Softwire WG
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DHCPv6 Options for IPv6 DS-Lite Multicast Prefix
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Abstract

This document defines Dynamic Host Configuration Protocol version 6 (DHCPv6) Options for multicast transition solutions, aiming to convey the IPv6 prefixes to be used to build unicast and multicast IPv4-embedded IPv6 addresses.

These options can be in particular used in the context of DS-Lite, Stateless A+P and other IPv4-IPv6 interconnection techniques.

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 May 3, 2012.

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1. Introduction

[I-D.ietf-softwire-dslite-multicast] and several other solutions (e.g., [I-D.ietf-softwire-mesh-multicast], [I-D.venaas-behave-mcast46], etc.) are proposed for the delivery of multicast services in the context of transition to IPv6. Even these solutions may have different applicable use cases, they all use specific IPv6 addresses to embed IPv4 addresses, for both the multicast group addresses [I-D.boucadair-behave-64-multicast-address-format], and the multicast source addresses [RFC6052].

This document defines DHCPv6 options [RFC3315] to convey the IPv6 prefixes (a.k.a., PREFIX64) to be used for constructing these IPv4-embedded IPv6 addresses.

These options can be in particular used in the context of DS-Lite [RFC6333], Stateless A+P [RFC6346] and other IPv4-IPv6 interconnection techniques.

1.1. Requirements Language

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 RFC 2119 [RFC2119].

2. Terminology

This document makes use of the following terms:

- IPv4-embedded IPv6 address: is an IPv6 address which embeds a 32 bit-encoded IPv4 address [RFC6052]. An IPv4-embedded IPv6 address can be unicast or multicast address.

- PREFIX64: is a dedicated IPv6 prefix for building IPv4-embedded IPv6 addresses. A PREFIX64 can be of unicast or multicast.

- M_PREFIX64: denotes a multicast PREFIX64. It may belong to the SSM range (i.e., ff3x::/32 [RFC4607]) or ASM range.

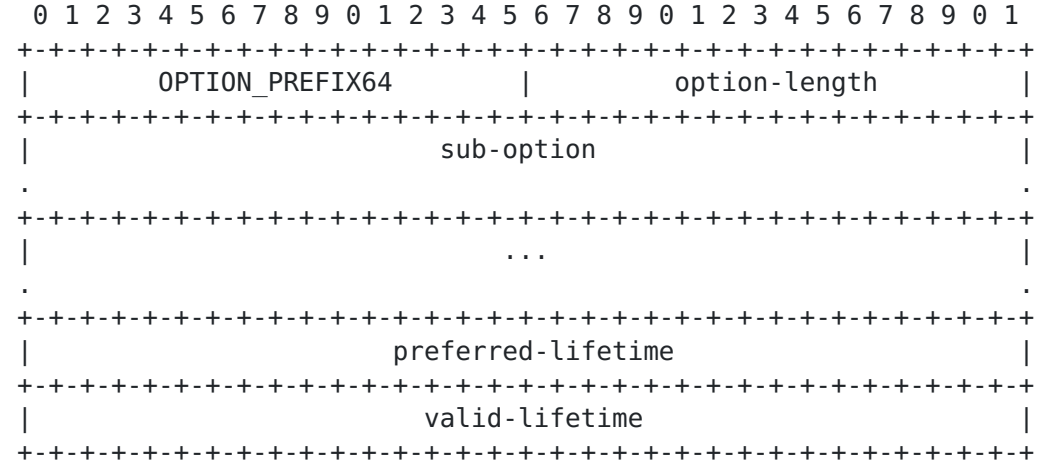
- U_PREFIX64: denotes a unicast PREFIX64 for building the IPv4-embedded IPv6 addresses of multicast sources in SSM mode.

3. PREFIX64 DHCPv6 Option

OPTION_PREFIX64 is defined to convey the IPv6 prefix(es) to use to synthesize IPv4-embbedded IPv6 addresses. This option MAY enclose one or more sub-options.

3.1. Option Format

Figure 1 shows the format of the OPTION_PREFIX64 DHCPv6 option.



option-code: OPTION_PREFIX64 (TBD)

option-length: The length of enclosed sub-option(s) + 8 in octets

sub-option: One or several sub-obtions. Two sub-codes are defined in this document:
(1) SUB_OPTION_M_PREFIX64
(2) SUB_OPTION_U_PREFIX64

preferred-lifetime: The preferred lifetime for the IPv6 prefix(es) in the sub-option(s), expressed in units of seconds.

