Stream:	Internet Engineering Task Force (IETF)
RFC:	10028
Updates:	3307
Category:	Standards Track
Published:	August 2026
ISSN:	2070-1721
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RFC 10028
Updates to Dynamic IPv6 Multicast Address Group IDs

Abstract

This document describes limitations of the existing range of dynamic IPv6 multicast addresses specified in "Allocation Guidelines for IPv6 Multicast Addresses" (RFC 3307). It updates RFC 3307 by 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 the Multicast Address Dynamic Client Allocation Protocol (MADCAP) (RFC 2730), a range for Source-Specific Multicast (SSM), a Private Use range, a range for Experimental Use, and Solicited-Node multicast addresses (which were not previously noted in RFC 3307).

Status of This Memo

This is an Internet Standards Track document.

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1. Introduction

For IPv6 multicast addresses, [RFC3307], Section 2 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. [RFC3307], Section 4.3 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 group ID range for dynamic assignment overlaps with the range used for Solicited-Node multicast addresses (see [RFC4291], Section 2.7.1 for the definition of this range and [RFC10019] for the discussion of problems associated with duplicate group ID values on the network).

Only one server allocation protocol has been defined at the time of writing (see [RFC2730]), but [RFC10019] advocates developing a decentralized, zero-configuration host allocation protocol. This document updates [RFC3307], Section 4.3 to allow multiple dynamic allocation protocols to coexist on the same network and so that dynamic IPv6 multicast group ID ranges use a registry to better align with current practices for protocol number assignment.

This document adheres to the IPv6 multicast address architecture outlined in [RFC4291], [RFC3307], [RFC7371], et al.

2. Considerations for Source-Specific Multicast

One of the benefits of Source-Specific Multicast (SSM) listed in [RFC4607], Section 1 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 the new "Dynamic Multicast Group IDs" registry in the "IPv6 Multicast Address Space" registry group. The registry has been populated with the following entries:

Range	Description	Reference
0x80000000-0x8FFFFFFF	MADCAP	Defined in [RFC2730], range assigned in RFC 10028
0x90000000-0xEFFFFFFF	Unassigned	
0xF0000000-0xFCFFFFFF	Host allocation of SSM group addresses	RFC 10028
0xFD000000-0xFDFFFFFF	Reserved for Private Use	RFC 10028
0xFE000000-0xFEFFFFFF	Reserved for Experimental Use	RFC 10028

Range	Description	Reference
0xFF000000-0xFFFFFFFF	Solicited-Node multicast addresses	[RFC4291], Section 2.7.1

Table 2: Updated Allocations

This reduces the range previously available for the Multicast Address Dynamic Client Allocation Protocol (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 (see [RFC8126], Section 4.1). The Experimental Use range may be used for experimentation with new dynamic allocation protocols (see [RFC8126], Section 4.2). 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

IANA has created 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 initially contains the entries listed in Table 2 and lists both [RFC3307] and this document as references.

IANA has also updated the references to "`FF3X:0:0:0:0:8000:0-FF3X: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 indicates that this range uses dynamic assignment according to the protocols listed in the new "Dynamic Multicast Group IDs" registry and includes a reference to this document. The description in the registry entry indicates that this range uses dynamic assignment according to the protocols listed in the new "Dynamic Multicast Group IDs" registry and the reference has been changed to this document.

7. References

7.1. Normative References

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Acknowledgements

Special thanks to the National Marine Electronics Association for their contributions in developing marine industry standards and their support for this work.

The authors are grateful to the members of the PIM Working Group for their early brainstorming sessions and review of this document and to the following individuals specifically:

- Dave Thaler for discussing MADCAP deployment in Microsoft products and the impact of changing the range of group IDs used by MADCAP
- 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

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