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Handling Unknown DHCPv6 Messages
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Abstract

Dynamic Host Configuration Protocol version 6 (DHCPv6) isn't specific about handling messages with unknown types. This memo describes the problems and defines how a DHCPv6 function node should behave in this case. This document updates [RFC 3315](#).

Status of This Memo

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[1.](#) Introduction

Dynamic Host Configuration Protocol version 6 (DHCPv6) [[RFC3315](#)] provides a framework for conveying IPv6 configuration information to hosts on a TCP/IP network. But [[RFC3315](#)] is not specific about how to deal with messages with unrecognized types. This document describes the problems and defines the behavior of a DHCPv6 function node when handling unknown DHCPv6 messages.

[2.](#) 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 [[RFC2119](#)].

[3.](#) Problem Statement

The relay agent is bound to send a message either to the server or to the client. But [RFC3315](#) doesn't explicitly describe how the relay agent can find out it should send a message towards the server or towards the client.

Another issue is that, it's not specific in [RFC3315](#) about what a relay agent should do if it doesn't recognize the received messages. The relay agent isn't required to relay the messages, nor advised to drop them.

In addition, there is no specific requirement of the client or server on dealing with an unknown message in [RFC3315](#).

4. Relay Agent Behavior Update

A relay agent relays the message towards the server or the client according to the message type. Relay-reply messages are sent toward the client. The Relay-forward message and other types of message are sent toward the server.

We say "toward the client" and "toward the server" because relay agents may be chained together, so a relay message may be sent through multiple relays along the path to its destination. Relay-reply messages specify a destination address; the relay agent extracts the encapsulated message and sends it to the specified destination address. Any message other than a Relay-reply does not have such a specified destination, so it follows the default forwarding path configured on the relay agent, which is always toward the server.

The sole purpose of requiring relay agents to relay unknown messages is to ensure that when legitimate new messages are defined in the protocol, relay agents, even if they were manufactured prior to the definition of these new messages, will, by default, succeed in relaying such messages.

4.1. Definition of a Valid Message

[Section 20.1 of \[RFC3315\]](#) states that:

"When a relay agent receives a valid message to be relayed, it constructs a new Relay-forward message."

It doesn't define what a valid message is. In this document, we specify the definition as follows.

The message is valid for constructing a new Relay-forward message:

- (a) if the message is a Relay-forward message, or
- (b) if a relay agent receives the message but the relay agent does not identify itself as the target of the message, and the message is not a Relay-reply message.

In the case that a new type of relay message is sent to a relay agent but the relay agent doesn't recognize it, the message is put into a Relay-forward message and sent to the server. Then the server knows the relay agent doesn't support the new message.

4.2. Relaying a Message towards Server

If the relay agent received a Relay-forward message, [Section 20.1.2 of \[RFC3315\]](#) defines the related behavior. If the relay agent received messages other than Relay-forward and Relay-reply, it MUST forward them as is described in [Section 20.1.1 of \[RFC3315\]](#).

4.3. Relaying a Message towards Client

If the relay agent receives a Relay-reply message, it MUST process the message as is defined in [Section 20.2 of \[RFC3315\]](#), regardless of the type of the message encapsulated in the Relay Message Option.

5. Client and Server Behavior Update

There are chances that the client or server would receive DHCPv6 messages with unknown types. In this case, the client or server MUST discard the unrecognized messages.

6. Security Considerations

As the relay agent will forward all unknown types of DHCPv6 messages, a malicious attacker can interfere with the relaying function by constructing fake DHCPv6 messages with arbitrary type code. The same problem may happen in current DHCPv4 and DHCPv6 practice where the attacker has to construct the fake DHCP message with an known type code.

Clients and servers that implement this specification will discard unknown DHCPv6 messages. Since [RFC3315](#) did not specify either relay, client or server behavior in the presence of unknown messages, it is possible that some servers or clients that have not been updated to conform to this specification might be made vulnerable to client attacks through the relay agent.

For this reason, we recommend that relay agents, clients and servers be updated to follow this new specification. However, in most deployment scenarios, it will be much easier to attack clients directly than through a relay; furthermore, attacks using unknown message types are already possible on the local wire.

So in most cases, if clients are not upgraded there should be minimal additional risk; at sites where only servers and relays can be upgraded, the incremental benefit of doing so most likely exceeds any risk due to vulnerable clients.

Nothing in this update should be construed to mean that relay agents may not be administratively configurable to drop messages on the basis of the message type, for security reasons (e.g., in a firewall).

7. IANA Considerations

This document does not include an IANA request.

8. Contributors List

Many thanks to Bernie Volz, Cong Liu and Yuchi Chen for their contributions to the document.

9. Normative References

[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.

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