

DHC Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: August 17, 2014

S. Krishnan  
Ericsson  
J. Korhonen  
Broadcom  
S. Bhandari  
Cisco Systems  
February 13, 2014

Support for multiple provisioning domains in DHCPv6  
draft-kkb-mpvd-dhcp-support-01

## Abstract

The MIF working group is producing a solution to solve the issues that are associated with nodes that can be attached to multiple networks. One part of the solution requires associating configuration information with provisioning domains. This document details how configuration information provided through DHCPv6 can be associated with provisioning domains.

## 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 August 17, 2014.

## Copyright Notice

Copyright (c) 2014 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect

Internet-Draft

DHCPv6 mPVD support

February 2014

to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">3</a>
<a href="#">2.</a>	Terminology . . . . .	<a href="#">3</a>
<a href="#">3.</a>	PVD Container option . . . . .	<a href="#">3</a>
<a href="#">4.</a>	PVD Identity option . . . . .	<a href="#">4</a>
<a href="#">5.</a>	PVD Authentication and Authorization option . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Set of allowable options . . . . .	<a href="#">6</a>
<a href="#">7.</a>	Behaviour of DHCPv6 entities . . . . .	<a href="#">6</a>
<a href="#">7.1.</a>	Client and Requesting Router Behavior . . . . .	<a href="#">6</a>
<a href="#">7.2.</a>	Server and Delegating Router Behavior . . . . .	<a href="#">6</a>
<a href="#">8.</a>	Security Considerations . . . . .	<a href="#">7</a>
<a href="#">9.</a>	IANA Considerations . . . . .	<a href="#">8</a>
<a href="#">10.</a>	Acknowledgements . . . . .	<a href="#">8</a>
<a href="#">11.</a>	Normative References . . . . .	<a href="#">8</a>
	Authors' Addresses . . . . .	<a href="#">9</a>

Internet-Draft

DHCPv6 mPVD support

February 2014

## [1.](#) Introduction

The MIF working group is producing a solution to solve the issues that are associated with nodes that can be attached to multiple networks based on the Multiple Provisioning Domains (MPVD) architecture work [[I-D.anipko-mif-mpvd-arch](#)]. One part of the solution requires associating configuration information with provisioning domains. This document describes a DHCPv6 mechanism for explicitly indicating provisioning domain information along with any configuration that will be provided. The proposed mechanism uses a DHCPv6 option that indicates the identity of the provisioning domain and encapsulates the options that contain the configuration information as well as any accompanying authentication/authorization information.

## [2.](#) Terminology

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 [[RFC2119](#)].

## [3.](#) PVD Container option

The PVD container option is used to encapsulate and group together all the configuration options that belong to the explicitly identified provisioning domain. The PVD container option MUST encapsulate exactly one OPTION\_PVD\_ID. The PVD container option MAY occur multiple times in the same message, but each of these PVD container options MUST have a different PVD identity specified under its PVD identity option. The PVD container option SHOULD contain exactly one OPTION\_PVD\_AUTH.

0	1																2																3															
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																	

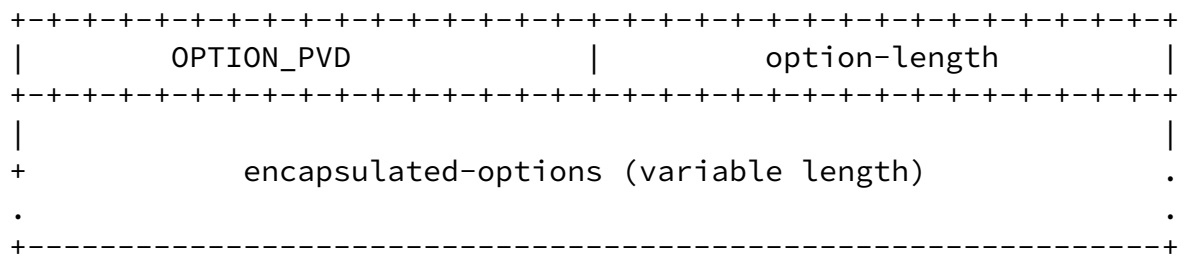


Figure 1: PVD Container Option

- o option-code: OPTION\_PVD (TBA1)
- o option-length: Length of encapsulated options
- o encapsulated-options: options associated with this provisioning domain.

