DHCPv6 Extension for Configuring Hosts with multiple Interfaces
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Abstract

This document defines a DHCPv6 option to help configure a multi-homed host’s routing table with new entries when the host attaches to a new network on a new interface.

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1. Introduction

Traditional routing considered only the destination address in IPv4/v6 header. Policy routing on the hand considers all of the fields in the header sometimes even the payload. In IPv6, the hosts receive router advertisements containing information useful for policy routing. However in some networks, e.g. cellular networks, DHCP servers can be used to help multi-homed mobile nodes configure their routing tables.

Using a single default route would lead to routing of all flows through a single interface. Such a configuration makes it impossible to use multiple interfaces simultaneously if the host is multi-homed.

Requirements of supporting multiple interfaces in hosts without involving mobility protocols are discussed in [I-D.yang-mif-req]. DHCP is identified as a protocol to communicate interface management policies between MIF nodes and the network.

The IPv6 hosts receive router advertisements and then populate their Default Router List and Prefix List based on information in the router advertisements (RA) [RFC2461]. [RFC4191] extended RAs with Route Information Option and added Default Router Preference. Such RAs if available would help multi-homed mobile nodes configure better to enable the simultaneous use of all interfaces.

In this document we define a new DHCPv6 option. This option is to inform multi-homed hosts about the routes and other useful information available on the new network that the host has just connected. It is appropriate to use DHCP for this purpose because DHCP is already needed for initial configuration of the host’s interface, e.g. for address assignment.

2. Terminology

This document uses the terminology defined in [RFC3315], [RFC3633].

3. Configuring Routing Tables of Multi-homed Hosts

IPv6 routing table contains these entries: prefix, prefix length, preference value, lifetime, and the address of the next-hop router.

Multi-homed hosts receive configuration information on each interface. Routers send router advertisements. DHCP servers provide host configuration information. SDOs are defining servers such as Access Network Discovery and Selection function (ANDSF). ANDSF can
also provide node configuration information on SDO interfaces. Configuration information helps host set up and update important databases that the host uses such as the routing table.

Since IPv6 allows multiple unicast addresses to be assigned to interfaces, IPv6 hosts face the problem of default source and destination address selection when initiating communication. [RFC3484] defined algorithms for this purpose.

In this document we extend DHCPv6 with an option called multi-homed routing policy entry option. Using this option DHCPv6 server can inform DHCPv6 client on the default routes available on the interface which the host is about to connect. The option also allows DHCP server to provide more information on the flows such as the traffic classes or more sophisticated flow description. The host receives the route information ordered with priority which allows the host to select the right interface to start communication.

4. DHCPv6 Option

A new option is defined to carry the host routing information. It is shown in Figure 1.

DHCP server MAY send a Reply message containing multi-homed routing policy entry option. DHCP client MUST add an entry to its routing table based on this option. DHCP client MAY modify other tables such as Default Router List or Pref List [RFC4191].

DHCP Client MAY include multi-homed routing policy entry option in Option Request Option [RFC3315] in DHCP Request message. DHCP Server MUST include multi-homed routing policy entry option in the corresponding Reply message. The option contains a list of routing policies, each of them containing the flow description followed by the route to apply when packet to forward is matching.
Figure 1: DHCP Option

- option-code: OPTION_MHRPE multi-homed routing policy entry option (TBD)
- Option-length: Total length of prefix-length, IPv6 prefix, TOS and Reserved fields in octets; It should be a multiple of 36.
- FD-len: length of the flow description
- PID: The Policy Identifier field is an 8-bit unsigned integer that includes the identifier for the policy.
Flow Description: This field contains flow information such as flow identifier, priority, etc. This field is of length FD-len - 8.

prefix-len: Prefix length of the destination prefix over which the flow will be routed
IPv6 prefix: Destination prefix over which the flow will be routed
TOS: Traffic class for the flow, 8 bits
Reserved: 16 bits set to zero by the sender ignored by the receiver
IPv6 Router Address: Default router address for this route. This field is 16 octets.
Prefix-length: Length of the prefix of IPv6 router address field. It is 8 bits.
Reserved: 24 bits set to zero by the sender ignored by the receiver

5. Security Considerations

This document does not by itself introduce any security issues.

6. IANA Considerations

IANA is requested to assign an option code to the following options from the option-code space defined in "DHCPv6 Options" section of the DHCPv6 specification [RFC3315].

<table>
<thead>
<tr>
<th>Option Name</th>
<th>Value</th>
<th>Described in</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTION_MHPTE</td>
<td>TBD</td>
<td>Section 4</td>
</tr>
</tbody>
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7. Acknowledgements

TBD.

8. References

8.1. Normative References

8.2. Informative references


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