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Router Advertisement Prefix Option Extension for On-Demand Mobility
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Abstract

Router Advertisement / Router Solicitation is one of the ways for hosts to establish network IPv6 connectivity configuration. This document describes two approches to allowing a router to specify mobility service type availability to mobile hosts. Mobile hosts can then configure their IP address to the preferred type of mobile connectivity. Two possibilities are considered: (i) creating an extension to the router advertisement prefix information option to allow the router to specify mobility connectivity types, and (ii) specifying a new RA options that allows the router to specify the mobility connectivity types.

Status of This Memo

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 March 16, 2019.

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1. Introduction

[I-D.ietf-dmm-ondemand-mobility] defines different types of mobility related network services provided by access network to mobile hosts. In particular, it defines different types of prefix continuity types as mobile nodes move between different points of attachments.

This document proposes two such options to the router advertisement message ([RFC4861]) to allow the router to convey mobility services associated with an Ipv6 prefix. The possibilities considered are: (i) creating an extension to the router advertisement prefix information option to allow the router to specify mobility connectivity types, and (ii) specifying a new RA options that allows the router to specify the mobility connectivity types.

For (i), the prefix information option is extended to support the specification of mobility type. In (ii), a new RA option field is provided to do the same.

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. Router Advertisement Extensions

IP prefixes are conveyed in Router Advertisement messages through the Prefix Information Option field ([RFC4861]). These prefix information option fields are used to allow hosts to configure their IPv6 addresses.

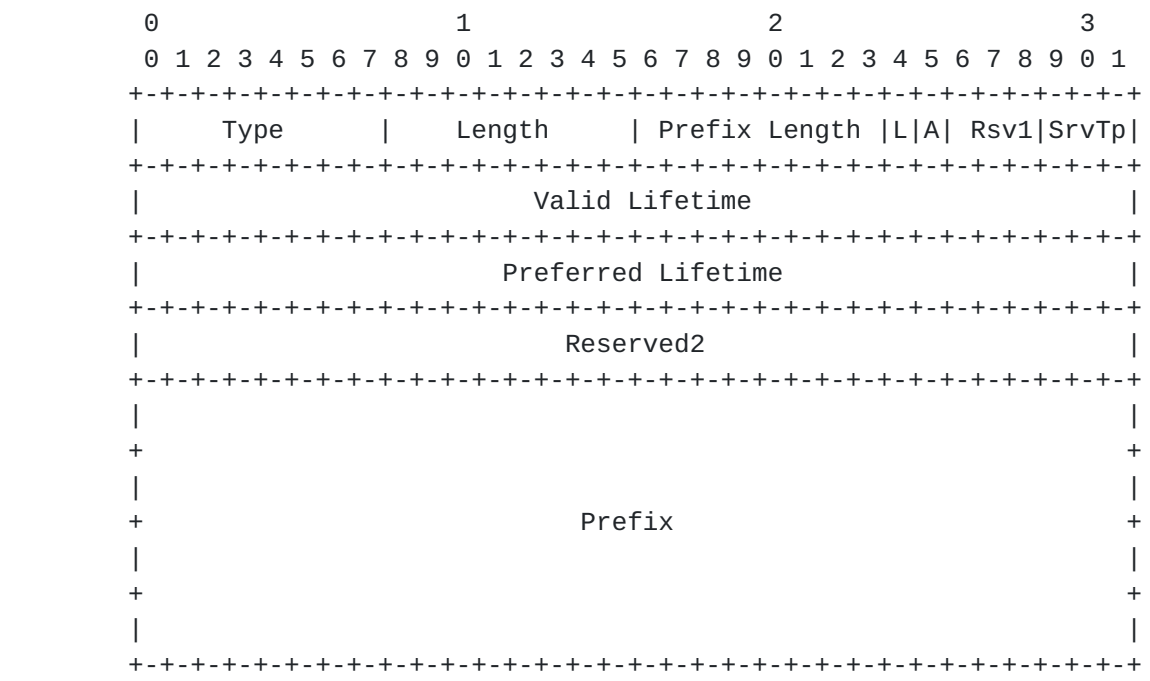
For distributed mobility management, there is a need for a network to be able to convey different prefixes for different connectivity scenarios. [I-D.ietf-dmm-ondemand-mobility] defines different service continuity requirements including: Non-Persistent, Session-Lasting, Fixed, and Graceful-replacement. Currently, however, there is no way for a router to specify the continuity type through a router advertisement message.

This document proposes two possibilities for modifying the router advertisement message to include mobility service options that it is offering to mobile hosts that are attached: (i) creating an extension to the router advertisement prefix information option (PIO) to allow the router to specify mobility connectivity types, and (ii) specifying a new RA options that allows the router to specify the mobility connectivity types.

3.1. Modifying PIO

The first option is to modify the PIO. The advantages of this approach are that it is semantically in line with the intended function. That is, specifying prefix options. This, however, requires the modification of several bits in the existing PIO to support the specification of the type.

The modified prefix information option fields are shown in the following figure:



Fields:

Type 3

Length 4

Prefix Length 8-bit unsigned integer. The number of leading bits in the Prefix that are valid. The value ranges from 0 to 128.

L 1-bit on-link flag. When set, indicates that this prefix can be used for on-link determination.

A 1-bit autonomous address-configuration flag. When set indicates that this prefix can be used for stateless address configuration.

Rsv1 3-bit unused field. It MUST be initialized to zero by the sender and MUST be ignored by the receiver.

