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**DHCP Relay Agent Option to Support Mobile IPv6 bootstrapping
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Abstract

This document defines a new DHCPv6 option and number of sub-options

for DHCP Relay Agent to facilitate Mobile IPv6 bootstrapping along with a AAA infrastructure.

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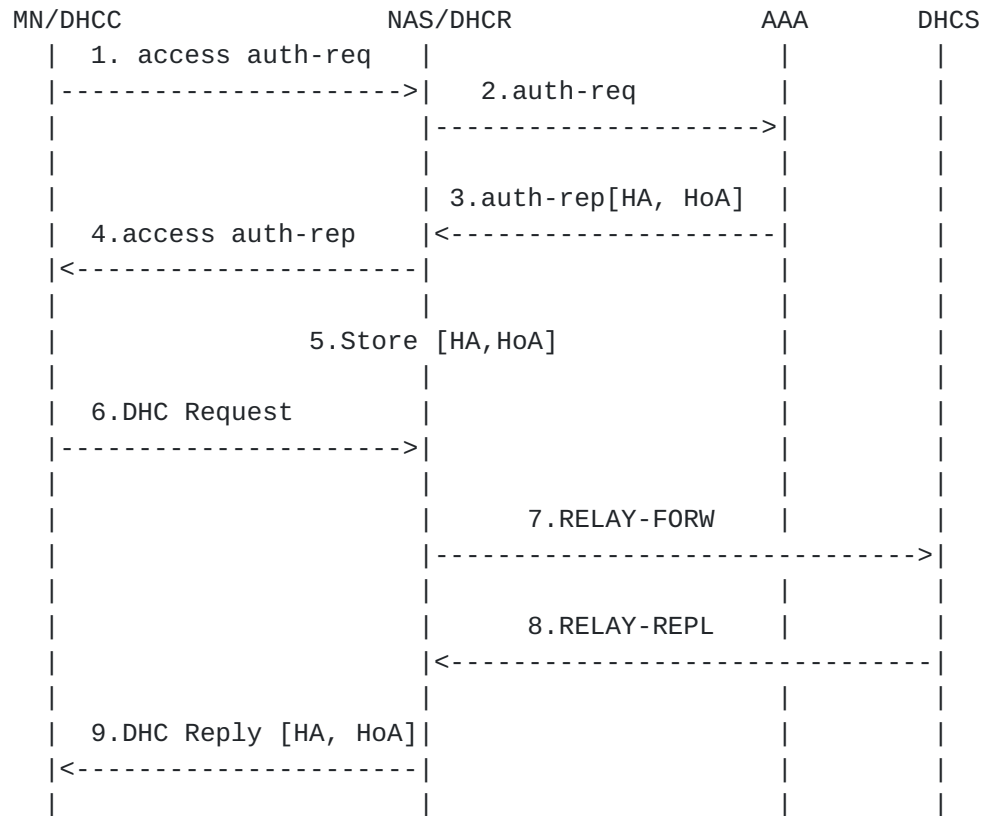
1. Introduction

In an access network, typically the user's device (Mobile Node) provides authentication credentials to the Access Device for authentication and authorization (e.g. PAP/CHAP). This Access Device may be the Network Access Server (NAS) or an Access Router (AR). Upon receipt of this authentication and authorization information from the user, the Access Device relays it to the Home AAA server.

Based on the home network's policy, the Home AAA server verifies the user's profile and includes a set of Mobile IPv6 specific information in the resulting response to the Access Device. Upon receiving the set of information from the Home AAA server, the Access Device needs to convey them to the user.

In the networks where DHCPv6 [[RFC3315](#)] is used for configuration purposes, the Access Device may act as a DHCPv6 relay agent. In this context the Access Device can relay the received information to the DHCP Client (MN) while sending REPLY message or ADVERTISE message to the DHCP client.

An example call flow is shown below:



In this example call flow:

1. The Mobile Node sends an access-authentication request to the NAS.
2. The NAS sends an authentication and authorization request (e.g. Access-Request for RADIUS or AA-Request for DIAMETER).
3. The AAA server authenticates and authorizes the MN and assigns Home Agent (HA) and Home Address for the Mobile Node(MN)'s subsequent Mobile IPv6 access.
4. The NAS responds to the MN. At this step the network access authentication and authorization is complete.
5. The NAS stores the received HA and HoA information.

6. The DHC client (DHCC) in the MN sends a DHCP Request to the DHC relay agents anycast address. The NAS/DHC Relay Agent (DHCR) receives the request.

7. The DHCR relays the Request to the DHC Server (DHCS).

8. The DHCS responds back to the DHCR.

9. The DHCR responds back to the DHCC with a DHC Reply message. Along with the message the DHCR appends the DHC Relay Agent Option for Mobile IPv6 to convey HA and HoA information to the MN.

The AAA procedures using RADIUS is defined in [[MIP6-RADIUS](#)].

[2.](#) Overview

In the typical Mobile IPv6 access scenario, the MN attaches in an access network for IPv6 service prior to performing Mobile IPv6 home registration. During this attach procedure, the NAS authenticates and authorizes the MN for IPv6 access service.

At the time of authorizing the user, the Home AAA server detects that the user is authorized for Mobile IPv6 access. Based on Home network providers policy, the Home AAA server may allocate several parameters to the MN for user during the subsequent Mobile IPv6 access. A list of such parameters is described in this section.

