DHCPv6 Extension for On Demand Mobility exposure
draft-moses-dmm-dhcp-ondemand-mobility-06

Abstract

   Applications differ with respect to whether or not they need IP
   session continuity and/or IP address reachability. Networks
   providing the same type of service to any mobile host and any
   application running on the host yields inefficiencies. This document
   describes extensions to the DHCPv6 protocol to enable mobile hosts to
   indicate the required mobility service type associated with a
   requested IP prefix and to allow networks to indicate the type of
   mobility service associated with the allocated IP prefix in return.

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   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   This Internet-Draft will expire on December 20, 2017.

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1. Introduction

[I-D.ietf-dmm-ondemand-mobility] defines different types of mobility-associated services provided by access networks to mobile hosts with regards to maintaining IPv6 prefix continuity after an event of the host moving between locations with different points of attachments within the IP network topology. It further specifies means for applications to convey to the IP stack in the mobile host, their requirements regarding these services.

This document defines extensions to the DHCPv6 protocol ([RFC3315]) in the form of a new DHCP option that specifies the type of mobility services associated with an IPv6 prefix. The IP stack in a mobile host uses the DHCP client to communicate the type of mobility service it wishes to receive from the network. The DHCP server in the network uses this option to convey the type of service that is guaranteed with the assigned IPv6 prefix in return.

This new option also extends the ability of mobile routers to specify desired mobility service in a request for IPv6 prefixes (as specified in [RFC3633]), and enable delegating routers to convey the type of mobility service that is committed with the allocated IPv6 prefixes in return.

In a distributed mobility management environment, there are multiple Mobility Anchors (as specified in [I-D.ietf-dmm-distributed-mobility-anchoring]). In some use-cases, mobile hosts may wish to indicate to the network, their preference of the serving Mobility Anchor. This document specifies a new DHCPv6 option that is used by DHCPv6 clients to convey this preference.

2. Notational Conventions

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. IPv6 Continuity Service Option

The IPv6 Continuity Service option is used to specify the type of
continuity service associated with a source IPv6 prefix. The IPv6
Continuity Service option must be encapsulated in the IAprefix-
options field of the IA_PD prefix option.

The format of the IPv6 Continuity Service option is:

```
 0                   1                   2                   3
 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_IPv6_CONTINUITY_SERVICE|         option-length         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| service-type  |
+-+-+-+-+-+-+-+-+
```

option-code   OPTION_IPv6_CONTINUITY_SERVICE (TBD)

option-len   1

service-type   one of the following values:

               Non-Persistent -   a non-persistent IP prefix (1)

               Session-Lasting -   a session-lasting IP prefix (2)

               Fixed -   a fixed IP prefix (3)

               Graceful-replacement -   a graceful-replacement IP
                            prefix (4)

               Anytype -   Anyone of the above (0)

The definition of these service types is available in
[I-D.ietf-dmm-ondemand-mobility].

All other values (5-255) are reserved for future use. If the
OPTION_IPv6_CONTINUITY_SERVICE option is received and its service-
type is equal to one of the reserved values, the option should be
ignored.

When a message is sent from a client to a server, the value of the
IPv6 Continuity Service option indicates the type of continuity
service required for the IPv6 prefix requested by the client.

When a message is sent from a server to a client, the value of the
IPv6 Continuity Service option indicates the type of continuity
service committed by the network for the associated IPv6 prefix. The
value 'AnyType' can only appear in the message sent from the client
to the server to indicate that the client has no specific preference.
However, it cannot appear in a message sent from the server.

Once an IPv6 prefix type is requested and provided, any subsequent
messages involving this prefix (lease renewal - for example) must
include the IPv6 Continuity Service option with the same service type
that was assigned by the server during the initial allocation.

If a server receives a request to assign an IPv6 prefix with a
specified IPv6 Continuity service, but cannot fulfill the request, it
must reply with the NoAddrsAvail status.

A server that does not support this option will discard it as well as
the IA_PD Prefix option that had this option encapsulated in one of
its IAprefix-options field.

If a client does not receive the requested prefix, it must resend the
request without the desired IPv6 Continuity Service option since it
is not supported by the server. In this case, the requesting device
(host or router) cannot assume any IP continuity service behaviour
for that prefix.

A server must not include the IPv6 Continuity Service option in the
IAprefix-options field of an IA_PD Prefix option, if not specifically
requested previously by the client to which it is sending a message.

If a client receives an IA_PD Prefix option from a server with the
IPv6 Continuity Service option in the IAprefix-options field, without
initially requesting a specific service using this option, it must
discard the received IPv6 prefix.

If the mobile device (host or router) has no preference regarding the
type of continuity service it uses the 'AnyType' value as the
specified type of continuity service. The Server will allocate an
IPv6 prefix with some continuity service and must specify the type in