SrvTp 3-bit field that specifies the service type. The field can have 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)

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

0 is reserved and should not be used. All other values (5-7) are reserved for future use.

The value of the Service Type indicates the type of continuity service committed by the network for the associated IPv6 prefix.

Once an IPv6 prefix type is 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.

Given the list of IPv6 prefixes and their associated mobility service type, the mobile host can then configure its IP address to the appropriate service required by the application

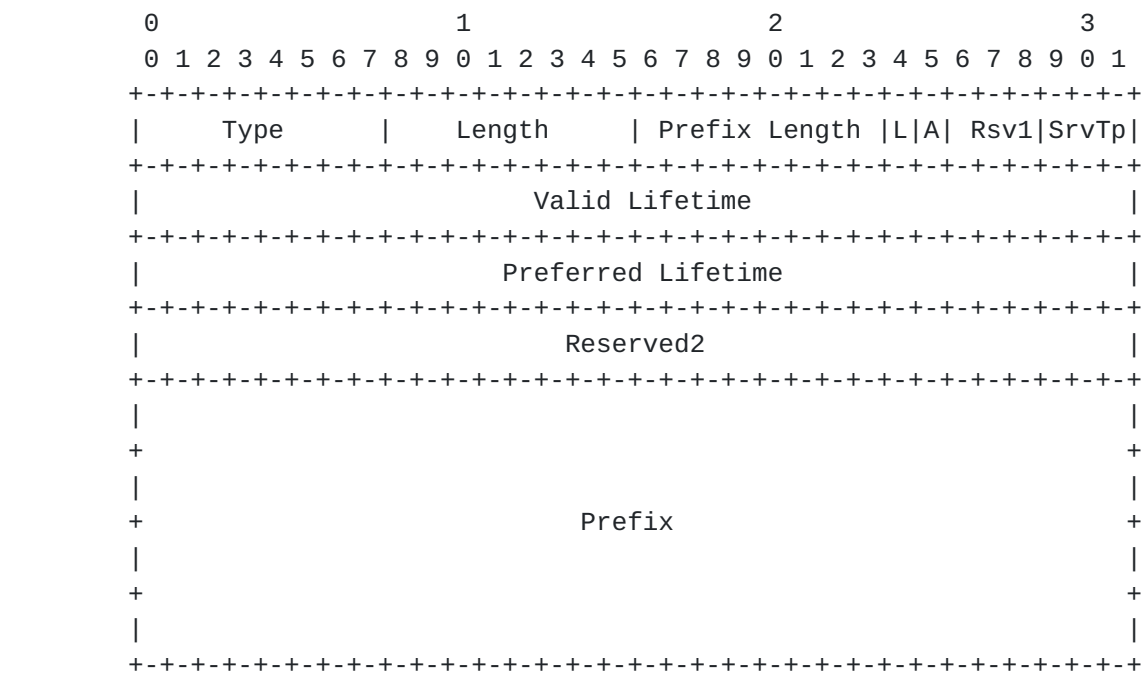
Mobile hosts that do not support this new option should ignore the prefix information option.

Routers should also send an additional prefix information option without the session-type field from time to time for hosts that do not support this new format.

3.2. Adding a new RA option

The second approach is to add a new RA option alongside the existing PIO (and other RA options). The advantage of this approach are that it leaves the existing PIO untouched. Furthermore, hosts that receive this option with the type that they do not understand can simply disregard it.

The new RA option specification is shown in the following figure:



Fields:

Type — Need to define new Type #

Length — 4

Prefix Length — 8-bit unsigned integer. The number of leading bits in the Prefix that are valid. The value ranges from 0 to 128.

L — 1-bit on-link flag. When set, indicates that this prefix can be used for on-link determination.

A — 1-bit autonomous address-configuration flag. When set indicates that this prefix can be used for stateless address configuration.

Rsv1 — 3-bit unused field. It MUST be initialized to zero by the sender and MUST be ignored by the receiver.

SrvTp — 3-bit field that specifies the service type. The field can have 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)

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

0 is reserved and should not be used. All other values (5-7) are reserved for future use.

The value of the Service Type indicates the type of continuity service committed by the network for the associated IPv6 prefix.

Once an IPv6 prefix type is 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.

Given the list of IPv6 prefixes and their associated mobility service type, the mobile host can then configure its IP address to the appropriate service required by the application

Mobile hosts that do not support this new option should ignore the prefix information option.

Routers should also send an additional prefix information option without the session-type field from time to time for hosts that do not support this new format.

4. Security Considerations

There are no specific security considerations for this option.

5. IANA Considerations

TBD

6. References

6.1. 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, <https://www.rfc-editor.org/info/rfc2119>.

6.2. Informative References

[I-D.ietf-dmm-distributed-mobility-anchoring]
Chan, A., Wei, X., Lee, J., Jeon, S., and C. Bernardos, "Distributed Mobility Anchoring", draft-ietf-dmm-distributed-mobility-anchoring-11 (work in progress), August 2018.

[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-15 (work in progress), July 2018.

[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, <https://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, <https://www.rfc-editor.org/info/rfc3633>.

[RFC4861] Narten, T., Nordmark, E., Simpson, W., and H. Soliman, "Neighbor Discovery for IP version 6 (IPv6)", RFC 4861, DOI 10.17487/RFC4861, September 2007, <https://www.rfc-editor.org/info/rfc4861>.

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

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