Network Working Group
Internet-Draft
Expires: October 31, 2009

F. Xia
B. Sarikaya
Huawei USA
April 29, 2009

Local Mobile Anchor Discovery Using DHCP
draft-xia-netlmm-lma-discovery-02

Status of this Memo

Copyright Notice

Abstract

This draft defines a DHCP-based scheme to enable dynamic discovery of a Local Mobility Anchor (LMA) in Proxy Mobile IPv6. Existing Dynamic Host Configuration Protocol (DHCP) options are used allowing a Mobile Access Gateway (MAG) to request the LMA's IP address, Fully Qualified Domain Name (FQDN), or home network prefix via the DHCP response.

Table of Contents

1. Introduction

[I-D.giaretta-netlmm-mip-interactions] describes possible scenarios which require an interaction between PMIPv6 and MIPv6. In a similar scenario depicted in Figure 1 , some mobile nodes use Mobile IPv6 to manage their movements while others rely on a network-based mobility solution provided by the network. There is a common mobility anchor that acts as Mobile IPv6 Home Agent and Proxy Mobile IPv6 LMA, depending on the type of the node.

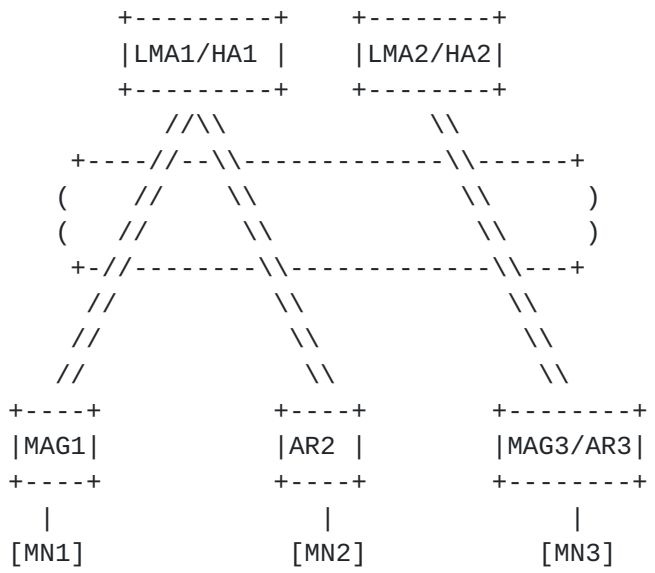

Figure 1: Hybrid deployment with MIPv6 and PMIPv6

Before a MAG or a MN can engage in mobility management signaling with the mobility anchor (LMA or HA), it SHOULD either know the IP address of the mobility anchor via pre-configuration, or dynamically discover it.

[I-D.ietf-mip6-hiopt] defines DHCPv6 options which are used for acquiring the mobile anchor(HA) information from a DHCPv6 server in MIPv6, while this document describes a procedure that the MAG retrieves the information from the same server using the DHCP options in Proxy MIPv6.

We note that LMA discovery can be done by some other means such as AAA. MAG could be provided with LMA address by AAA server during access authentication of the mobile node. LMA can also be discovered by lower layer means such as from the identity of the mobile node.

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].

The terminology in this document is based on the definitions in [RFC5213].

3. Message Sequence

Figure 2 shows the message sequence for dynamic LMA discovery using DHCPv6. The following details apply.

