

DMM Working Group
Internet-Draft
Intended status: Standards Track
Expires: June 10, 2016

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December 8, 2015

DHCPv6 Extension for On Demand Mobility exposure
draft-moses-dmm-dhcp-ondemand-mobility-02

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 address, and networks to indicate the type of mobility service associated with the allocated IP address in return.

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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 address continuity after an event of the host moving to different 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 address. 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 address in return.

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

In a distributed mobility management environment, there are multiple Mobility Anchors (as specified in [TBD reference to the Distributed Mobility Management architecture RFC]). In some use-cases, mobile hosts may wish to indicate to the network, 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 address or IPv6 prefix. The IPv6 Continuity Service option must be encapsulated in the IAAddr-options field of the IA Address option when associated with an IPv6 address, and in the IAPrefix-options field of the IA_PD prefix option when associated with an IPv6 prefix.

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:

Nomadic -	a nomadic address or prefix (1)
Sustained -	a sustained address or prefix (2)
Fixed -	a fixed address or prefix (3)
Anytype -	Anyone of the above (0)

This option can appear in one of two contexts: (1) As part of a request to assign a source IPv6 address of the specified mobility service type, and (2) As part of a request to assign an IPv6 prefix of the specified mobility service type.

3.1. Source IPv6 Address Type Specification

In this context, the IPv6 Continuity Service option is encapsulated in the IAaddr-options field of the IA Address option.

When in a message 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 address requested by the client.

When in a message sent from a server to a client, the value of the IPv6 Continuity Service option indicates the type of IP continuity service committed by the network for the associated IPv6 address. The value 'AnyType' cannot appear in a message sent from the server.

Once an IPv6 address type was requested and provided, any subsequent messages involving this address (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 received a request to assign an IPv6 address with a specified IPv6 Continuity service, but cannot fulfill the request, it must reply with the [TBD] status.

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

If a client does not receive the requested address, it must resent the request without the desired IPv6 Continuity Service option since it is not supported by the server. In that case, the host of the client cannot assume any IP continuity service behaviour for that address.

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

If a client receives an IA Address option from a server with the IPv6 Continuity Service option in the IAaddr-options field, without initially requesting a specific service using this option, it must discard the received IPv6 address.

If the mobile host 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 address with some continuity service and must specify the type in IPv6 Continuity Service option encapsulated in the IAaddr-options field of the IA

Address option. The method for selecting the type of continuity service is outside the scope of this specification.

3.2. IPv6 Prefix Type Specification

In this context, the IPv6 Continuity Service option is encapsulated in the IAprefix-options field of the IA_PD prefix option.

When in a message 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 in a message 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' cannot appear in a message sent from the server.

Once an IPv6 prefix type was 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 received a request to assign an IPv6 prefix with a specified IPv6 Continuity service, but cannot fulfill the request, it must reply with the [TBD] 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 resent the request without the desired IPv6 Continuity Service option since it is not supported by the server. In that case, the mobile router of the client 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 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

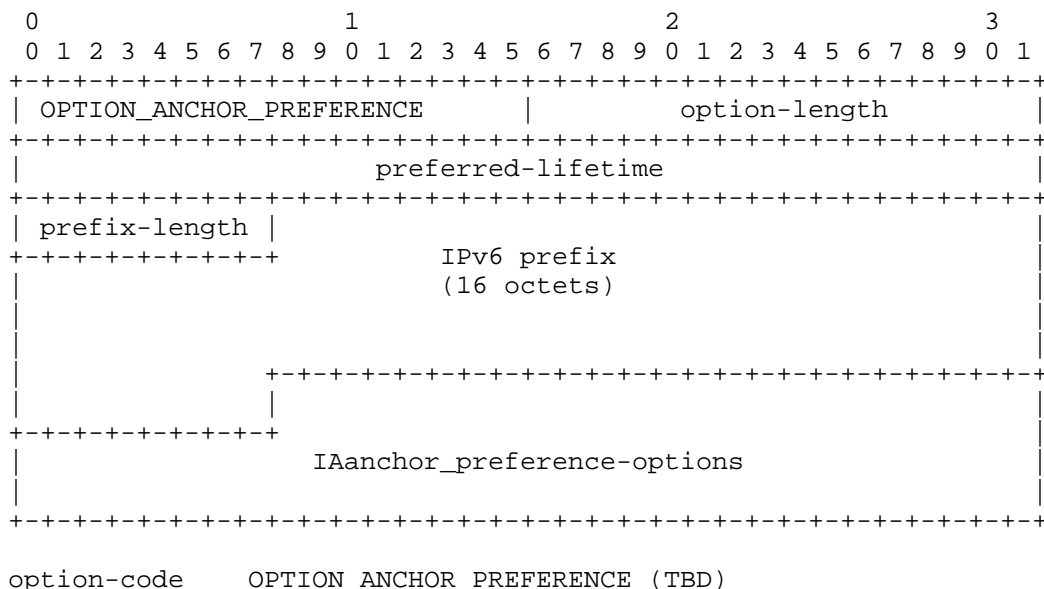
In a distributed mobility management environment that deploys multiple Mobility Anchors, each Mobility Anchor may have a set of IPv6 prefixes that is being used when assigning Sustained or Fixed source IPv6 addresses to hosts.

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 source IPv6 address with a specific 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:



option-len 25 + 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 of this prefix in bits

IPv6 prefix The requested prefix

IAanchor_preference-option Options associated with this request

This option is used by the client in a request for a new IPv6 source address. The server replies with an IPv6 address that may or may not have the desired prefix. Subsequent interactions between the client and server regarding this address, must use the the IA address option.

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 Address option.

When requesting an IPv6 prefix, only the 'Sustained' and 'fixed' types are legal.

The server must assign the IPv6 address of the requested type to the client, even if it does not fulfill the request for the specified prefix.

If a server received a request to use a specific IPv6 prefix and an IPv6 address type, but cannot assign an IPv6 address with that specified IPv6 Continuity it must reply with the [TBD] status.

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

If a client does not receive any address, it must assume that the the option is not supported by the server and use the IA Address 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-ondemand-mobility] Yegin, A., Kweon, K., Lee, J., Park, J., and D. Moses, "On Demand Mobility Management", draft-ietf-dmm-ondemand-mobility-01 (work in progress), November 2015.
- [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>>.

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