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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 Identifiers (IIDs) to allocate multicast addresses. When a link-local unicast address is configured at each interface of a node, an IID is uniquely determined. After that, each node can generate their unique multicast addresses automatically without conflicts. Basically, this document proposes an alternative method for creating link-local multicast addresses over a known method like unicast-prefix-based IPv6 multicast addresses. It is preferred

to use this method for link-local scope rather than unicast-prefix-based IPv6 multicast addresses. This memo update RFC3306.

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1. Introduction

This document 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 IIDs to allocate multicast addresses. When a link-local unicast address is configured at each interface of a node, an IID is uniquely determined. After that, each node can generate their unique multicast addresses automatically without conflicts. That is, these addresses could safely be configured at any time after DAD (Duplicate Address Detection) has completed.

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 scop, plen and network prefix fields of [RFC 3306]. Therefore, this document specifies encoded information for link-local scope in 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. Also, hosts which are supplied multicast services from multicast servers then make multicast addresses of multicast servers using ND (address resolution) and well-known group IDs.

Consequently, this technique MUST only be used for link scoped

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

3. Link Scoped Multicast Address Format

This document specifies a new format that incorporates IID in the link-local scope multicast addresses.

Figure 1 illustrates the new format for link scoped multicast addresses.

```
|   8    | 4  | 4  |   8    |   8    |       64        |    32     |
+--------+----+----+--------+--------+----------------+-----------+
|11111111|flgs|scop|reserved|  plen  |      IID       | group ID |
+--------+----+----+--------+--------+----------------+-----------+
```

Figure 1: Link scoped multicast IPv6 address format

Flgs, scop, and plen fields are used to identify whether an address is a multicast address as specified in this document as follows:

1. flgs MUST be "0011".
2. scop MUST be <= 2.
3. The reserved field MUST be zero.
4. "plen" field is a special value "1111 1111" (decimal 255).

The IID field (replacing the 64-bit prefix field from [RFC 3306]) is used to distinguish each node from others. 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 IID embedded in the multicast address MUST only come from the IID of the link-local unicast address on the interface after DAD has completed. That is, the creation of the multicast address MUST only occur after DAD has completed as part of the auto-configuration process.

Group ID is generated to indicate a 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].

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. Consideration of Lifetime

Generally, Link scoped multicast addresses have no lifetime because link-local unicast addresses also have no lifetime. But, it is not true in environment of mobile. Even though multicast addresses are created from the unique IID of unicast address, their useful lifetime is linked to the period during which the IID is known to be unique. Thus, it is possible to conflict between IIDs, due to a new node in merged network that uses the same IID as a powered node.

This is a scenario where DAD also fails to guarantee the uniqueness of the unicast address, so this document does not try to address this issue.

6. Security Considerations

The uniqueness of multicast addresses using this method is guaranteed by the DAD process. So, it is needed to get a secure DAD process for stability of this method. This document proposes the mechanism in [RFC 3041] for this purpose.

[RFC 3041] describes the privacy extension to IPv6 stateless address autoconfiguration to how to configure the IID of non-link-local scope unicast addresses. [RFC 3041] can not be used for making a link-local unicast address, and hence it cannot be used to create an IID for link-scoped multicast address. However, as [RFC 3041] does not protect the privacy of link-local unicast addresses, it does not protect the privacy of link-local unicast addresses, it does not seem to be required to protect the privacy of IID-based link-local multicast addresses.

7. Acknowledgements

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. Special thanks are due to Erik Nordmark and Pekka Savola for valuable comments.

8. References

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