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Generalized Source UDP Port of DHCP Relay
draft-ietf-dhc-relay-port-01

Abstract

This document extends the DHCP and DHCPv6 protocols for the UDP transport from relay agent to server and allows the port to be any valid number on the DHCP relay system.

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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1. Introduction

RFC 2131 [RFC2131] and RFC 3315 [RFC3315] specify the DHCP transport protocol as UDP. They also define both the server side and client side port numbers. The DHCP server port is UDP number (67) and the client port is UDP number (68); for DHCPv6 the server port is (546) and the client port is (547).

This fixed port number of DHCP protocol scheme creates problems in certain DHCP relay operations and environments. For instance, in a large scale DHCP relay implementation on a single switch node, the DHCP relay functionality may be partitioned among multiple relay processes running under different CPUs. All those DHCP relay processes may share the same IP address of the switch node. If the UDP source port has to be a fixed number, the transport socket operation of DHCP packets needs to go through a central location or process which defeats the purpose of distributed DHCP relay functionality.

In some of the scalable operational environment, the decision to split functionality into multiple processes on a node may not be purely based on DHCP relay load. But DHCP relay is one of the functions in the multiple process implementation.

Although assigning the different source IP/IPv6 address for each DHCP relay process can be a solution, it requires operational and network management involvement. It needs to be sure, at least for DHCP, the

address space among the relay and server is in private IPv4 address domain.

This document proposes the option to relax the fixed source port requirement for the DHCP relay agents. This extension requires the DHCP server or relay agent, in the case of relay chaining [RFC3315], to remember the inbound packet's UDP port number along with the IP/IPv6 address. The DHCP server when sending back replies MUST use the UDP port number that the incoming relay agent uses instead of blindly setting the DHCP fixed port number.

1.1. 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].

2. Changes to DHCP and DHCPv6 Specifications

2.1. Changes to DHCP in RFC 2131

Section 4.1 of RFC 2131 [RFC2131] asserts that: DHCP uses UDP as its transport protocol. DHCP messages from a client to a server are sent to the 'DHCP server' port (67), and DHCP messages from a server to a client are sent to the 'DHCP client' port (68).

This specification adds to the above paragraph in the paragraph below.

DHCP messages from a relay agent to a server are sent to the 'DHCP server' port (67), and the UDP source port it uses can be any valid UDP port available on the relay system, including the DHCP port 67. The default is port number 67 if there is no explicit configuration for generalized source UDP port extension of DHCP relay.

2.2. Changes to DHCPv6 in RFC 3315

Section 5.2 of RFC 3315 [RFC3315] asserts that: Clients listen for DHCP messages on UDP port 546. Servers and relay agents listen for DHCP messages on UDP port 547.

This specification adds to the above paragraph in the paragraph below.

DHCP relay agents can listen for DHCP messages from server or another upstream relay agent on any valid UDP port available on the relay system including the DHCP UDP port 547. The default is port 547 if

there is no explicit configuration for generalized source UDP port extension of DHCP relay.

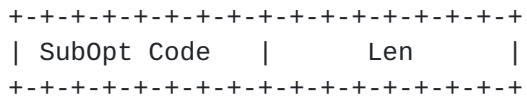
3. Relay Agent Source Port Sub-option and Option

Although the DHCP or DHCPv6 server can implicitly detect a source UDP port that is different from the standard DHCP port number when it receives an inbound message from relay agents, this sub-option makes the request explicit for the server to use a non-DHCP UDP port in the reply message.

3.1. DHCP Relay Agent Source Port Sub-option

The Relay Agent Source Port sub-option is part of the relay-agent-information option for DHCPv4 [RFC3046]. It SHOULD be used by the relay agent that uses a non-DHCP UDP port communicating with the DHCP server.

The format of the DHCPv4 Relay Agent Source Port Sub-option is shown below:



Where:

SubOpt Code: TBD. 8 bits value, to be assigned by IANA.

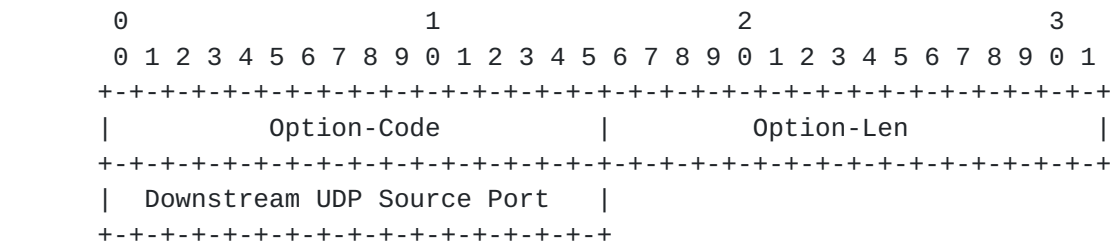
Len: 8 bits value to be set to 0.