[2.1](#) Home Agent

The Home network provider may decide to assign a Home Agent to the MN which is in close proximity to the point of attachment (NAS-ID). There may be other reasons for assigning Home Agents to the MN, e.g. load sharing in the network. The Home network may also assign a list of Home Agents for the MN to choose.

[2.2](#) Home Link Prefix

The Home network may assign a Home Link that is in close proximity to the point of attachment (NAS-ID). The reason for doing that are similar to that of the HA. The MN can perform [[RFC3775](#)] specific procedures to discover other information for Mobile IPv6 registration.

[2.3](#) Home Address

The Home AAA server may assign Home Address to the MN. This allows the network operator to support mobile devices that are not configured with static addresses.

[2.4](#) Home Link Prefix Length

The Home AAA server may indicate the prefix length of Mobile's assigned Home Link when assigning the Home Agent and/or Home Address

to the MN. This assists the MN to infer the Home Link (HL) prefix information from the assigned HA and/or HoA values.

3. Terminology

The keywords "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](#).

4. DHC Relay Agent Option to carry Mobile IPv6 parameters

This section defines format and syntax for the option that carries the Mobile IPv6 parameters described in [section 2](#).

The Relay Agent MAY append these options with the REPLY, ADVERTISE messages.

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|      OPTION_MIP6-Option      |      option-len      |
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
.                               sub-options                               .
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+

```

option-code OPTION_MIP6_option (TBD by IANA).

option-len Length of OPTION_MIP6-Option.

sub-options A series of sub-options carrying MIP6
information such as HA address, HoA,
HL etc.

4.1 Home Agent sub-option

This sub-option carries the assigned Home Agent to the DHCP Client.

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|      sub-option=1      |      sub-option-len      |
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
.                               .
.                               assigned-MIP6-HA                               .

```

+ - + - + - + - + - + - + - + - + - + - + - + - + - + - + - + - + - +

```
sub-option-code      MIP6 Home Agent (1).
```

| | |
|------------|-------------------------------|
| option-len | Length of assigned HA fields. |
|------------|-------------------------------|

| | |
|------------------|-------------------------------|
| assigned-MIP6-HA | The address of the Home Agent |
|------------------|-------------------------------|

assigned by the AAA server.

[4.2](#) Home Link Prefix sub-option

This sub-option carries the assigned Home Link prefix to the DHC Client.

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   sub-option = 2           |   sub-option-len           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
.
.           assigned-MIP6-HL
.
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

sub-option-code MIP6 Home Link Prefix (2).

option-len Length of assigned HL fields.

assigned-MIP6-HL The prefix of the Home Link that is
assigned by the AAA server.

[4.3](#) Home Address sub-option

This sub-option carries the assigned Home Address by the AAA server to the DHC Client.

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

sub-option-code MIP6 Home Address (3).

option-len Length of assigned HoA field.

assigned-MIP6-HoA HoA assigned by the AAA server.

4.4 Home Link Prefix Length sub-option

This sub-option carries the Home Link Prefix Length so that the MN can infer the Home Link prefix from the assigned HA and/or HoA.

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|      sub-option = 4      |      sub-option-len      |
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
.                               Home Link Prefix Length                               .
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+

```

sub-option-code Home Link Prefix Length (4).

option-len Length of assigned Home Link Prefix Length.

Home Link Prefix Length Length of the Home Link Prefix in octets.

4.5 Authenticity sub-option

This sub-option carries the secure checksum of the assigned values. The purpose is to allow the MN to validate that the received information is indeed from the Home AAA with which the MN shares a secret. The secure checksum is computed by:

HMAC-SHA-1 (shared secret between MN and the Home AAA, assigned values).

```

 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|   sub-option = 5           |   sub-option-len           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
.                           authenticator                      .
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

sub-option-code Secure Checksum (6).

option-len Length of authenticator.

authenticator secure checksum.

5. DHC Client Operation Considerations

Upon receiving the DHC Relay Agent Option carrying Mobile IPv6 parameters, the MN MUST look for the Authenticity sub-option. If included, the MN MUST validate the authenticator by computing an HMAC-SHA-1 of the received values in other sub-options. If the validation succeeds, the MN SHALL accept the received values for Mobile IPv6 registration.

6. DHC Relay agent Considerations

The DHCP relay agent MUST append the DHC Relay Agent Option defined in this document while sending REPLY and ADVERTISEMENT messages to the DHC Client when the MIP6 informations are received from the Home AAA as per [[MIP6-RADIUS](#)].

7. Security Considerations

The options introduced in this document may be used by a rogue relay agent to insert data in the REPLY and ADVERTISE messages. The result could be that the MN may be misled to send Mobile IPv6 BU to a wrong Home Agent. In this case the MN's security credentials could be exposed to a rogue HA. However, if the Authenticity sub-option is in use, the likelihood of a rogue relay agent inserting malicious data or modifying received parameters can be greatly mitigated. Therefore, it is strongly recommended that the authenticity sub-option be included in OPTION_MIP6-Option.

8. IANA Considerations

IANA needs to assign the option code for OPTION_MIP6-Option. The IANA also needs to assign sub-option-codes for Home Agent, Home Link Prefix, Home Address, Home Link Prefix Length, and the Authenticity sub-options defined in this document.

9. Acknowledgements

TBD.

10 Normative References

[MIP6-RADIUS]

Chowdhury et. al., K., "RADIUS Attributes for Mobile IPv6 bootstrapping", [draft-chowdhury-mip6-bootstrap-radius-01](#) (work in progress), July 2004.

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

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