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Port Control Protocol (PCP) NAT-PMP Interworking Function  
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Abstract

This document specifies the behavior of a PCP NAT Port Mapping Protocol (NAT-PMP) Interworking element, for instance embedded in Customer Premise routers.

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## 1. Introduction

The NAT Port Mapping Protocol (NAT-PMP [I-D.cheshire-nat-pmp]) provides LAN based NAT control features which are a subset of the new Port Control Protocol (PCP [I-D.ietf-pcp-base]).

This document is about an Interworking Function (IWF) between NAT-PMP clients on internal hosts and a PCP server running on a ISP Carrier-Grade NAT.

Two kinds of IWFs are described:

- Link IWF which serves only clients attached to a LAN

- Home IWF which serves directly or indirectly through Link IWFs all the clients of the Home domain

The Home IWF can be integrated with a UPnP IGD IWF [I-D.bpw-pcp-upnp-igd-interworking] and/or a PCP Proxy [I-D.bpw-pcp-proxy]. Because NAT-PMP does not work through routers, an IWF is REQUIRED to serve any LAN where a NAT-PMP client is attached. A Home IWF is REQUIRED per Home domain where a NAT-PMP client is to be served.

Note the NAT-PMP IWF architecture is closed to the PCP Proxy one so a knowledge of [I-D.bpw-pcp-proxy] is assumed.

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].

## 2. TODO

To be filled (imports from UPnP IGD IWF / PCP Proxy)

## 3. Link IWF

A Link IWF is used to cross routers, i.e., it allows a NAT-PMP client attached to a link where the Home IWF is not connected to get the service.

The Link IWF keeps:

- the IP address of the Home IWF

- a service socket per link where it offers the service

- the source address and port of pending requests

- the operation code of pending requests

Pending requests are expired after a reasonable timeout, e.g., 30 seconds.

NAT-PMP port requests and responses are mapped to PCP MAP4 requests and responses. A THIRD\_PARTY option is used to carry the client address.

public address requests and responses are not mapped to PCP messages but are sent to and received from the Home IWF.

#### 4. Result code mapping

PCP result codes and error conditions are mapped to NAT-PMP result codes following this table:

- a bad version in NAT-PMP request is mapped to code 1 "Unsupported Version"
- a bad opcode in NAT-PMP request is mapped to code 5 "Unsupported Opcode"
- to have no external address and similar conditions are mapped to code 3 "Network Failure"
- NO\_RESOURCES and USER\_EX\_QUOTA are mapped to code 4 "Out of resources"
- NOT\_AUTHORIZED is mapped to code 2 "Not Authorized/Refused"
- SUCCESS is mapped to code 0 "Success"

[I-D.woodyatt-spnatpmp-appl]

#### 5. Home IWF

At the exception of public address request handling, a Home IWF works as a Smart PCP Proxy. In particular the Epoch handling is a REQUIRED service.

When the Epoch value is reset, a multicast public address announce SHOULD be sent on served links with a multicast capability.

A Home IWF MUST deal with public address request and response internally, i.e., it gets the Epoch value and the external address from its internal state.

The request/response caching and retransmission services SHOULD be supported as the IWF adapts retransmission scheduling between protocols.

#### 6. multicast announces

To be filled.

## 7. IANA Considerations

This document makes no request of IANA.

Note to RFC Editor: this section may be removed on publication as an RFC.

## 8. Security Considerations

To be filled.

## 9. Acknowledgments

To be filled.

## 10. References

### 10.1. Normative References

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