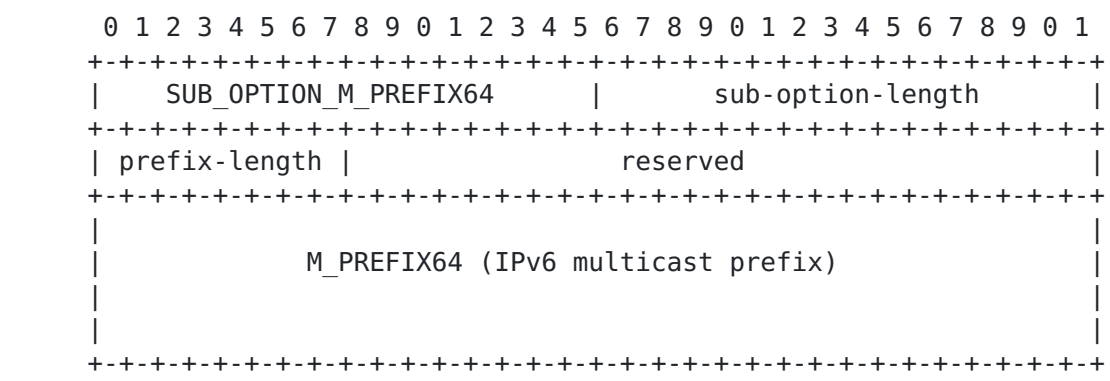
valid-lifetime: The valid lifetime for the IPv6 prefix(es) in the sub-option(s), expressed in units of seconds.

Figure 1: DHCPv6 Option Format for PREFIX64

3.2. M_PREFIX64 Sub-option

This sub-option (Figure 2) is defined to convey the IPv6 multicast prefix to use to synthesize the IPv4-embedded IPv6 addresses of the multicast groups [I-D.boucadair-behave-64-multicast-address-format]. The conveyed multicast IPv6 prefix MAY belong to the SSM range (i.e.,

ff3x::/32 [RFC4607]) or ASM range.



sub-option-code: SUB_OPTION_M_PREFIX64 (TBD)

sub-option-len: 20 in octets

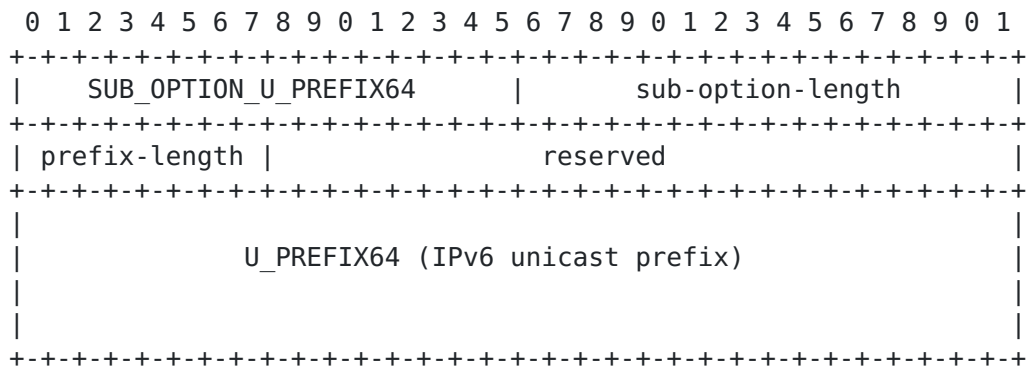
prefix-length: the length of M_PREFIX64 in bits

M_PREFIX64: the multicast prefix for constructing the IPv4-embedded IPv6 addresses of multicast groups. It MAY belong to SSM or ASM address range.

Figure 2: DHCPv6 Sub-option Format for M_PREFIX64

3.3. U_PREFIX64 Sub-option

This sub-option (Figure 3) is defined to convey the IPv6 unicast prefix to be used in SSM mode for constructing the IPv4-embedded IPv6 addresses of the multicast sources. It is also used to extract the IPv4 address from received multicast data flows (e.g., [I-D.ietf-softwire-dslite-multicast]). The address synthesis MUST follow the guidelines documented at [RFC6052].



sub-option-code: SUB_OPTION_U_PREFIX64 (TBD)

sub-option-len: 20 in octets

prefix-length: the length of U_PREFIX64 in bits

U_PREFIX64: the unicast prefix for constructing the IPv4-embedded IPv6 addresses of the multicast sources in SSM mode

Figure 3: DHCPv6 Sub-option Format for U_PREFIX64

4. Client Behaviour

To retrieve the IPv6 prefixes to use to synthesize unicast and multicast IPv4-embedded IPv6 addresses, the DHCPv6 client MUST include OPTION_PREFIX64 in its OPTION_ORO.

