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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 a link-local unicast address is configured at each interface of a node, an interface ID is uniquely determined. By delegating multicast addresses at the same time as the interface ID, each node can generate their unique multicast addresses automatically without conflicts. Basically, it is preferred to use this method for the link-local scope rather than unicast-prefix-based IPv6 multicast addresses [RFC 3306].

Table of Contents:

1. Introduction

This specification defines an extension to the multicast portion of the IPv6 addressing architecture [RFC 3513]. 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 a link-local unicast address is configured at each interface of a node, an interface ID is uniquely determined. By delegating multicast addresses at the same time as the interface ID, each node can generate their unique multicast addresses automatically without conflicts.

Basically, it is preferred to use this method for the link-local scope rather than unicast-prefix-based IPv6 multicast addresses [RFC 3306]. This document restricts the usage of defined fields such as scope, plen and network prefix fields of [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/serverless environment. For example, multicast addresses less than or equal to link-local scope are themselves generated by nodes supplying multicast services without conflicts.

Consequently, this technique MUST be used for link scoped multicast

addresses. If you want to use multicast addresses greater than link-local scope, you need other methods such as [RFC 3306].

3. Link scoped multicast address format

[RFC 3306] defines the following format of unicast-prefix-based IPv6 multicast addresses:

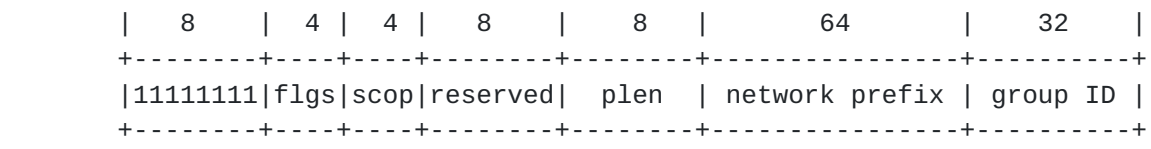

Figure 1: Unicast-Prefix-based IPv6 multicast address format

This document specifies a new format that incorporates interface ID information in the multicast addresses. The idea of delegating multicast addresses at the same time as the interface ID can be applicable to link-local scope.

Figure 2 illustrates the new format for link scoped multicast addresses.

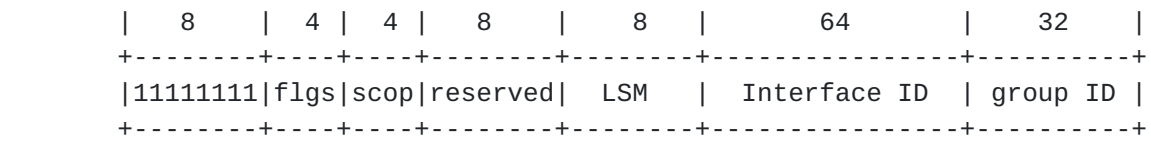

Figure 2: Link scoped multicast IPv6 address format

flgs MUST be "0011". (The first two bits have been yet undefined, sent as zero and ignored on receipt.) flgs MUST use the same flag defined in section 4 of [RFC 3306].

scop MUST be <= 2. It is preferred to use this method for the link-local scope rather than unicast-prefix-based IPv6 multicast addresses [RFC 3306].

The reserved field MUST be zero.

LSM (Link Scoped Multicast) field MUST be "1111 1111" which maps to plen field in [RFC 3306], whereas the plen of [RFC 3306] MUST NOT be greater than 64.

That is, flgs, scop, and LSM fields are used to identify whether an address is a multicast address as specified in this document and to be processed any further.

Interface ID field is used to distinguish each node 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 link scoped multicast addresses 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. Example

This is an example of link scoped IPv6 multicast addresses. For example in an ethernet environment, if the link-local unicast address is FE80::A12:34FF:FE56:7890, the link scoped multicast prefix of the node is FF32:00FF:A12:34FF:FE56:7890::/96.

5. Considerations

The link scoped multicast address format supports source-specific multicast addresses by the same method, as defined by [RFC 3306].

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.

7. Acknowledgements

We would like to thank Dave Thaler and Brian Haberman for their comments related to the consistency between the unicast prefix-based multicast addresses [RFC 3306] and this one. Special thanks are due to Erik Nordmark and Pekka Savola for valuable comments.

8. References

Normative

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[RFC 3041] T. Narten and R. Draves, "Privacy Extensions for
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3041, April 2001.

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[RFC 3307] B. Haberman, "Allocation Guidelines for IPv6 Multicast Addresses," RFC 3307, August 2002.

[RFC 3513] R. Hinden and S. Deering, "IP Version 6 Addressing Architecture," RFC 3513, April 2003.

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