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Unicast-Prefix-based IPv6 Multicast Addresses

Status of this Memo

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Abstract

This specification defines an extension to the multicast addressing architecture of the IP Version 6 protocol. The extension presented in this document allows for unicast-prefix-based allocation of multicast addresses. By delegating multicast addresses at the same time as unicast prefixes, network operators will be able to identify their multicast addresses without needing to run an inter-domain allocation protocol.

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1. Introduction

This document specifies an extension to the multicast portion of the IPv6 addressing architecture [[RFC 2373](#)]. The current architecture does not contain any built-in support for dynamic address allocation. This proposal introduces encoded information in the multicast address to allow for dynamic, unicast prefix-based allocation of IPv6 multicast addresses, as well as allocation of source-specific 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. Multicast Address Format

[Section 2.7.2 of RFC 2373](#) defines the following operational format of IPv6 multicast addresses:

8	4	4	80	32
+-----+-----+-----+-----+-----+				
11111111	flgs	scop	reserved must be zero	group ID
+-----+-----+-----+-----+-----+				

This document introduces a new format that incorporates unicast prefix information in the multicast address. The following illustrates the new format:

8	4	4	8	8	64	32
+-----+-----+-----+-----+-----+-----+						
11111111	flgs	scop	reserved	plen	network prefix	group ID
+-----+-----+-----+-----+-----+-----+						

flgs is a set of 4 flags:

+--+--+--+			
0	0	P	T
+--+--+--+			

o P = 0 indicates a multicast address that is not assigned

- based on the network prefix.
- o P = 1 indicates a multicast address that is assigned based on the network prefix.
- 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](#).

The reserved field MUST be zero.

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plen indicates the actual number of bits in the network prefix field that identify the subnet when P = 1.

network prefix identifies the network prefix of the unicast subnet owning the multicast address. If P = 1, this field contains the unicast network prefix defined in [[RFC 2374](#)] and assigned to the domain owning, or allocating, the multicast address.

With the network prefix-based architecture and the current unicast address architecture [[RFC 2374](#)], the network prefix portion of the multicast address will be at most 64 bits.

The scope of the unicast-prefix based multicast address MUST NOT exceed the scope of the unicast prefix embedded in the multicast address.

The lifetime of a unicast prefix-based multicast addresses MUST be less than or equal to the Valid Lifetime field in the Prefix Information option, corresponding to the unicast prefix being used, contained in the Neighbor Discovery Router Advertisement message [[RFC 2461](#)].

[4. Source-Specific Multicast Addresses](#)

The unicast prefix-based IPv6 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 plen = 0.
- o Set network prefix = 0.

These settings indicate that the multicast address is being used in source-specific multicast transmission. The source address field in the IPv6 header identifies the owner of the multicast address.

5. Security Considerations

Using unicast network-prefix based multicast addresses can sometimes aid in identifying the allocation domain of a given multicast address, although no guarantee is provided.

Using source-specific multicast addresses can sometimes aid in the prevention of denial-of-service attacks by arbitrary sources, although no guarantee is provided.

6. References

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