#### 4. PVD Identity option

The PVD identity option is used to explicitly indicate the identity of the provisioning domain that is associated with the configuration information encapsulated by the PVD container option.

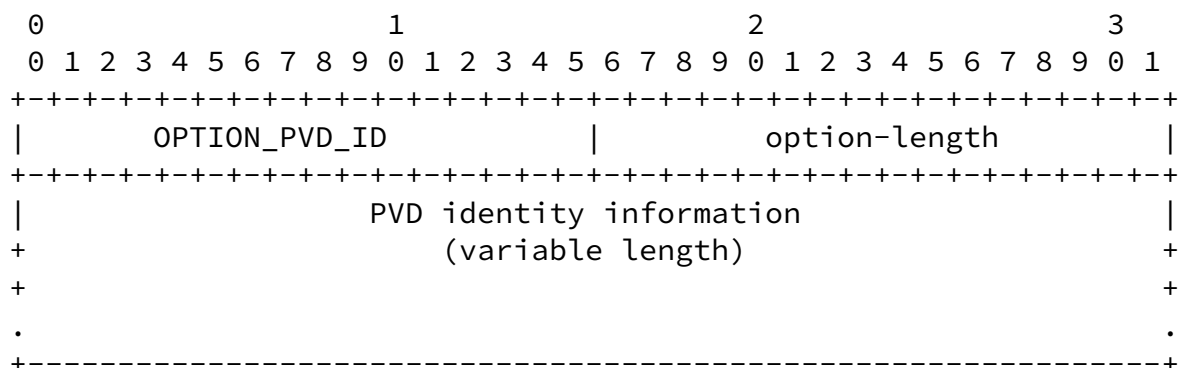


Figure 2: PVD ID Option

- o option-code: OPTION\_PVD\_ID (TBA2)

- o option-length: Length of PVD identity information
- o PVD identity information: The provisioning domain identity. The contents of this field is defined in a separate document [[PVDIDS](#)].

## 5. PVD Authentication and Authorization option

The PVD authentication and authorization option contains information that could be used by the DHCPv6 client to verify whether the configuration information provided was not tampered with by the DHCPv6 server as well as establishing that the DHCPv6 server was authorized to advertise the information on behalf of the PVD per OPTION\_PVD basis. The contents of the authentication/authorization information is provided by the owner of the provisioning domain and is completely opaque to the DHCPv6 server that passes along the information unmodified. Every OPTION\_PVD option SHOULD contain at

most one OPTION\_PVD\_AUTH option. The OPTION\_PVD\_AUTH option MUST be the last option inside the OPTION\_PVD option.

