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DHCPv6 Relay Agents and NEMO
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Abstract

The IPv6 network mobility (NEMO) configuration relies on a prefix delegation service to fulfill its task. Such service has already been described in two different proposals, one is based on DHCPv6 and the other extends NEMO signaling.

However, both failed to gather consensus. This memo describes how DHCPv6 Relay Agents can be used in order to provide the missing

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flexibility and pave the way for a solution.

1. Introduction

One aspect of network mobility support is the assignment of a prefix or a set of prefixes to a Mobile Router (MR) for use on the links in the Mobile Network. For this purpose, two solutions have been proposed. The first one (described in [[NEMOdhc](#)]) uses DHCPv6 [[RFC3315](#)] Prefix Delegation [[RFC3633](#)] in the tunnel between the MR and its Home Agent (HA), while the second [[NEMOpd](#)] is an adhoc extension of NEMO signaling.

While DHCPv6 Prefix Delegation is the standard way to provide the Prefix Delegation service, using it directly over the MR-HA tunnel is far from immediate and a source of complexities. In an attempt to avoid these complexities, the second proposal did not reuse the DHCPv6 Prefix Delegation framework but failed to gain a rough consensus as it went against the DHCPv6 mainstream.

In order to improve this situation, the use of DHCPv6 Relay Agents has been suggested but was never written down and thus, had a limited effect. This document aims to explain how a clever use of DHCPv6 Relay Agents can inject the desired flexibility to extend the applicability of DHCPv6 in general and DHCPv6 Prefix Delegation in particular to environments with very different constraints than in the original design.

2. A short description of DHCPv6 Relay Agent function

The main function of DHCPv6 Relay Agents is to allow DHCPv6 Servers to be located anywhere in the network and not only on the same link than their Clients. But DHCPv6 extends it with the support of multiple Relays, the resulting topology from a Client is a tree with:

- the Client as the tree root
- Relays as intermediate nodes
- Servers as leaves

Relays forward messages from downstream Clients or Relays to upstream Servers or Relays, using unicast and/or multicast, and forward responses back in the other way.

DHCPv6 Relay Agents use two specific messages (Relay-forward and

Relay-repl). These messages share a common header:

- a message type
- a hop-count (to detect loops)

- a link-address (to identify the downstream link)
 - a peer-address (to identify the downstream Client or Relay)
- To help the identification of the downstream link, the Relay may insert an Interface-id option which will be reflected back by Servers in Relay-repl messages. The content of this option is opaque, i.e., Servers do not parse it.

On another side, for the identification of DHCPv6 Clients, Relay Agents may insert Subscriber-id [[RFC4580](#)] or Remote-id [[RFC4649](#)] options in Relay-forward messages.

[3.](#) Flexibility introduced by the use of DHCPv6 Relay Agents

DHCPv6 mandates the Client to use link-local address and multicast to communicate with an onlink Server or Relay. Such design makes sense for global address assignments but is a very annoying constraint in the MR-HA context.

Since a Relay does not have such constraint, the idea is to co-locate a Relay in the MR at the MR end of the tunnel.

[4.](#) Transport of DHCPv6 messages

DHCPv6 messages can be easily encapsulated, in fact relaying encapsulates recursively DHCPv6 messages in Relay-message options. But when reusing DHCPv6 code, the Relay function is the easiest, i.e., when flexibility is needed to support transport of DHCPv6 messages in a not standard way the solution is to use (again) Relays. Consequently, the main argument of NEMO Prefix Delegation [[NEMOOpd](#)], the overhead to run signaling then prefix delegation after each movement, no more stands as DHCPv6 can be piggy-backed into the mobility signaling.

5. Final recommendation

If the use of DHCPv6 Relays introduces flexibility, it should nevertheless be mentioned that this is not a reason to enforce their use. It follows that the wording should be enough accurate in order to keep the choice between a Relay or another entity. For instance, the DHCPv6 Prefix Delegation for NEMO [[NEMOdhc](#)] is right when it allows a Relay or a Server in the Home Agent.

6. Acknowledgments

The idea described in this document is not new so we are sure it is not our own idea...

7. Security Considerations

This memo proposes some ways to improve code and security analysis sharing for the Prefix Delegation service so should indirectly help security.

8. IANA Considerations

None.

9. References

9.1. Normative References

- [RFC3315] Droms, R., Ed., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", [RFC 3315](#), July 2003.
- [RFC3633] Troan, O. and R. Droms, "IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6", [RFC 3633](#), December 2003.

[9.2.](#) Informative References

- [NEMOdhc] Droms, R. and P. Thubert, "DHCPv6 Prefix Delegation for NEMO", [draft-ietf-nemo-dhcpv6-pd-03.txt](#) (work in progress), December 2007.
- [NEMOpd] Thubert, P. and TJ. Kniveton, "Mobile Network Prefix Delegation", [draft-ietf-nemo-prefix-delegation-02.txt](#) (work in progress), August 2007.
- [RFC4580] Volz, B., "Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Subscriber-ID Option", [RFC 4580](#), June 2006.
- [RFC4649] Volz, B., "Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Remote-ID Option", [RFC 4649](#), August 2006.

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