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A Guide to Implementing Stateless DHCPv6 Service
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Abstract

Stateless DHCPv6 service is used by hosts to obtain configuration information such as the addresses of DNS servers that does not require the maintenance of any dynamic state for individual clients. A host that uses stateless DHCP must have obtained its IPv6 addresses through some other mechanism, typically stateless address autoconfiguration. This document is a guide to the protocol messages and options that must be implemented to provide stateless DHCPv6 service.

1. Introduction

Hosts that have obtained IPv6 addresses through some other mechanism

can use stateless DHCPv6 to obtain other configuration information such as a list of DNS server or NTP servers. A stateless DHCPv6 server provides only configuration information to hosts and does not perform any address assignment. Such a server is called "stateless" because it need not maintain any dynamic state for individual clients.

While the DHCPv6 specification [3] defines more than 10 protocol messages and 20 options, only a subset of those messages and options are required for stateless DHCPv6 service. This document gives guidelines about which messages and options are required for stateless DHCPv6 service. The intended use of the document is to guide the efficient and complete implementation of clients and servers that use stateless DHCPv6 service.

The operation of relay agents is the same for stateless and stateful DHCPv6 service. The operation of relay agents is described in the DHCPv6 specification.

[Section 4](#) of this document lists the sections of the DHCPv6 document that an implementor should read for an overview of the DHCPv6 specification and the basic requirements of a DHCPv6 service. [Section 5](#) lists the specific messages and options that are specifically required for stateless DHCPv6 service. [Section 6](#) describes how stateless and stateful DHCPv6 servers interact to provide service to clients that require address assignment and clients that require only stateless service.

2. Terminology

Throughout this document, "DHCP" refers to DHCP for IPv6.

This document uses the terminology defined in [RFC2460](#) [1], the DHCP specification, the DHCP DNS configuration options specification [4] and the DHCP NTP configuration options specification [5].

"Stateless DHCP" refers to the use of DHCP to provide configuration information to clients that does not require the server to maintain dynamic state about the DHCP clients.

3. Overview

This document assumes that a host using stateless DHCP configuration is not using DHCP for address assignment, and that a host has determined at least a link-local address as described in [section 5.3 of RFC2461](#) [2]

To obtain configuration parameters through stateless DHCP, a host

uses the DHCP Information-request message. DHCP servers respond to the host's message with a Reply message that carries the DNS configuration parameters. The Reply message from the server can carry configuration information such as a list of DNS servers and NTP servers.

4. Basic Requirements for Implementation of DHCP

Several sections of the DHCP specification [3] provide background information or define parts of the specification that are common to all implementations:

- 1-4 - give an introduction to DHCPv6 and an overview of DHCP message flows
- 5 - defines constants used throughout the protocol specification
- 6, 7 - illustrates the format of DHCP messages
- 8 - describes the representation of Domain Names
- 9 - defines the "DHCP unique identifier" (DUID) used to identify DHCP participants
- 13-16 - describe DHCP message transmission, retransmission and validation
- 21 - describes authentication for DHCP

5. Implementation of stateless DHCP

The client indicates that it is requesting configuration information by sending an Information-request message that includes an Option Request option specifying the options that it wishes to receive from the DHCP server. For example, if the client is attempting to obtain DNS configuration information, it includes either or both of the DNS configuration options in the Information-request message. The server determines the appropriate configuration parameters for the client based on its configuration policies and responds with a Reply message containing the requested parameters. In this example, the server would respond with DNS configuration parameters.

Use of the Client DUID option and the Server DUID option are not required for stateless DHCP service. However, it can be beneficial for the client to include a client DUID option, because the server administrator may want to customize the server's response on a per-client basis, and this requires that the client identify itself.

5.1 Messages required for stateless DHCP

Clients and servers implement the following messages for stateless DHCP service; the section numbers in this list refer to the DHCPv6 specification:

Information-request: sent by a DHCP client to a server to request DNS configuration parameters (sections [18.1.5](#) and [18.2.5](#))

Reply: sent by a DHCP server to a client containing the DNS configuration parameters (sections [18.1.6](#) and [18.2.8](#))

In addition, servers and relay agents implement the following messages for stateless DHCP service:

Relay-forward: Sent by a DHCP relay agent to carry the client message to a server ([section 15.13](#))

Relay-reply: Sent by a DHCP server to carry a response message to the relay agent ([section 15.14](#))

5.2 Options required for stateless DHCP service

Clients and servers implement the following options for stateless DHCP service; the section numbers in this list refer to the DHCPv6 specification:

Option Request: specifies the configuration information that the client is requesting from the server ([section 22.7](#))

Status Code: used to indicate completion status or other status information ([section 22.13](#))

Servers and relay agents implement the following options for stateless DHCP service; the section numbers in this list refer to the DHCPv6 specification:

Client message: Sent by a DHCP relay agent in a Relay-forward message to carry the client message to a server ([section 20](#))

Server message: Sent by a DHCP server in a Relay-reply message to carry a response message to the relay agent ([section 20](#))

Interface-ID: Sent by the DHCP relay agent and returned by the server to identify the interface to use to forward a message to the client ([section 22.18](#))

5.3 Options used for configuration information

Clients and servers use the following options to pass configuration information to clients:

DNS Server: specifies the DNS servers the client uses for name resolution; see "DNS Configuration options for DHCPv6"

DNS search list: specifies the domain names to be searched during name resolution; see "DNS Configuration options for DHCPv6"

NTP Servers: specifies the NTP servers the client uses for synchronizing its clock; see "Time Configuration Options for DHCPv6"

5.4 Other options used in stateless DHCP

Clients and servers may implement the following options for stateless DHCP service; the section numbers in this list refer to the DHCPv6 specification [3]:

Preference: Sent by a DHCP server to indicate the preference level for the server ([section 22.8](#))

Elapsed time: Sent by a DHCP client to indicate the time since the client began the DHCP configuration process ([section 22.9](#))

User Class: Sent by a DHCP client to give additional information to the server for selecting configuration parameters for the client ([section 22.15](#))

Vendor Class: Sent by a DHCP client to give additional information about the client vendor and hardware to the server for selecting configuration parameters for the client ([section 22.16](#))

Vendor-specific Information: Sent by a DHCP server to pass information to clients in options defined by vendors ([section 22.17](#))

Client DUID: Sent by a DHCP client to identify itself ([section 22.2](#)). Clients are not required to send this option; servers never send this option

Authentication: Used to provide authentication of DHCP messages ([section 21](#))

6. Interaction with DHCP for Address Assignment

In some networks, there may be both clients that are using stateless address autoconfiguration and DHCP for DNS configuration and clients that are using DHCP for stateful address configuration. Depending on the deployment and configuration of relay agents, DHCP servers that are intended only for stateless configuration may receive messages from clients that are performing stateful address configuration.

A DHCP server that is only able to provide stateless configuration information through an Information-request/Reply message exchange discards any other DHCP messages it receives. Specifically, the server discards any messages other than Information-Request or Relay-forward it receives, and the server does not participate in any stateful address configuration messages exchanges. If there are other DHCP servers that are configured to provide stateful address assignment, one of those servers will provide the address assignment.

7. Acknowledgments

Ted Lemon, Bernie Volz and Jim Bound reviewed this document and contributed editorial suggestions.

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