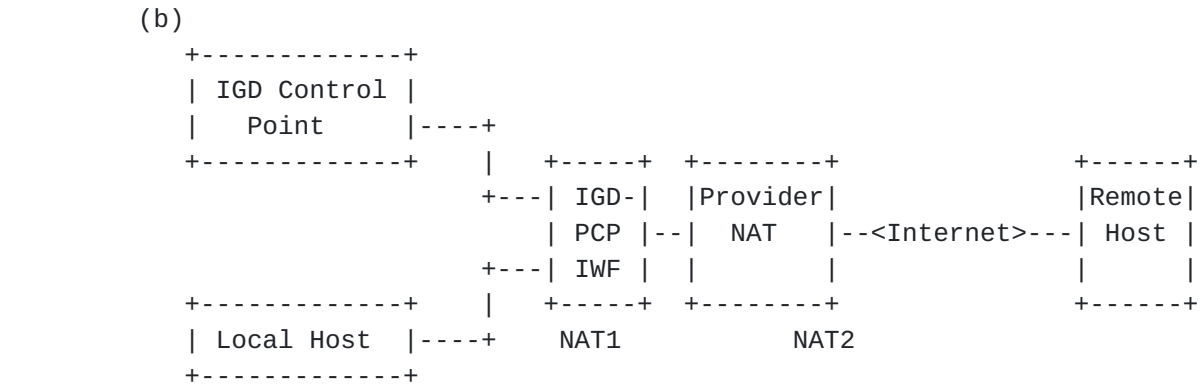
7.2. UPnP IGD-PCP Interworking Model

This model is specified in [RFC6970]. The interworking function must be provisioned with the IP address(es) of remote PCP server(s).

(a)

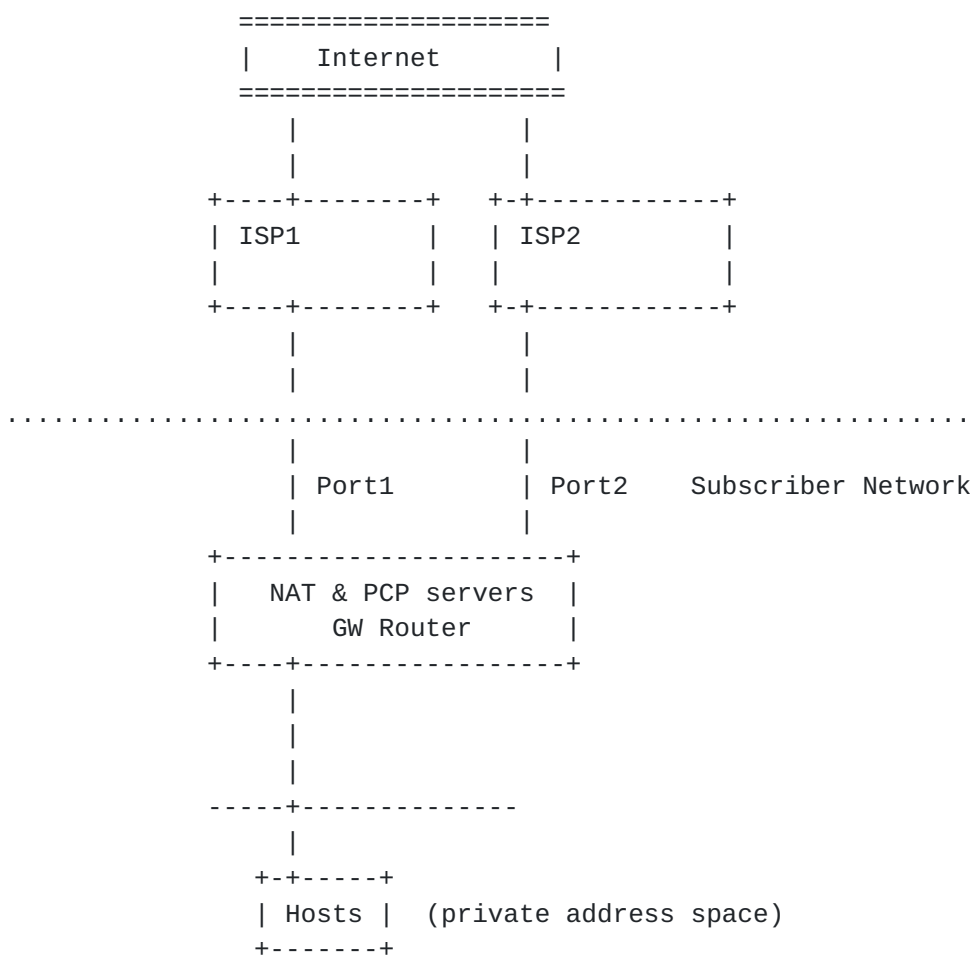


(b)



