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Unicast-Prefix-based IPv6 Multicast Addresses

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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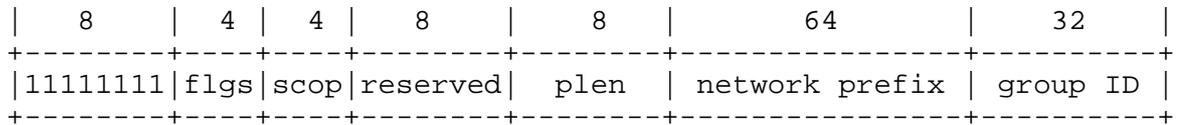
Abstract

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



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. This indicates a multicast address as defined in [ADDRARCH].
- 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 [ADDRARCH].

The reserved field MUST be zero.

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 assigned to the domain owning, or allocating, the multicast address. All non-significant bits of the network prefix field SHOULD be zero.

It should be noted that the Interface Identifier requirements in Section 2.5.1 of [ADDRARCH] effectively restrict the length of the unicast prefix to 64 bits, hence the network prefix portion of the multicast address will be at most 64 bits.

Group ID is set based on the guidelines outlined in [IPV6 GID].

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

5. Address Lifetime

The lifetime of a unicast prefix-based multicast address SHOULD NOT exceed 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]. The lifetime of the multicast address is needed to support the Abstract API for Multicast Address Allocation [RFC 2771].

It should be noted that the unicast prefix's Valid Lifetime in the Router Advertisement message does not indicate that the prefix will become invalid at the end of the lifetime. Rather, that value is typically a constant until a renumbering event is scheduled after which, the prefix does become invalid.

The use of unicast prefix-based multicast addresses after the unicast prefix has become invalid may lead to operational problems. For example, routers that perform policy checks comparing the multicast prefix against the unicast prefix assigned to an AS may discard the packet.

6. 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 create an SSM range of FF3x::/32 (where 'x' is any valid scope value). The source address field in the IPv6 header identifies the owner of the multicast address.

7. Examples

The following are a few examples of the structure of unicast prefix-based multicast addresses.

- Global prefixes - A network with a unicast prefix of 3FFE:FFFF:1::/48 would also have a unicast prefix-based multicast prefix of FF3x:0030:3FFE:FFFF:0001::/96 (where 'x' is any valid scope).
- SSM - All IPv6 SSM multicast addresses will have the format FF3x::/96.

8. Security Considerations

It is possible that the embedded unicast prefix can aid in identifying the allocation domain of a given multicast address, though an allocation domain choosing to avoid being traced has no obstacles currently to creating addresses using a prefix not assigned to it, or using a smaller scope embedded prefix.

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

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