IPv6 Continuity Service option encapsulated in the IAprefix-options
field of the IA_PD Prefix option. The method for selecting the type
of continuity service is outside the scope of this specification.
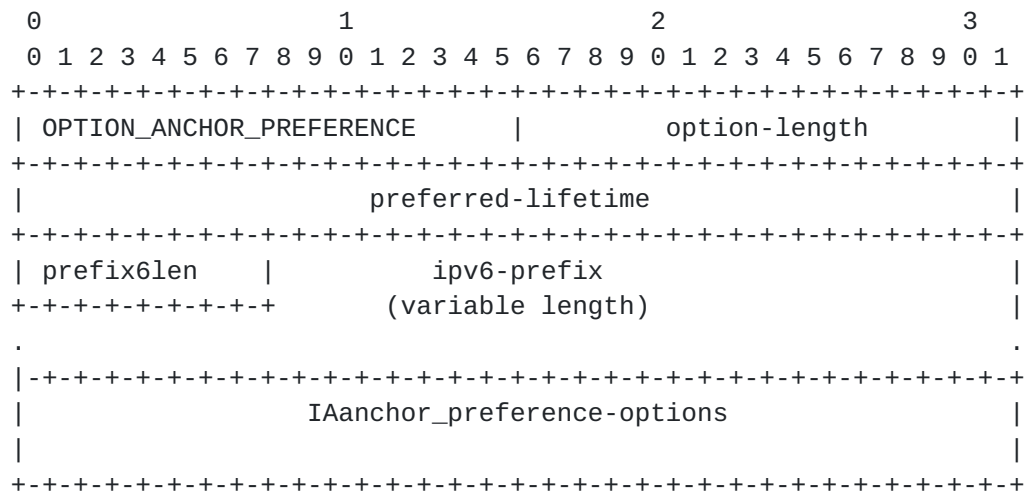
4. Anchor Preference Option

In a distributed mobility management environment that deploys
multiple Mobility Anchors, each Mobility Anchor may have a set of
IPv6 prefixes that is being used when assigning Session-lasting or
Fixed source IPv6 prefixes to hosts.

The selection of the Mobility Anchor that will serve a mobile host is
performed by the network at various events like, the event of initial
attachment of a mobile host to a network.

The Anchor Preference option enables a host to express its desire to
receive a specific source IPv6 prefix. This is useful when the
mobile host wishes to indicate to the network which Mobility Anchor
should be used for anchoring its traffic and ensuring service
continuity in the event of handoff between LANs with different IPv6
prefixes.

The network MAY respect this request but is not required to do so.

The format of the Anchor Preference option is:

```
 0                   1                   2                   3
 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_ANCHOR_PREFERENCE      |         option-length         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      preferred-lifetime                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| prefix6len    |          ipv6-prefix                          |
+-+-+-+-+-+-+-+-+       (variable length)                       |
.                                                               .
|-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 IAanchor_preference-options                   |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

option-code   OPTION_ANCHOR_PREFERENCE (TBD)

option-len   5 + length of ipv6-prefix field + length of
               anchor_preference-options field

preferred-lifetime The preferred lifetime of the IPv6 address whose
                 prefix is requested, expressed in units of seconds

prefix-length The length in bits of the ipv6-prefix. Typically
                 allowed values are 0 to 128.

IPv6 prefix   This is a variable length field that specifies the
                 desired ipv6 prefix. The length is (prefix6len + 7) /
                 8. This field is padded with 0 bits up to the nearest
                 octet boundary when prefix6len is not divisible by 8.

IAanchor_preference-option Options associated with this request

An IPv6 prefix is requested only when the mobile host wishes to be
anchored by a specific mobility anchor. The client must also
indicate the type of mobility service it requires using the IPv6
Continuity Service option encapsulated in the IAanchor_preference-
options field of the IA_PD Prefix Option.

When requesting a specific IPv6 prefix, the 'Non-Persistent' type
must not be used since these prefixes are not anchored and there is
no need to request a specific anchor.

If a server receives a request to use a specific IPv6 prefix and an
IPv6 Continuity Service type, but cannot assign an IPv6 prefix with
that specified IPv6 Continuity Service it must reply with the
NoAddrsAvail status.

A server that does not support this option will discard it.

A server is not required to respect the prefix request. It can
assign a different prefix as long as it fulfills the IP Continuity
Service request.

If a client does not receive any prefix, it must assume that the the
option is not supported by the server and should not use this option
in subsequent requests.

5. Security Considerations

There are no specific security considerations for this option.

6. IANA Considerations

TBD

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
           Requirement Levels", BCP 14, RFC 2119,
           DOI 10.17487/RFC2119, March 1997,
           <http://www.rfc-editor.org/info/rfc2119>.

7.2. Informative References

[I-D.ietf-dmm-distributed-mobility-anchoring]
           Chan, A., Wei, X., Lee, J., Jeon, S., Petrescu, A., and F.
           Templin, "Distributed Mobility Anchoring", draft-ietf-dmm-
           distributed-mobility-anchoring-05 (work in progress), May
           2017.

[I-D.ietf-dmm-ondemand-mobility]
           Yegin, A., Moses, D., Kweon, K., Lee, J., Park, J., and S.
           Jeon, "On Demand Mobility Management", draft-ietf-dmm-
           ondemand-mobility-10 (work in progress), January 2017.

[RFC3315] Droms, R., Ed., Bound, J., Volz, B., Lemon, T., Perkins,
           C., and M. Carney, "Dynamic Host Configuration Protocol
           for IPv6 (DHCPv6)", RFC 3315, DOI 10.17487/RFC3315, July
           2003, <http://www.rfc-editor.org/info/rfc3315>.

[RFC3633] Troan, O. and R. Droms, "IPv6 Prefix Options for Dynamic
           Host Configuration Protocol (DHCP) version 6", RFC 3633,
           DOI 10.17487/RFC3633, December 2003,
           <http://www.rfc-editor.org/info/rfc3633>.

[RFC7934] Colitti, L., Cerf, V., Cheshire, S., and D. Schinazi,
           "Host Address Availability Recommendations", BCP 204,
           RFC 7934, DOI 10.17487/RFC7934, July 2016,
           <http://www.rfc-editor.org/info/rfc7934>.

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