dhc Working Group
Internet-Draft
Intended status: Informational
Expires: April 29, 2015

Y. Cui
Z. Liu
C. Liu
Tsinghua University
October 26, 2014

DHCP4o6 Active Leasequery
draft-cui-dhc-dhcp4o6-active-leasequery-00

Abstract

As networks migrate towards IPv6, some entities still have the requirement for IPv4 configuration. DHCPv4 over DHCPv6 [RFC7341] provides a mechanism for obtaining IPv4 configuration information dynamically in IPv6 networks. DHCPv4/DHCPv6 Active Leasequery allows a client to get real-time DHCP address binding information data via TCP. This document describes an extension of DHCPv6 Active Leasequery to provide an mechanism to getting real-time DHCPv4 over DHCPv6 lease information.

Table of Contents

1. Introduction

The DHCPv6 Leasequery [RFC5007] extends the basic DHCPv6 capability [RFC3315] to allow an external entity to query a DHCPv6 server to recover individual lease state information about a particular IPv6 address or client in near real-time. The DHCPv6 Bulk Leasequery [RFC5460] extends DHCPv6 Leasequery [RFC5007] that allows an external entity to query a DHCPv6 server for bulk transfer of lease information via TCP. The Active Leasequery allows an entity not directly participated in DHCPv6 client-server transactions and caches the current DHCPv6 lease state in real-time.And for DHCPv4, there are also similar protocols for DHCPv4 lease. [RFC4388] [RFC6926]

As networks migrate towards IPv6, hosts in some IPv6 network also need DHCPv4 configuration using DHCPv4 over DHCPv6[RFC7341]. The lease information in DHCPv4 over DHCPv6 (i.e. DHCP4o6 lease information) contains DHCPv4 lease information (including IPv4 address and other DHCPv4 options) in DHCPv4 messages, and stateless DHCPv6 options in DHCPV4-QUERY/DHCPV4-RESPONSE messages. The capability of additional DHCPv6 options makes it different from original DHCPv4 [RFC2131]. One example usage is in Lightweight 4over6 dynamic provisioning: A client (lwB4) chooses its IPv6 tunnel source address and puts it into a DHCPv6 option (OPTION_DHCP4O6_SADDR) [I-D.fsc-softwire-dhcp4o6-saddr-opt] to tell the provisioning system. The tuple of client (lease IPv4 address, port set, IPv6 tunnel source address)is then used to create a binding entry in lwAFTR.

In the case that a requestor wants to get both DHCPv4 lease information and DHCPv6 lease information of the same client, it can run DHCPv4 Active Leasequery and DHCPv6 Active Leasequery separately,

using the same client identifier to associate them together. However, it doesn't work for a requestor getting DHCP4o6 lease information because there's no DUID or any other DHCPv6 identifiers in DHCPV4-QUERY/DHCPV4-RESPONSE messages, thus the DHCPv6 options can only be associated with the DHCPv4 lease. A requestor asking for DHCP4o6 lease must get the DHCPv6 options along with the DHCPv4 lease information.

However, the DHCPv4 Active Leasequery mechanism doesn't support providing DHCPv6 options, and the DHCPv6 Active Leasequery mechanism doesn't support providing DHCPv4 lease information. This document describes an extension of DHCPv6 Active Leasequery, naming the DHCP4o6 Active Leasequery, to allow an entity get the mixed DHCPv4 over DHCPv6 lease information in real-time in IPv6 network.

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. Solution

The DHCP4o6 Active Leasequery mechanism is modeled on the existing DHCPv4 over DHCPv6 protocol in [RFC7341], which combine DHCPv4 Active Leasequery and DHCPv6 Active Leasequery to providing real-time DHCPv4 lease and related DHCPv6 lease information in IPv6 network. The DHCP4o6 Active Leasequery requestors and DHCP4o6 servers communicate with each other using DHCPv6 Active Leasequery which contains DHCPv4 Message Option defined in [RFC7341].

DHCPv4 Message Option defined in [RFC7341] contains the DHCPv4 message sent by the DHCP client or server. In DHCP4o6 Active Leasequery scenario, DHCPv4 Message Option contains the DHCPv4 Active Leasequery message sent by requestor and DHCP4o6 server.

DHCP4o6 Leasequery requestor SHOULD obtain necessary IPv6 configuration and have the DHCP4o6 server IPv6 address available via configuration or some other means, and that it has unicast IPv6 reachability to the DHCP4o6 server.

DHCP4o6 Leasequery requestor creates a TCP connection to DHCP4o6 server as defined [I-D.ietf-dhc-dhcpv6-active-leasequery]. After establishing a connection, requestor sends a DHCPv6 ACTIVELEASEQUERY message with a DHCPv4 Message Option in it to query for DHCPv4 over DHCPv6 lease information. The DHCPv4 Message Option encapsulates the DHCPv4 DHCPACTIVELEASEQUERY message to describe the query for a DHCPv4 lease. And the related DHCPv6 options will be queried in

DHCPv6 query-options. The requestor MUST NOT put more than one DHCPv4 Message Option into a single DHCPv6 ACTIVELEASEQUERY message.

When received the DHCPv6 ACTIVELEASEQUERY message, DHCP4o6 server SHOULD address the DHCPv4 DHCPACTIVELEASEQUERY message in the DHCPv4 Message Option and the related DHCPv6 query in DHCPv6 query-options. DHCP4o6 server will reply with DHCPv6 LEASEQUERY-REPLY message/ LEASEQUERY-DATA message. When the server update DHCPv4 lease or related DHCPv6 information, it will generate a response to requestors. In response, the server sends updates of DHCPv4 over DHCPv6 lease information in the DHCPv6 LEASEQUERY-DATA message. The DHCPv4 lease sent to the requestor using DHCPv4 DHCPLEASEACTIVE or DHCPLEASEUNASSIGNED message which will be encapsulated in DHCPv4 Message Option. The related DHCPv6 options will be carried in the DHCPv6 OPTION_CLIENT_DATA option.