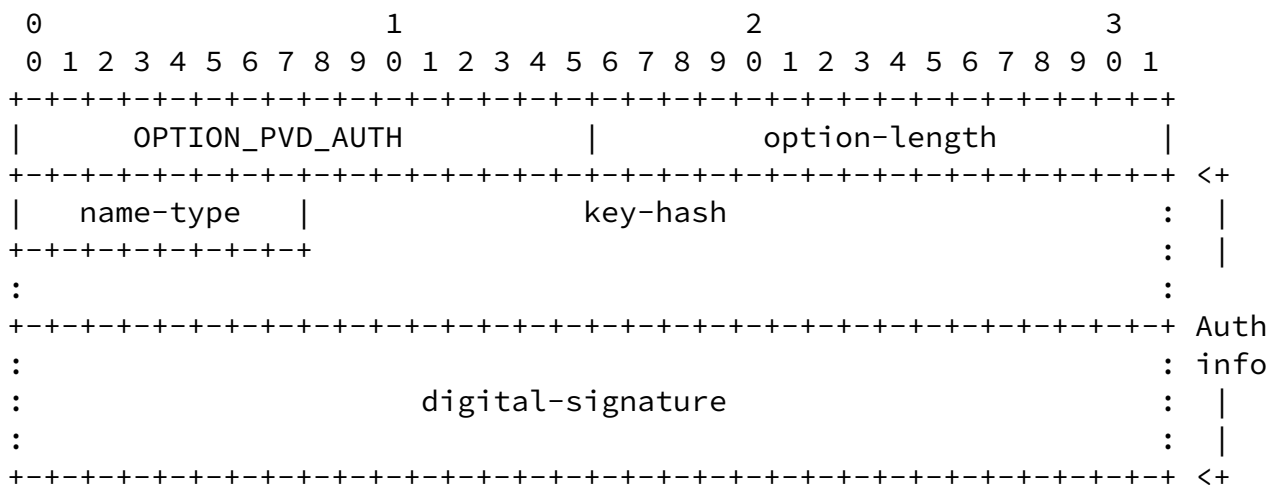


Figure 3: PVD Auth Option

- o option-code: OPTION\_PVD\_AUTH (TBA3)

- o option-length: Length of the Auth info
- o name-type: Names the algorithm used to identify a specific X.509 certificate using the method defined for the Subject Key Identifier (SKI) extension for the X.509 certificates. The usage and the Name Type registry aligns with the mechanism defined for SeND [[RFC6494](#)][RFC6495]. Name Type values starting from 3 are supported and an implementation MUST at least support SHA-1 (value 3).
- o key-hash: A hash of the public key using the algorithm identified by the Name Type. The procedure how the Key Hash is calculated is defined in [[RFC3971](#)] and [[RFC6495](#)]
- o digital-signature: A signature calculated over the encapsulating OPTION\_PVD including all option data from the beginning of the option while setting the digital-signature field to zero. The procedure of calculating the signature is identical to the one defined for SeND [[RFC3971](#)].

[TODO: There may be some alignment considerations here for some implementations as DHCPv6 options are not aligned.]

## [6.](#) Set of allowable options

The PVD container option MAY be used to encapsulate any allocated DHCPv6 options but MUST NOT be used to encapsulate another OPTION\_PVD option. [TODO: Should we add any other exclusions?]

## [7.](#) Behaviour of DHCPv6 entities

This section describes role of DHCPv6 entities involved in requesting and receiving DHCPv6 configuration or prefix and address allocation.

### [7.1.](#) Client and Requesting Router Behavior

DHCPv6 client or requesting router can request for configuration from

provisioning domain in the following ways:

- o In the SOLICIT message it MAY include OPTION\_PVD\_ID requesting configuration for the specific PVD ID indicated in the OPTION\_PVD\_ID option. It can include multiple OPTION\_PVD\_ID options to indicate its preference for more than one provisioning domain. The PVD ID it requests is learnt via configuration or any other out of band mechanism not defined in this document.
- o In the SOLICIT message include an OPTION\_ORO option with the OPTION\_PVD option code to request configuration from all the PVDs that the DHCPv6 server can provide.

The client or requesting router parses OPTION\_PVD options in the response message. The Client or Requesting router MUST then include all or subset of the received OPTION\_PVD options in the REQUEST message so that it will be responsible for the configuration information selected.

If DHCPv6 client or requesting router receives OPTION\_PVD options but does not support PVD, it SHOULD ignore the received option(s).

## [7.2.](#) Server and Delegating Router Behavior

If the Server or Delegating router supports PVD and it is configured to provide configuration data in one or more provisioning domains, it selects configuration for the PVD based allocation in the following way:

- o If OPTION\_PVD option code within OPTION\_ORO is not present in the request, it MUST NOT include provisioning domain based configuration. It MAY select configuration and prefix allocation from a default PVD defined.

- o If OPTION\_PVD\_ID is included, it selects information to be offered from that specific PVD if available.
- o If OPTION\_PVD option code within OPTION\_ORO is included, then based on its configuration and policy it MAY offer configuration from the available PVD(s).

When PVD information and configuration are selected for address and prefix allocation the server or delegating router responds with an ADVERTISE message after populating OPTION\_PVD.

If OPTION\_PVD is not included, then the server or delegating router MAY allocate the prefix and provide configuration as specified in [\[RFC3315\]](#) and [\[RFC3633\]](#) and MUST NOT include OPTION\_PVD option in the response.