When a DHCP server receives a message from relay agent with this Relay Source Port sub-option, it MUST remember the inbound message UDP source port from the relay agent and use the same port number for the UDP destination port that sends the reply message to the same relay agent.

3.2. DHCPv6 Relay Agent Source Port Option

The Relay Agent Source Port Option is a new DHCPv6 option. It SHOULD be used either by a DHCPv6 relay agent that uses a non-DHCP UDP port communicating with the DHCP server and the upstream relay agent, or by a DHCPv6 relay agent that detects the use of a non-DHCP UDP port by a downstream relay agent.

The format of the DHCPv6 Relay Agent Source Port Option is shown below:



Where:

Option-Code: TBD. 16 bits value, to be assigned by IANA.

Option-Len: 16 bits value to be set to 2.

Downstream UDP Source Port: 16 bits value. To be set by the DHCPv6 relay to the downstream relay agent's UDP source port used for the UDP packet or to be set to zero.

The DHCPv6 relay agent SHOULD include this Relay Source Port Option when it uses a non-DHCP UDP port to communicate to the DHCPv6 server or an upstream DHCPv6 relay agent. Also when a DHCPv6 relay agent detects that the downstream relay agent uses a non-DHCP UDP port in the packet, it MUST record the port number in the Downstream UDP Source Port field of this option. If this option is included to indicate only the local non-DHCP UDP port usage and there is no downstream relay agent's non-DHCP UDP port usage, the field Downstream UDP Source Port MUST be set to zero.

When a DHCPv6 server receives the relayed DHCPv6 packet with this Relay Source Port Option, it MUST copy and add the option when constructing the Relay-Reply chain in response to the Relay-Forward messages. This option MUST NOT appear in any message except a Relay-Forward or Relay-Reply message.

With this Relay Source Port Option in the message, when a DHCPv6 server replies the Relay-Reply message towards a relay agent, it MUST check and use the UDP source port from the UDP packet of the Relay-Forward message by the relay agent.

When a relay agent receives this Relay-Reply message with this option from the server or from an upstream relay agent, and if the Downstream UDP Source Port value is non-zero, it MUST use this UDP port to relay the Relay-Reply message to the downstream relay agent.

4. Compatibility

With this extension of DHCP and DHCPv6 source port generalization, the server behavior is compatible with the relay agent that uses the DHCP fixed UDP port. The DHCP server will reflect back the UDP well-known port number (67/547) that the client uses when relaying back to the relay agent. It is recommended to upgrade the server side first.

The implementation is advised to allow the relay agent configuration for specifying a fixed DHCP relay port number. This is for the case where the DHCP relay agent is upgraded with this extension before the server side upgrade.

5. IANA Considerations

A new sub-option, DHCP Relay Agent Source Port, is defined in this document within the DHCPv4 Relay Agent Information Option. It needs to be assigned by IANA from the DHCP Relay Agent sub-options space [RFC3046].

A new option, DHCPv6 Relay Source Port, is defined in this document for DHCPv6 and it needs to be assigned by IANA for the DHCPv6 option code.

6. Security Considerations

If the network uses firewall to block or allow DHCP packets with both static UDP source and destination port numbers, this may no longer match the packets from new DHCP relay agent and server software. The firewall rules need to be modified only to match the DHCP server side of the UDP port number, and if necessary, IP addresses and other attributes.

7. Acknowledgments

The authors would like to thank Peter Arberg, Bhanu Gopalasetty, Andre Kostur, Ted Lemon, and Kishore Seshadri for their review and comments of this document.

The authors would like to thank Bernie Volz for discussions that lead to the definition of The Relay Agent Source Port sub-option and DHCPv6 Relay Agent Source Port Option.

The RFC text was produced using Marshall Rose's xml2rfc tool.

8. Document Change Log

8.1. Changes to draft-ietf-dhc-relay-port-01

- Posted the draft in January 2017.
- Change the DHCPv6 Relay Agent Source Port Option, UDP Source Port field to Downstream UDP Source Port. Add the option handling mechanism for DHCPv6 server and relay agents.

8.2. Changes to draft-ietf-dhc-relay-port-00

- Posted first version of working group draft in October 2016.
- This draft was renamed from draft-shen-dhc-client-port-03.txt.

9. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[RFC2131] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, DOI 10.17487/RFC2131, March 1997, <http://www.rfc-editor.org/info/rfc2131>.

[RFC3046] Patrick, M., "DHCP Relay Agent Information Option", RFC 3046, DOI 10.17487/RFC3046, January 2001, <http://www.rfc-editor.org/info/rfc3046>.

[RFC3315] Droms, R., Ed., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, DOI 10.17487/RFC3315, July 2003, <http://www.rfc-editor.org/info/rfc3315>.

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