4. Use Case

As the method described above, it will provide the requestor with related DHCPv4 lease and DHCPv6 information of a DHCP client in real-time. It MAY be used in many cases. We will describe the using for Lightweight 4over6 [I-D.ietf-softwire-lw4over6]as an example.

In Lightweight 4over6, lwAFTR need the binding IPv6 address for the mapping table. lwAFTR can work as a DHCP4o6 Active Leasequery requestor to get real-time DHCPv4 lease and related DHCPv6 information. lwAFTR need all lwB4’s IPv4 address, PSID, IPv6 address to make the maaping table for the tunnel. So, lwAFTR will send the DHCPv6 ACTIVELEASEQUERY message with DHCPv4 Message Option to query for DHCPv4 lease and related DHCPv6 lease information of a DHCP client. DHCPv4 ACTIVELEASEQUERY message in the DHCPv4 Message Option SHOULD contains the primary query as Query for All Configured IP addresses. And the Parameter Request List option in DHCPv4 ACTIVELEASEQUERY message SHOULD contains the DHCPv4 Port Parameters option defined in [I-D.ietf-dhc-dynamic-shared-v4allocation]. And in the OPTION_LQ_QUERY option in DHCPv6 ACTIVELEASEQUERY message, the DHCPv6 OPTION_ORO option MUST contains the DHCPv4 over DHCPv6 Source address option defined in [I-D.fsc-softwire-dhcp4o6-saddr-opt].

DHCP4o6 server configure the lwB4s with DHCPv4 lease, and get the binding IPv6 address during the process. As defined in [RFC7341], DHCP4o6 client query for DHCP4o6 server’s address during DHCPv6 interaction. After receiving DHCP4o6 server’s address, DHCP4o6 client will query for IPv4 address from DHCP4o6 server. At the same time, DHCP4o6 client MAY negotiate the binding IPv6 address with DHCP4o6 server, and DHCP4o6 server can record the binding IPv6 address as defined in [I-D.fsc-softwire-dhcp4o6-saddr-opt]. When DHCP4o6 server received DHCPv6 ACTIVELEASEQUERY message from lwAFTR,

it SHOULD reply with the DHCPv6 LEASEQUERY-REPLY/LEASEQUERY-DATA message which contains the CPEs' IPv4 address, PSID, IPv6 address and other information in the following time if there is update of DHCPv4 lease or DHCPv6 lease.

In other cases, DHCP4o6 server MAY get more DHCPv6 information or even the whole DHCPv6 lease by some means, it can provide more information to the requestors.

5. Security Considerations

To be continue

6. References

6.1. Normative References

[I-D.ietf-dhc-dhcpv6-active-leasequery] Dushyant, D., Kinnear, K., and D. Kukrety, "DHCPv6 Active Leasequery", draft-ietf-dhc-dhcpv6-active-leasequery-01 (work in progress), March 2014.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2131] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, March 1997.

[RFC2132] Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions", RFC 2132, 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.

[RFC4388] Woundy, R. and K. Kinnear, "Dynamic Host Configuration Protocol (DHCP) Leasequery", RFC 4388, February 2006.

[RFC5007] Brzozowski, J., Kinnear, K., Volz, B., and S. Zeng, "DHCPv6 Leasequery", RFC 5007, September 2007.

[RFC5460] Stapp, M., "DHCPv6 Bulk Leasequery", RFC 5460, February 2009.

[RFC6926] Kinnear, K., Stapp, M., Desetti, R., Joshi, B., Russell, N., Kurapati, P., and B. Volz, "DHCPv4 Bulk Leasequery", RFC 6926, April 2013.

[RFC7341] Sun, Q., Cui, Y., Siodelski, M., Krishnan, S., and I. Farrer, "DHCPv4-over-DHCPv6 (DHCP 4o6) Transport", RFC 7341, August 2014.

6.2. Informative References

[I-D.fsc-softwire-dhcp4o6-saddr-opt]
Farrer, I., Sun, Q., and Y. Cui, "DHCPv4 over DHCPv6 Source Address Option", draft-fsc-softwire-dhcp4o6-saddr-opt-01 (work in progress), September 2014.

[I-D.ietf-dhc-dhcpv4-active-leasequery]
Kinnear, K., Stapp, M., Volz, B., and N. Russell, "Active DHCPv4 Lease Query", draft-ietf-dhc-dhcpv4-active-leasequery-01 (work in progress), June 2014.

[I-D.ietf-dhc-dynamic-shared-v4allocation]
Cui, Y., Qiong, Q., Farrer, I., Lee, Y., Sun, Q., and M. Boucadair, "Dynamic Allocation of Shared IPv4 Addresses", draft-ietf-dhc-dynamic-shared-v4allocation-02 (work in progress), September 2014.

[I-D.ietf-softwire-lw4over6]
Cui, Y., Qiong, Q., Boucadair, M., Tsou, T., Lee, Y., and I. Farrer, "Lightweight 4over6: An Extension to the DS-Lite Architecture", draft-ietf-softwire-lw4over6-11 (work in progress), October 2014.

Authors' Addresses

Yong Cui
Tsinghua University
Beijing 100084
P.R.China

Phone: +86-10-6260-3059
Email: yong@csnet1.cs.tsinghua.edu.cn

ZiLong Liu
Tsinghua University
Beijing 100084
P.R.China

Phone: +86-10-6278-5822
Email: liuzilong8266@126.com

Cong Liu
Tsinghua University
Beijing 100084
P.R.China

Phone: +86-10-6278-5822
Email: gnocuil@gmail.com