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Link Scoped IPv6 Multicast Addresses
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Abstract

This document specifies an extension to the multicast addressing architecture of the IPv6 protocol. The extension allows for the use of interface-IDs to allocate multicast addresses. When the link-local unicast address is configured at each interface of a host, an interface ID is uniquely determined. By delegating multicast addresses at the same time as the interface ID, each host can identify their multicast addresses automatically at Layer 1 without running an intra- or inter-domain allocation protocol in serverless environments.

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1. Introduction

This specification defines an extension to the multicast portion of the IPv6 addressing architecture [[ADDRARCH](#)]. The current architecture does not contain any built-in support for dynamic address allocation. The extension allows for use of interface-IDs to allocate multicast addresses. When the link-local unicast address is configured at each interface of a host, an interface ID is uniquely determined. By delegating multicast addresses at the same time as the interface ID, each host can identify its multicast addresses automatically without running an intra- or inter-domain allocation protocol in serverless environments.

The current multicast address allocation architecture [[RFC 2908](#)] is based on a multi-layered, multi-protocol system. The goal of this proposal is to reduce the number of protocols and servers to get dynamic multicast address allocation.

The use of interface ID-based multicast address allocation will, at a minimum, remove the need to run the Multicast Address Allocation Protocol (AAP) [[AAP WORK](#)][[RFC 2909](#)] and the Multicast Address Allocation servers [[RFC 2908](#)].

This document specifies encoded information in the link scoped multicast address to allow for dynamic allocation of IPv6 multicast addresses.

2. Terminology

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](#)].

3. Applicability

The allocation technique in this document is designed to be used in any environment in which link-local scope IPv6 multicast addresses are assigned or selected. Especially, this method goes well with nodes supplying multicast services in a zeroconf environment. For example, multicast addresses less than or equal to link-local scope are themselves generated by nodes supplying multicast services.

Consequently, this technique is limited to use by multicast scope. If you want to use multicast addresses greater than link-local, you need other methods.

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4. Link scoped multicast address format

Section 2.7 of [[ADDRARCH](#)] defines the following operational format of IPv6 multicast addresses:



Figure 1: Generic IPv6 multicast address format

This document introduces new formats that incorporate interface ID information in the multicast address. The idea of delegating multicast addresses at the same time as the interface ID, can be applicable to link-local.

Figure 2 illustrates the new format for link-local multicast addresses.

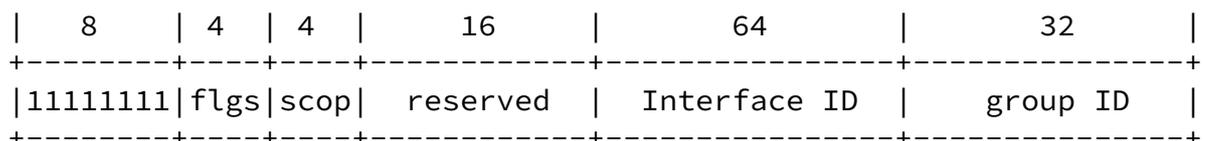


Figure 2: link scoped multicast address format

flgs is a set of 4 flags: +---+---+
 |0|0|P|T|
 +---+---+

- o P = 0 indicates a multicast address that is not assigned on the basis of the interface ID.
- o P = 1 indicates a multicast address that is assigned on the basis of the interface ID.
- o If P = 1, T MUST be set to 1, otherwise the setting of the T bit is defined in [Section 2.7 of RFC 2373](#).

flgs should use the same flag defined in section 3 of [[UNIMULTI](#)]. That is, this document proposes the third bit of 'flgs' field to indicate an Interface ID-based multicast addresses. Additionally, it is necessary to distinguish between an Interface ID-based multicast address and a unicast-prefix-based multicast address.

scop <= 2. The scope of this multicast address MUST be independent of the scope of the unicast address, which derives the interface ID embedded in the multicast address.

The reserved field MUST be zero.

interface ID field is used to distinguish each host from others. And this value is obtained from the IEEE EUI-64 based interface identifier of the link-local unicast IPv6 address.

group ID is generated to indicate multicast application and is used to guarantee its uniqueness only in the host. It may also be set on the basis of the guidelines outlined in [[IPV6 GID](#)].

The lifetime of an Interface ID-based multicast address has no dependency on the Valid Lifetime field in the Prefix Information option, corresponding to the unicast address being used, contained in the Router Advertisement message [[RFC 2461](#)].

[5](#). Source-specific multicast addresses

The link scoped multicast address format supports source-specific multicast addresses, as defined by [SSM ARCH]. To accomplish this, a node MUST:

- o Set P = 1.
- o Set interface ID = 0.

These settings create an SSM range of FF32::/96. The source address field in the IPv6 header identifies the owner of the multicast address.

6. Examples

This is an example of an interface ID-based multicast address with link-local scope. For example in an ethernet environment, if the link-local unicast address is FE80::12:34:56:78:90:AB, the mutlicast prefix of the host is FF32:0:1234:56FF:FE78:90AB::/96. For SSM, multicast address will be FF32::/96.

7. Considerations

This draft considers only link-local multicast addresses. For this purpose, P flag is used in figure 2. The [UNIMULTI] draft also uses the P flag to indicate a multicast address that is assigned on the basis of the network prefix. For consistency, some modifications in the [UNIMULTI] draft are required. For example, by restrictng the syntax to scope > 2 in [UNIMULTI].

8. Security considerations

[RFC3041] describes the privacy extension to IPv6 stateless address autoconfiguration for an interface ID. So, [RFC3041] satisfied our requirements.

Using source-specific multicast addresses can sometimes aid in the prevention of denial-of-service attacks by arbitrary sources, although no guarantee is provided. A more in-depth discussion of the security considerations for SSM can be found in [SSM ARCH].

9. References

[RFC 2373]

R. Hinden and S. Deering, "IP Version 6 Addressing Architecture", [RFC 2373](#), October 1998.

[RFC 2461]

Narten, T., Nordmark, E., Simpson, W., "Neighbor Discovery for IP Version 6 (IPv6)", [RFC 2461](#), December 1998.

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D. Thaler, M. Handley and D. Estrin, "The Internet Multicast Address Allocation Architecture," [RFC2908](#), September 2000.

[RFC 2909]

Radoslavov, P., Estrin, D., Govindan, R., Handley, M., Kumar, S. and D. Thaler, "The Multicast Address-Set Claim (MASC) Protocol", [RFC 2909](#), September 2000.

[RFC 3041]

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[UNIMULTI]

B. Haberman and D. Thaler, "Unicast-Prefix-based IPv6 Multicast Addresses," Work In Progress, December 2001.

[IPV6 GUID]

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[SSM ARCH]

H. Holbrook and B. Cain, "Source-Specific Multicast for IP", Work In Progress, March 2001.

[10](#). Acknowledgements

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