DHCP Options for the Port Control Protocol (PCP)
draft-ietf-pcp-dhcp-09

Abstract

   This document specifies DHCP (IPv4 and IPv6) options to configure
   hosts with Port Control Protocol (PCP) Server IP addresses. The use
   of DHCPv4 or DHCPv6 depends on the PCP deployment scenario.

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.

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   This Internet-Draft will expire on May 09, 2014.

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1. Introduction

   This document defines DHCPv4 [RFC2131] and DHCPv6 [RFC3315] options
   that can be used to provision PCP server [RFC6887] IP addresses.

   This specification assumes a PCP server is reachable with one or
   multiple IP addresses. As such, a list of IP addresses can be
   returned in the PCP server DHCP option.

   This specification allows returning one or multiple instances of the
   PCP server DHCP option. This is used as a hint to guide the PCP
   client when determining whether to send PCP requests to one or
   multiple PCP servers. For guidelines on how a PCP client can use
   multiple IP addresses and multiple PCP servers, see
   [I-D.ietf-pcp-server-selection].

   The use of DHCPv4 or DHCPv6 depends on the PCP deployment scenarios.

2. Terminology

This document makes use of the following terms:

o 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].
o PCP client denotes a PCP software instance responsible for issuing
   PCP requests to a PCP server. Refer to [RFC6887].
o DHCP refers to both DHCPv4 [RFC2131] and DHCPv6 [RFC3315].
o DHCP client (or client) denotes a node that initiates requests to
   obtain configuration parameters from one or more DHCP servers.
o DHCP server (or server) refers to a node that responds to requests
   from DHCP clients.

3. DHCPv6 PCP Server Option

3.1. Format

The PCP server DHCPv6 option can be used to configure a list of IPv6
addresses of a PCP server.

The format of this option is shown in Figure 1.

```
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |       OPTION_PCP_SERVER       |          Option-length        |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                                                               |
    |                          ipv6-address                         |
    |                                                               |
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                                                               |
    |                          ipv6-address                         |
    |                                                               |
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                             ...                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
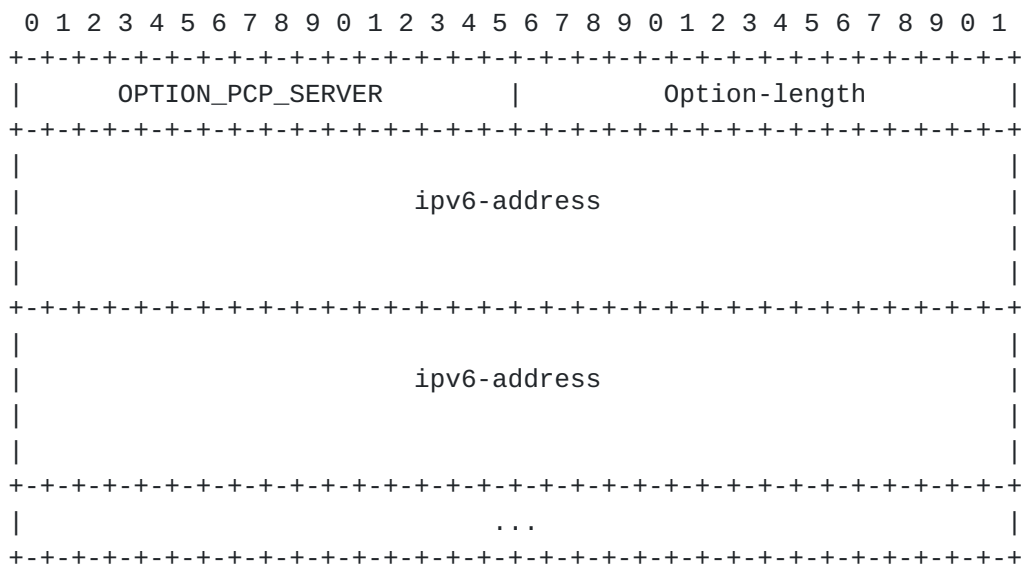
Figure 1: PCP Server DHCPv6 Option

The fields of the option shown in Figure 1 are as follows:

o Option-code: OPTION_PCP_SERVER (TBA, see Section 9.1)

   o Option-length: Length of the 'PCP server IP Address(es)' field in
      octets. MUST be a multiple of 16.
   o PCP server IPv6 Addresses: Includes one or more IPv6 addresses
      [RFC4291] of the PCP server to be used by the PCP client. Note,
      IPv4-mapped IPv6 addresses (Section 2.5.5.2 of [RFC4291]) are
      allowed to be included in this option.

3.2. Client Behavior

   To discover a PCP server, the DHCPv6 client requests PCP server IP
   addresses by including OPTION _PCP_SERVER in an Option Request Option
   (ORO), as described in Section 22.7 of [RFC3315].

   The client MUST be prepared to receive multiple instances of the
   DHCPv6 PCP server option; each instance is to be treated as a
   separate PCP server.

   If an IPv4-mapped IPv6 address is received in an OPTION_PCP_SERVER
   option, it indicates that the PCP server has the corresponding IPv4
   address.

   When multiple instances of the PCP server DHCPv6 option or multiple
   IPv6 addresses are received from the DHCPv6 server, the PCP client
   follows the behavior specified in [I-D.ietf-pcp-server-selection].

4. DHCPv4 PCP Option

4.1. Format

   The PCP server DHCPv4 option can be used to configure a list of IPv4
   addresses of a PCP server. The format of this option is illustrated
   in Figure 2.

