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Generalized Source UDP Port of DHCP Relay  
draft-shen-dhc-client-port-03

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

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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 client 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 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 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:

```

+-----+
| SubOpt Code | Len |
+-----+
```

Where:

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

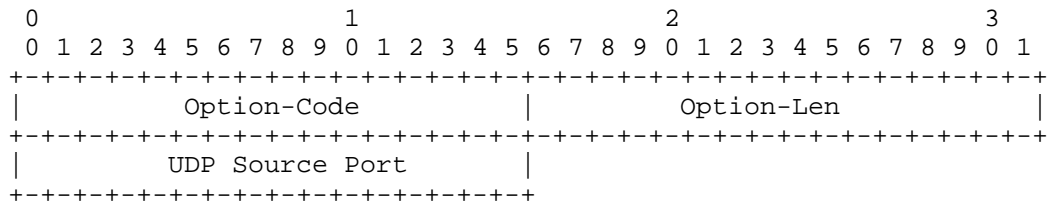
Len: 8 bits value to be set to 0.

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 by the DHCPv6 relay agent that uses a non-DHCP UDP port communicating with the DHCP server and upstream 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.

UDP Source Port: 16 bits value. To be set by the DHCPv6 relay to the UDP source port used for the packet.

With this Relay Source Port Option in the message, when a DHCPv6 server replies or a relay agent relays a message towards a downstream relay agent, it MUST use the same port number for the UDP destination to the previous hop 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 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

TBD.

## 8. Document Change Log

### 8.1. Changes to draft-shen-dhc-client-port-03

- o Submitted August 2016
- o Added more motivation paragraphs in the section of Introduction.
- o Added the language for default DHCP/DHCPv4 relay ports of (67/547) if not explicitly being provisioned for this generalized UDP source port extension.

### 8.2. Changes to draft-shen-dhc-client-port-02

- o Submitted July 2016
- o Added 16-bits UDP Source Port field in the DHCPv6 Relay Agent Source Port Option.

### 8.3. Changes to draft-shen-dhc-client-port-01

- o Submitted July 2016
- o Changed the document title from "Generalize Client UDP Port Number of DHCP Relay" to "Generalized Source UDP Port of DHCP Relay".
- o Changed the document text such that the source port extension is only applied for DHCP and DHCPv6 relay agents.
- o Defined the DHCPv4 Relay Agent Source Port sub-option and the DHCPv6 Relay Agent Source Port option.

#### 8.4. Changes to draft-shen-dhc-client-port-00

- o Initial version of the draft is published in June 2016.

#### 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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