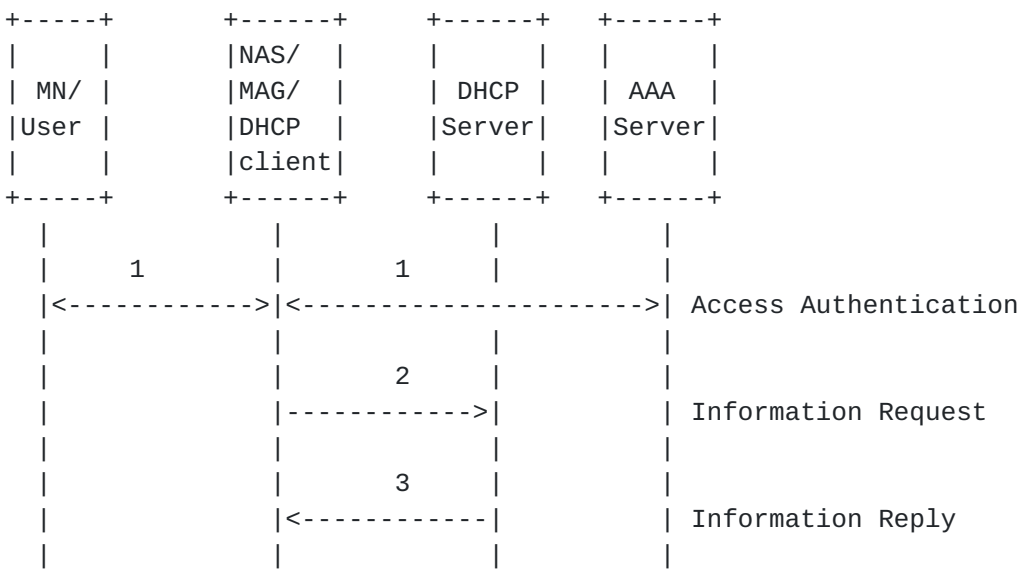

Figure 2: Dynamic LMA Using DHCP

1. The mobile node executes the network access authentication procedure (e.g., IEEE802.1X or IKEv2 SA establishment followed by EAP authentication) and it interacts with the NAS/MAG. The NAS/MAG interacts with the AAA server to authenticate the mobile node. In the process of authorizing the mobile node, the AAA server verifies in the AAA profile that the mobile node is allowed to use the Proxy Mobile IPv6 service. The AAA server possibly assigns a LMA and returns this information to the NAS through Diameter [I-D.korhonen-dime-pmip6] or RADIUS [I-D.xia-netlmm-radius], thus, it is not necessary to continue with step 2 and 3. Otherwise, the NAS/MAG continues the

following DHCP exchanges to inquire the home network information.

2. The NAS/MAG as a DHCP client sends a DHCPv6 Information Request message [RFC3315] to the All_DHCP_Relay_Agents_and_Servers multicast address. In this message, the NAS/MAG SHALL include Home Network Identifier Option [I-D.ietf-mip6-hiopt] in the OPTION_ORO, and a Home Network Identifier Option with id-type set to 0. When the Sub-opt-code of the sub-option is set to 1 in the request, the Home Network Parameter field MUST contain an identifier to specify the home network requested by the mobile node. This field MUST be set in the form of a FQDN [RFC1035], encoded as specified in Section 8 of [RFC3315]. If the mobile node has a NAI, the FQDN can be constructed by concatenating a fixed string with the realm part of the NAI. This sub-option in the request SHOULD be copied into the Home Network Information option returned in the reply. The NAS/MAG SHALL also include the OPTION_CLIENTID to identify itself to the DHCP server. The DHCP Unique Identifier(DUID) can be generated based on the mobile node's link layer address or other information. How to create DUID is beyond the scope of this document.
3. The DHCP server identifies the client by looking at the DUID for the client in the OPTION_CLIENTID. The DHCP server also determines that the MAG is requesting home network information by looking at the Home Network Identifier Option (id-type 0). The DHCP server retrieves the allocated IP (v6 and v4) address of the HA, i.e. LMA, FQDN of the HA, i.e. LMA, and home network prefix, and includes them in the Home Network Information Option [I-D.ietf-mip6-hiopt] in the Information Reply Message that it sends to the DHCP client.

4. DHCPv6 Relay Agent

A DHPCv6 relay agent function [RFC3315] SHOULD be used when NAS/MAG and the DHCP server are not connected directly. In this configuration, the relay agent function is co-located in the NAS/MAG with the DHCPv6 client function. Rather than using multicast to send DHCPv6 messages to the DHCPv6 server, the DHCPv6 client in the NAS/MAG hands any outbound DHCPv6 messages to the co- located relay agent. Responses from the DHCPv6 server are delivered to the relay agent function in the NAS/MAG, which extracts the encapsulated message and delivers it to the DHCPv6 client in the NAS/MAG.

