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## IPv6 Multicast Address Scopes

### Abstract

This document updates the definitions of IPv6 multicast scopes and therefore updates RFCs 4007 and 4291.

### Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <http://www.rfc-editor.org/info/rfc7346>.

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## 1. Introduction

RFC 4291 [RFC4291] defines "scop" as "a 4-bit multicast scope value used to limit the scope of the multicast group" and defines "scop 3" as "reserved". The multicast protocol specification in [MPL] desires to use multicast scop 3 to transport multicast traffic scoped to a network of nodes connected in a mesh. This scop value is used to accommodate a multicast scope that is greater than Link-Local but is also automatically determined by the network architecture.

## 2. Definition of IPv6 Multicast Address Scopes (Updates RFC 4291)

The following table updates the definitions in [RFC4291]:

scop	NAME	REFERENCE
0	Reserved	[RFC4291], RFC 7346
1	Interface-Local scope	[RFC4291], RFC 7346
2	Link-Local scope	[RFC4291], RFC 7346
3	Realm-Local scope	[RFC4291], RFC 7346
4	Admin-Local scope	[RFC4291], RFC 7346
5	Site-Local scope	[RFC4291], RFC 7346
6	Unassigned	
7	Unassigned	
8	Organization-Local scope	[RFC4291], RFC 7346
9	Unassigned	
A	Unassigned	
B	Unassigned	
C	Unassigned	
D	Unassigned	
E	Global scope	[RFC4291], RFC 7346
F	Reserved	[RFC4291], RFC 7346

The following change is applied to Section 2.7 of [RFC4291].

## OLD:

Admin-Local scope is the smallest scope that must be administratively configured, i.e., not automatically derived from physical connectivity or other, non-multicast-related configuration.

## NEW:

Interface-Local, Link-Local, and Realm-Local scope boundaries are automatically derived from physical connectivity or other non-multicast-related configurations. Global scope has no boundary. The boundaries of all other non-reserved scopes of Admin-Local or larger are administratively configured. For reserved scopes, the way of configuring their boundaries will be defined when the semantics of the scope are defined.

According to RFC 4007 [RFC4007], the zone of a Realm-Local scope must fall within zones of larger scope. Because the zone of a Realm-Local scope is configured automatically while the zones of larger scopes are configured manually, care must be taken in the

definition of those larger scopes to ensure that the inclusion constraint is met.

Realm-Local scopes created by different network technologies are considered to be independent and will have different zone indices (see Section 6 of [RFC4007]). A router with interfaces on links using different network technologies does not forward traffic between the Realm-Local multicast scopes defined by those technologies.

### 3. Definition of Realm-Local Scopes

The definition of any Realm-Local scope for a particular network technology should be published in an RFC. For example, such a scope definition would be appropriate for publication in an "IPv6-over-foo" RFC.

Any RFCs that include the definition of a Realm-Local scope will be added to the IANA "IPv6 Multicast Address Scopes" registry under the Realm-Local scope entry, and those specifications must include such a request in their IANA Considerations.

Section 5 of this document gives the definition of scop 3 for IEEE 802.15.4 [IEEE802.15.4] networks.

### 4. Definition of Automatic and Administratively Configured Scopes (Updates RFC 4007)

Section 5 of RFC 4007 [RFC4007] and Section 2.7 of RFC 4291 [RFC4291] disagree on the way in which multicast scop 3 is configured. To resolve that disagreement, the last bullet in the list in Section 5 of [RFC4007] is updated as follows:

OLD:

- o The boundaries of zones of a scope other than interface-local, link-local, and global must be defined and configured by network administrators.

NEW:

- o The boundaries of zones of a scope are defined by the IPv6 addressing architecture [RFC4291] and updated by RFC 7346.

## 5. Definition of Realm-Local Scope for IEEE 802.15.4

When used in an IP-over-IEEE802.15.4 network, scop 3 is defined to include all interfaces sharing a Personal Area Network Identifier (PAN ID).

## 6. IANA Considerations

IANA has established a sub-registry titled "IPv6 Multicast Address Scopes" in the existing "IPv6 Multicast Address Space Registry". The new registry has been populated with the scop values given in Section 2. New definitions for scop values will be made following the "IETF Review" policy [RFC5226].

For each future RFC that defines a Realm-Local scope for new network technologies (scop 3), IANA will add a reference to the defining document in the "IPv6 Multicast Address Scopes" registry. Such RFCs are expected to make an explicit request to IANA for inclusion in the registry.

IANA has included a note on the top of the "IPv6 Multicast Address Scopes" registry:

The definition of any Realm-Local scope for a particular network technology should be published in an RFC. For example, such a scope definition would be appropriate for publication in an 'IPv6-over-foo' RFC.

Any RFCs that define a Realm-Local scope will be listed in this registry as an additional reference in the Realm-Local scope entry. Such RFCs are expected to make an explicit request to IANA for inclusion in this registry.

## 7. Acknowledgments

Robert Cragie, Kerry Lynn, Jinmei Tatuya, Dave Thaler, and Stig Venaas all contributed text and/or review to ensure that the updates to RFC 4007 and RFC 4291 are correct.

## 8. Security Considerations

This document has no security considerations beyond those in RFC 4007 [RFC4007] and RFC 4291 [RFC4291].

## 9. References

### 9.1. Normative References

- [RFC4007] Deering, S., Haberman, B., Jinmei, T., Nordmark, E., and B. Zill, "IPv6 Scoped Address Architecture", RFC 4007, March 2005.
- [RFC4291] Hinden, R. and S. Deering, "IP Version 6 Addressing Architecture", RFC 4291, February 2006.

### 9.2. Informative References

- [IEEE802.15.4] IEEE Computer Society, "IEEE Std. 802.15.4-2006", October 2006.
- [MPL] Hui, J. and R. Kelsey, "Multicast Protocol for Low power and Lossy Networks (MPL)", Work in Progress, April 2014.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

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