If OPTION\_ORO option includes the OPTION\_PVD option code but the server or delegating router does not support PVD, then it SHOULD ignore the OPTION\_PVD and OPTION\_PVD\_ID options received.

If both client/requesting router and server/delegating router support PVD but cannot offer configuration with PVD for any other reason, it MUST respond to client/requesting router with appropriate status code as specified in [\[RFC3315\]](#) and [\[RFC3633\]](#).

## 8. Security Considerations

An attacker may attempt to modify the information provided inside the PVD container option. These attacks can easily be prevented by using the DHCPv6 AUTH option [\[RFC3315\]](#) that would detect any form of tampering with the DHCPv6 message contents.

A compromised DHCPv6 server or relay agent may insert configuration information related to PvDs it is not authorized to advertise. e.g. A coffee shop DHCPv6 server may provide configuration information purporting to be from an enterprise and may try to attract enterprise related traffic. The only real way to avoid this is that the PvD container contains embedded authentication and authorization information from the owner of the PvD. Then, this attack can be detected by the client by verifying the authentication and authorization information provided inside the PVD container option after verifying its trust towards the PvD owner (e.g. a certificate with a well-known/common trust anchor).

A compromised configuration source or an on-link attacker may try to capture advertised configuration information and replay it on a different link or at a future point in time. This can be avoided by including some replay protection mechanism such as a timestamp or a nonce inside the PvD container to ensure freshness of the provided



## 9. IANA Considerations

This document defines three new DHCPv6 options to be allocated out of the registry at <http://www.iana.org/assignments/dhcpv6-parameters/>

OPTION\_PVD (TBA1)  
OPTION\_PVD\_ID (TBA2)  
OPTION\_PVD\_AUTH (TBA3)

## 10. Acknowledgements

The authors would like to thank the members of the MIF architecture design team for their comments that led to the creation of this draft.

## 11. Normative References

- [I-D.anipko-mif-mpvd-arch]  
Anipko, D., "Multiple Provisioning Domain Architecture",  
[draft-anipko-mif-mpvd-arch-05](#) (work in progress),  
November 2013.
- [PVDIDS] Krishnan, S., Korhonen, J., Bhandari, S., and S.  
Gundavelli, "Identification of provisioning domains",  
[draft-kkbg-mpvd-id-00](#) (work in progress), February 2014.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate  
Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC3315] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C.,  
and M. Carney, "Dynamic Host Configuration Protocol for  
IPv6 (DHCPv6)", [RFC 3315](#), July 2003.
- [RFC3633] Troan, O. and R. Droms, "IPv6 Prefix Options for Dynamic  
Host Configuration Protocol (DHCP) version 6", [RFC 3633](#),  
December 2003.
- [RFC4122] Leach, P., Mealling, M., and R. Salz, "A Universally  
Unique Identifier (UUID) URN Namespace", [RFC 4122](#),  
July 2005.
- [RFC4282] Aboba, B., Beadles, M., Arkko, J., and P. Eronen, "The  
Network Access Identifier", [RFC 4282](#), December 2005.

- [RFC6494] Gagliano, R., Krishnan, S., and A. Kukec, "Certificate Profile and Certificate Management for SEcure Neighbor Discovery (SEND)", [RFC 6494](#), February 2012.
- [RFC6495] Gagliano, R., Krishnan, S., and A. Kukec, "Subject Key Identifier (SKI) SEcure Neighbor Discovery (SEND) Name Type Fields", [RFC 6495](#), February 2012.

#### Authors' Addresses

Suresh Krishnan  
Ericsson  
8400 Decarie Blvd.  
Town of Mount Royal, QC  
Canada

Phone: +1 514 345 7900 x42871  
Email: suresh.krishnan@ericsson.com

Jouni Korhonen  
Broadcom Communications  
Porkkalankatu 24  
FIN-00180 Helsinki  
Finland

Email: jouni.nospam@gmail.com

Shwetha Bhandari  
Cisco Systems  
Cessna Business Park, Sarjapura Marathalli Outer Ring Road  
Bangalore, KARNATAKA 560 087  
India

Phone: +91 80 4426 0474  
Email: shwethab@cisco.com