4.1. Relay agent configuration

The use of the relay agent function in the NAS/MAG allows the NAS/MAG to unicast DHCPv6 messages to the DHCPv6 server. The relay agent must be configured with the address of the DHCPv6 server or another DHCPv6 relay agent that will forward message on to a DHCPv6 server.

4.2. Transmission of DHCPv6 messages

In this configuration, when the DHCPv6 client in the NAS/MAG sends a message, it hands the message to the DHCPv6 relay agent in the NAS/MAG. The relay agent encapsulates the message from the client in a Relay-forward message and sends the resulting DHCPv6 message to the DHCP server. The relay agent sets the fields in the Relay-forward message as follows:

msg-type	RELAY-FORW
hop-count	1
link-address	A non-link-local address from the upstream or loopback interface.
peer-address	A non-link-local address from the upstream or loopback interface.
options	MUST include a "Relay Message option" in which OPTION_ORO is included.

4.3. Receipt of DHCPv6 messages

In this configuration, messages from the DHCPv6 server will be returned to the DHCPv6 relay agent, with the message for the DHCPv6 client encapsulated in the Relay Message option [RFC3315] in a Relay-reply message. The relay agent function extracts the message for the client from the Relay Message option and hands the message to the DHCPv6 client in the NAS/MAG.

5. Security Considerations

This document describes the use of DHCPv6 for LMA discovery in Proxy Mobile IPv6 networks. It does not introduce any additional security concerns beyond those described in the "Security Considerations" section of the DHCPv6 base specification [RFC3315].

6. IANA considerations

None.

7. Acknowledgements

The authors are thankful to Sri Gundavelli for his comments that have led to some improvements in this draft.

8. References

8.1. 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.

[RFC3736] Droms, R., "Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6", RFC 3736, April 2004.

[RFC5213] Gundavelli, S., Leung, K., Devarapalli, V., Chowdhury, K., and B. Patil, "Proxy Mobile IPv6", RFC 5213, August 2008.

[RFC3775] Johnson, D., Perkins, C., and J. Arkko, "Mobility Support in IPv6", RFC 3775, June 2004.

[RFC1035] Mockapetris, P., "Domain names - implementation and specification", STD 13, RFC 1035, November 1987.

8.2. Informative references

[I-D.ietf-mip6-bootstrapping-integrated-dhc]
Chowdhury, K. and A. Yegin, "MIP6-bootstrapping for the Integrated Scenario", draft-ietf-mip6-bootstrapping-integrated-dhc-06 (work in progress), April 2008.

[I-D.ietf-mip6-hiopt]
Jang, H., Yegin, A., Chowdhury, K., and J. Choi, "DHCP Options for Home Information Discovery in MIPv6", draft-ietf-mip6-hiopt-17 (work in progress), May 2008.

[I-D.xia-netlmm-radius]
Xia, F., Sarikaya, B., Korhonen, J., Gundavelli, S., and D. Damic, "RADIUS Support for Proxy Mobile IPv6", draft-xia-netlmm-radius-04 (work in progress), April 2009.

[I-D.korhonen-dime-pmip6]
Korhonen, J., Bournelle, J., Muhanna, A., Chowdhury, K., and U. Meyer, "Diameter Proxy Mobile IPv6: Support For Mobile Access Gateway and Local Mobility Anchor to Diameter Server Interaction", draft-korhonen-dime-pmip6-04 (work in progress), September 2008.

[I-D.giaretta-netlmm-mip-interactions]
Giaretta, G., "Interactions between PMIPv6 and MIPv6: scenarios and related issues", draft-giaretta-netlmm-mip-interactions-02 (work in progress), November 2007.

Authors' Addresses

Frank Xia
Huawei USA
1700 Alma Dr. Suite 500
Plano, TX 75075

Phone: +1 972-509-5599
Email: xiayangsong@huawei.com

Behcet Sarikaya
Huawei USA
1700 Alma Dr. Suite 500
Plano, TX 75075

Phone: +1 972-509-5599
Email: sarikaya@ieee.org