```
    Code   Len   PCP server IPv4 Address  PCP server IPv4 Address
   +-----+-----+-----+-----+-----+-----+-----+-----+--
   | TBA |  n  | a1  | a2  | a3  | a4  | a1  | a2  | ...
   +-----+-----+-----+-----+-----+-----+-----+-----+--
```

   This format assumes that an IPv4 address is encoded as a1.a2.a3.a4.

                   Figure 2: PCP Server DHCPv4 Option

   The description of the fields is as follows:

   o Code: OPTION_PCP_SERVER (TBA, see Section 9.2);
   o Length: Includes the length of included IP address(es) in octets;
      MUST be a multiple of 4.

   o PCP server IPv4 Addresses: Contains one or more IPv4 addresses of
      the PCP server to be used by the PCP client.

4.2. Client Behavior

   To discover a PCP server, the DHCPv4 client requests PCP server IP
   addresses by including OPTION_PCP_SERVER in a Parameter Request List
   Option [RFC2132].

   The client MUST be prepared to receive multiple instances of the
   DHCPv4 PCP server option; each instance is to be treated as a
   separate PCP server.

5. DHCP Server Configuration Guidelines

   DHCP servers supporting the DHCP PCP server option can be configured
   with a list of IP addresses of the PCP server(s). If multiple IP
   addresses are configured, the DHCP server MUST be explicitly
   configured whether all or some of these addresses refer to:

   1. the same PCP server: the DHCP server returns multiple addresses
       in the same instance of the DHCP PCP server option.

   2. distinct PCP servers: the DHCP server returns multiple instances
       of the DHCP PCP server option to the requesting client; each
       instance is referring to a distinct PCP server. For example,
       multiple OPTION_PCP_SERVER instances may be configured to a PCP
       client in some deployment contexts such as multi-homing. It is
       out of scope of this document to enumerate all deployment
       scenarios that require multiple OPTION_PCP_SERVER instances to be
       returned.

   The DHCP server MAY be configurable with one or multiple FQDNs of the
   PCP server(s). In such case, the DHCP server MUST resolve these
   FQDNs into one or a list of IP addresses. If multiple FQDNs are
   configured to the DHCP server, the DHCP server MUST include multiple
   OPTION_PCP_SERVER instances; each of them carries one or a list of IP
   addresses that resulted from the FQDN resolution. DHCPv4 servers
   supporting PCP server option MUST resolve any configured FQDNs into
   IPv4 addresses while DHCPv6 servers may resolve any configured FQDNs
   into IPv6 and/or IPv4 addresses. If an IPv4 address is retrieved by
   the DHCPv6 server, the corresponding IPv4-mapped IPv6 address is
   included in the OPTION_PCP_SERVER DHCPv6 option. If both IPv4 and
   IPv6 addresses are retrieved by the DHCPv6 server, these addresses
   are included in the same OPTION_PCP_SERVER DHCPv6 option (IPv4
   addresses are represented as IPv4-mapped IPv6 addresses).

Discussion: The motivation for this design is to accommodate
deployment cases where an IPv4 connectivity service is provided
while only DHPCv6 is in use (e.g., an IPv4-only PCP server in a
DS-Lite context [RFC6333]).

For guidelines on providing context-specific configuration
information (e.g., returning a regional-based configuration), and
information on how a server might be configured with FQDNs that get
resolved on demand, see [I-D.ietf-dhc-topo-conf].

6. Dual-Stack Hosts

A Dual-Stack host might receive OPTION_PCP_SERVER via both DHCPv4 and
DHCPv6. For guidance on how a client can handle PCP server IP lists
for the same network but obtained via different mechanisms, see
[I-D.ietf-pcp-server-selection].

7. Hosts with Multiple Interfaces

A host may have multiple network interfaces (e.g, 3G, IEEE 802.11,
etc.); each configured differently. Each PCP server learned MUST be
associated with the interface via which it was learned. Refer to
[I-D.ietf-pcp-server-selection] and Section 8.4 of [RFC6887] for more
discussion on multi-interface considerations.

8. Security Considerations

The security considerations in [RFC2131] and [RFC3315] are to be
considered. PCP-related security considerations are discussed in
[RFC6887].

9. IANA Considerations

9.1. DHCPv6 Option

IANA is requested to assign the following new DHCPv6 Option Code in
the registry maintained in http://www.iana.org/assignments/
dhcpv6-parameters:

```
             Option Name Value
             ---------------- -----
             OPTION_PCP_SERVER TBA
```

9.2. DHCPv4 Option

IANA is requested to assign the following new DHCPv4 Option Code in
the registry maintained in http://www.iana.org/assignments/bootp-
dhcp-parameters/:

```
                       Option Name Value
                       ----------------- -----
                       OPTION_PCP_SERVER TBA
```

10. Acknowledgements

Many thanks to B. Volz, C. Jacquenet, R. Maglione, D. Thaler, T.
Mrugalski, T. Reddy, S. Cheshire and M. Wasserman for their review
and comments.

Special thanks to T. Lemon for the review and his continuous effort
to enhance this specification.

11. References

11.1. Normative References

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11.2. Informative References

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