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Updates to Dynamic IPv6 Multicast Address Group IDs
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Abstract

This document describes limitations of the existing range of dynamic IPv6 multicast addresses specified in RFC3307. It recommends replacing these allocations with a new IANA registry in the IPv6 Multicast Address Space registry group. The document also defines initial contents of the new registry: a reduced allocation for MADCAP (RFC2730), a range for SSM, a Private Use range, a range for Experimental Use, and Solicited-Node multicast addresses (which were not previously noted in RFC3307, Allocation Guidelines for IPv6 Multicast Addresses).

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1. Introduction

For IPv6 multicast addresses, Section 2 of [RFC3307] defines the lower 32 bits of the IPv6 address, which are mapped directly to the link-layer, as the group ID, and then assigns ranges of group ID values based on how they are allocated. Section 4.3 of [RFC3307] describes dynamic assignment of group ID values and lists two different approaches (server allocation and host allocation). However, both approaches are assigned the same range of group ID values, which means they cannot coexist without risking an address collision. Also concerning is that the range for dynamic assignment overlaps with the range used for Solicited-Node multicast addresses (see Section 2.7.1 of [RFC4291]).

Only one server allocation protocol has been defined at the time of writing (see [RFC2730]), but [I-D.ietf-pim-zeroconf-mcast-addr-alloc-ps] advocates developing a decentralized, zero-configuration host allocation protocol. This document updates Section 4.3 of [RFC3307] to allow multiple dynamic allocation protocols to coexist on the same network, and so that dynamic IPv6 multicast group ID ranges better align with current practices for protocol number assignment.

This document adheres to the IPv multicast address architecture outlined in [RFC4291], [RFC3307], [RFC7371], et al.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

2. Considerations for Source-Specific Multicast

One of the benefits of Source-Specific Multicast (SSM) listed in Section 1 of [RFC4607] is "[avoiding] the need for inter-host coordination when choosing source-specific addresses". SSM allows a host to subscribe to channel (S,G) and only receive packets for destination address G that are from source address S. This reduces the need for coordinated dynamic assignment of G because multiple distinct hosts could use the same value for G and traffic would still be directed to the node that requested the stream (see [RFC8815], Section 3.2.2).

However, SSM is not universally supported (see [RFC4607], Section 6 and [RFC8815], Section 3.1). This document defines a range of dynamic IPv6 multicast group IDs for use in environments that do support SSM.

3. Updated Dynamic Multicast Group IDs

Existing group ID allocations specified in [RFC3307], Section 4.3 and [RFC4291], Section 2.7.1 are summarized in the following table:

Range	Solicited-Node	Server allocation (MADCAP)	Host allocation
0x80000000-0xFEFFFFFF	No	Yes	Yes
0xFF000000-0xFFFFFFFF	Yes	Yes	Yes

Table 1: Existing Allocations

This document updates the allocations in [RFC3307], Section 4.3 and moves them into a new registry in the IPv6 Multicast Address Space registry group. The registry shall be populated with the following entries:

Range	Description	Reference
0x80000000-0x8FFFFFFF	MADCAP	Defined in [RFC2730], range assigned in [This document]
0x90000000-0xEFFFFFFF	Unassigned	
0xF0000000-0xFCFFFFFF	Host allocation of SSM group addresses	[This document]
0xFD000000-0xFDFFFFFF	Private Use	[This document]
0xFE000000-0xFEFFFFFF	Experimental Use	[This document]
0xFF000000-0xFFFFFFFF	Solicited-Node multicast addresses	[RFC4291], Section 2.7.1

Table 2: Updated Allocations

This reduces the range previously available for MADCAP, while still providing a sizable allocation. It also allocates ranges for SSM, Private Use, and Experimental Use. The Private Use range can be used in isolated deployments for purposes such as manual address allocation. The Experimental Use range may be used for experimentation with new dynamic allocation protocols. There are no restrictions on experimental scope; these IDs may be used to run experiments over the open Internet. Finally, this documents the range used for Solicited-Node multicast addresses. All remaining entries are reserved for future assignment as new protocols are developed.

4. Operational Considerations

This document reduces the range of group ID values available for MADCAP ([RFC2730]). At the time of writing, there is only one known implementation of MADCAP, and there are no known large-scale deployments. Any implementations of MADCAP (known or otherwise) should be updated to reflect the new group ID range set forth in Table 2. Any existing deployments of MADCAP should either use an updated implementation or operate in an environment without other IPv6 multicast address allocation protocols.

5. Security Considerations

This document does not expand on any security considerations beyond what is discussed in [RFC3307] and [RFC2908].

6. IANA Considerations

This document requests IANA create a new registry named "Dynamic Multicast Group IDs" in the "IPv6 Multicast Address Space" registry group. The "Standards Action" registration policy is required to update the registry. Each entry in the registry contains the following fields:

1. Range
   A range of 32-bit values rendered in hexadecimal. Values must be within the range 0x80000000 to 0xFFFFFFFF.

2. Description
   A description or protocol name assigned to the range.

3. Reference
   A document describing the assignment.

The registry shall initially contain the entries listed in Table 2, and shall list both [RFC3307] and this document as references.

IANA should also update the references to "FF3X:0:0:0:0:0:8000:0-FF3X:0:0:0:0:0:FFFF:FFFF" in the "Unicast-based (Including SSM) Multicast Group IDs" registry in the "IPv6 Multicast Address Space" registry group. The registration procedure should indicate that this range uses dynamic assignment according to the protocols listed in the new "Dynamic Multicast Group IDs" registry and include a reference to this document. The description in the registry entry should indicate that this range uses dynamic assignment according to the protocols listed in the new "Dynamic Multicast Group IDs" registry and the reference should be changed to this document.

7. Acknowledgement

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* Stig Venaas for recognizing the need for a range of addresses that can be allocated manually

* Nico Cvitak for recommending a group ID block for SSM

8. References

8.1. Normative References

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8.2. Informative References

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