If the DHCPv6 client receives more than one OPTION_PREFIX64 option from the DHCPv6 server, only the first instance of that option MUST be used.

When OPTION_PREFIX64 option is received from the DHCPv6 server, at most three sub-options MAY be included.

The prefix conveyed in SUB_OPTION_U_PREFIX64 is used to synthesize unicast IPv4-embedded IPv6 addresses as specified in [RFC6052].

The prefix conveyed in SUB_OPTION_M_PREFIX64 is used to synthesize multicast IPv4-embedded IPv6 addresses as specified in [I-D.boucadair-behave-64-multicast-address-format].

5. Server Behaviour

A DHCPv6 server MUST NOT reply with a value for the OPTION_PREFIX64

if the DHCPv6 client has not explicitly included OPTION_PREFIX64 in its OPTION_ORO.

If OPTION_PREFIX64 option is requested by the DHCPv6 client, the DHCPv6 server MUST NOT send more than one OPTION_PREFIX64 option in the response.

One or two SUB_OPTION_M_PREFIX64 sub-options MAY be enclosed in OPTION_PREFIX64 DHCPv6 option. In particular, if only SSM or ASM mode is supported, only one SUB_OPTION_M_PREFIX64 sub-option MUST be returned to the requesting client. If both SSM and ASM mode are supported, two SUB_OPTION_M_PREFIX64 sub-options MUST be returned.

When two SUB_OPTION_M_PREFIX64 sub-options are present, one SUB_OPTION_M_PREFIX64 sub-option MUST convey an IPv6 prefix in SSM range and the other one MUST enclose an IPv6 prefix in the ASM range.

If the IPv6 multicast prefix conveyed in SUB_OPTION_M_PREFIX64 is an SSM prefix, U_PREFIX64 sub-option MUST also be present.

6. Security Considerations

The security considerations in [RFC3315] are to be considered.

7. Acknowledgements

TBD

8. IANA Considerations

A new DHCPv6 option:

OPTION_PREFIX64

and two sub-options:

SUB_OPTION_M_PREFIX64,

SUB_OPTION_U_PREFIX64

need to be assigned by IANA.

9. References

9.1. Normative References

[I-D.boucadair-behave-64-multicast-address-format]
Boucadair, M., Qin, J., Lee, Y., Venaas, S., Li, X., and M. Xu, "IPv4-Embedded IPv6 Multicast Address Format", draft-boucadair-behave-64-multicast-address-format-03 (work in progress), October 2011.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC3315] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, July 2003.

[RFC4607] Holbrook, H. and B. Cain, "Source-Specific Multicast for IP", RFC 4607, August 2006.

[RFC6052] Bao, C., Huitema, C., Bagnulo, M., Boucadair, M., and X. Li, "IPv6 Addressing of IPv4/IPv6 Translators", RFC 6052, October 2010.

9.2. Informative References

[I-D.ietf-softwire-dslite-multicast]
Wang, Q., Qin, J., Boucadair, M., Jacquenet, C., and Y. Lee, "Multicast Extensions to DS-Lite Technique in Broadband Deployments", draft-ietf-softwire-dslite-multicast-00 (work in progress), September 2011.

[I-D.ietf-softwire-mesh-multicast]
Xu, M., Cui, Y., Yang, S., Wu, J., Metz, C., and G. Shepherd, "Softwire Mesh Multicast", draft-ietf-softwire-mesh-multicast-01 (work in progress), October 2011.

[I-D.venaas-behave-mcast46]
Venaas, S., Asaeda, H., SUZUKI, S., and T. Fujisaki, "An IPv4 - IPv6 multicast translator", draft-venaas-behave-mcast46-02 (work in progress), December 2010.

[RFC6333] Durand, A., Droms, R., Woodyatt, J., and Y. Lee, "Dual-Stack Lite Broadband Deployments Following IPv4 Exhaustion", RFC 6333, August 2011.

[RFC6346] Bush, R., "The Address plus Port (A+P) Approach to the

IPv4 Address Shortage", RFC 6346, August 2011.

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