8. Multi-Homed CPE Model: One Single PCP Server

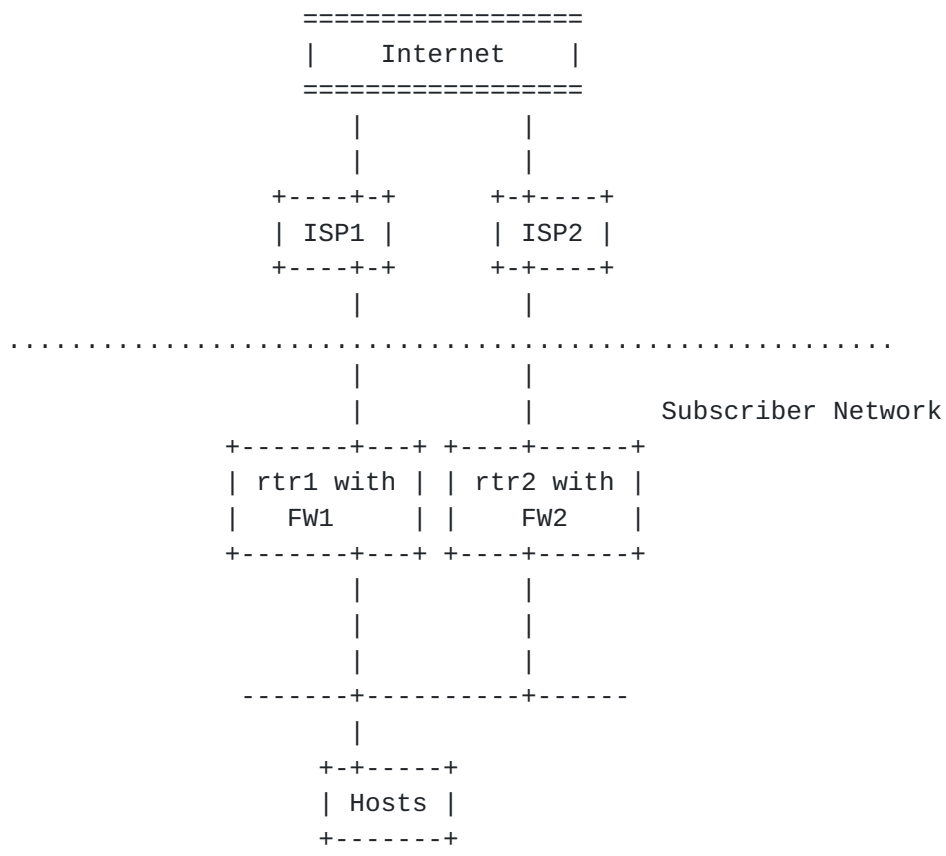
A typical example of this model is shown in the following figure:



Internal PCP clients can interact with one single PCP server.

9. Multi-Homed CPE Model: Multiple PCP Servers

A typical example of this model is shown in the following figure:



The PCP client must interact with all PCP servers; otherwise complications arise to communicate with remote peers. The procedure defined in [I-D.ietf-pcp-server-selection] is used to contact those servers.

The use of anycast-based model ([I-D.ietf-pcp-anycast]) will induce failures in communicating with external peers (e.g., incoming packets will be dropped by one of the firewalls).

10. Security Considerations

PCP-related security considerations are discussed in [RFC6887].

11. IANA Considerations

This document does not require any action from IANA.

12. Acknowledgements

TBC.

13. References

13.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC6887] Wing, D., Cheshire, S., Boucadair, M., Penno, R., and P. Selkirk, "Port Control Protocol (PCP)", RFC 6887, April 2013.

13.2. Informative References

[I-D.ietf-pcp-anycast] Kiesel, S., Penno, R., and S. Cheshire, "PCP Anycast Address", draft-ietf-pcp-anycast-00 (work in progress), October 2013.

[I-D.ietf-pcp-dhcp] Boucadair, M., Penno, R., and D. Wing, "DHCP Options for the Port Control Protocol (PCP)", draft-ietf-pcp-dhcp-09 (work in progress), November 2013.

[I-D.ietf-pcp-proxy] Boucadair, M., Penno, R., and D. Wing, "Port Control Protocol (PCP) Proxy Function", draft-ietf-pcp-proxy-04 (work in progress), July 2013.

[I-D.ietf-pcp-server-selection] Boucadair, M., Penno, R., Wing, D., Patil, P., and T. Reddy, "PCP Server Selection", draft-ietf-pcp-server-selection-01 (work in progress), May 2013.

[RFC6970] Boucadair, M., Penno, R., and D. Wing, "Universal Plug and Play (UPnP) Internet Gateway Device - Port Control Protocol Interworking Function (IGD-PCP IWF)", RFC 6970, July 2013.

Author's Address

Mohamed Boucadair
France Telecom
Rennes 35000
France

Email: mohamed.boucadair@orange.com