

IPv6 WG
Internet Draft
[draft-ietf-ipv6-link-scoped-mcast-03.txt](#)

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June 2003

Expires: December 2003

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. Basically this document updates the "Unicast-Prefix-based IPv6 Multicast Addresses" for the link-local scope [[RFC 3306](#)].

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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-Set Claim(MASC) Protocol[RFC 2909] and the Multicast Address Allocation servers [RFC 2908].

Basically this document updates the "Unicast-Prefix-based IPv6 Multicast Addresses" for the link-local scope [[RFC 3306](#)]. This document changes and restricts the usage of defined fields such as scope, plen and network prefix field in [[RFC 3306](#)]. Therefore, this document specifies encoded information for link-local scope in the multicast addresses.

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](#).

2. 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 MUST be used for link scoped multicast addresses. If you want to use multicast addresses greater than link-local, you need other methods such as [\[RFC 3306\]](#).

3. Link scoped multicast address format

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

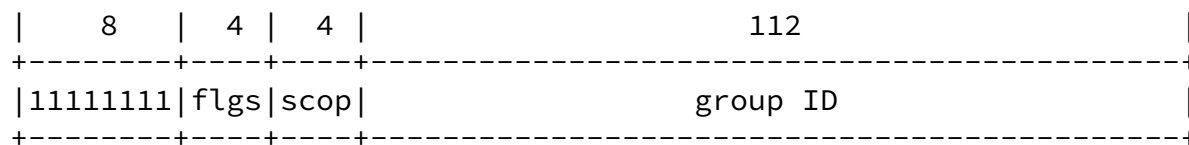


Figure 1: Generic IPv6 multicast address format

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 scoped multicast addresses. That is, if the scope of the multicast address is link-local scope, it is this format.

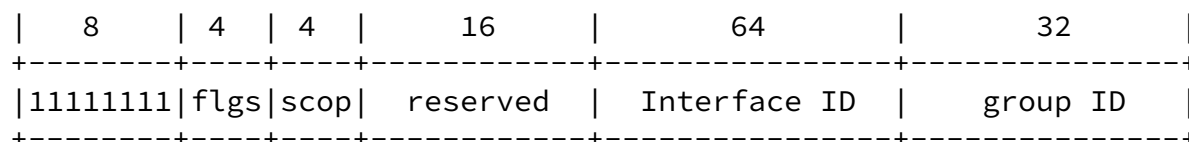


Figure 2: link scoped multicast IPv6 address format

```
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 4 of \[RFC 3306\]](#). That is, this document proposes the third bit of 'flgs' field to indicate an Interface ID-based multicast addresses.

scop <= 2. The value of this multicast address is necessary to distinguish between an Interface ID-based multicast address and a unicast-prefix-based multicast address. If scop <= 2, the former MUST be used. That is, this document updates the [\[RFC 3306\]](#), which describes the latter.

The reserved field MUST be zero which maps to a plen of zero in [RFC 3306](#).

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. Given the use of this method for link-local scope, the interface ID embedded in the multicast address SHOULD come from the interface ID of the link-local unicast address on the interface after DAD has completed. That is, the creation of the multicast address MUST occur after DAD has completed as part of the auto-config process.

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 [\[RFC 3307\]](#).

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 [\[RFC 2461\]](#).

[4. 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 multicast prefix of the host is FF32:0:1234:56FF:FE78:90AB::/96. For SSM, multicast address will be FF32::/96.

[5. Considerations](#)

This document updates [\[RFC 3306\]](#) for the scope ≤ 2 case.

This document considers only link scoped multicast addresses. For this purpose, scop field is used shown in figure 2.

The link scoped multicast address format supports source-specific multicast addresses by the same method, as defined by [\[RFC 3306\]](#). So, it could be confused with a [RFC 3306](#) SSM address. To resolve this, the usage of this format is restricted within link-local scope.

[6. Security Considerations](#)

[\[RFC 3041\]](#) describes the privacy extension to IPv6 stateless address autoconfiguration for an interface ID. The interface ID, generated by [\[RFC 3041\]](#), is also used in this method since the uniqueness is verified by DAD procedure as part of the secure auto-config process.

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 [\[SSM ARCH\]](#).

[7. References](#)

Normative

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Expires - December 2003

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[RFC 3307] B. Haberman, "Dynamic Allocation Guidelines for IPv6 Multicast Addresses," Work In Progress, October 2001.

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[8.](#) Acknowledgments

We would like to thank Dave Thaler and Brian Haberman for his comments related to the consistency between the unicast prefix-based multicast draft and this one.

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