Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: May 27, 2021

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November 23, 2020

The IPv6 Link-Local Address Type Field
draft-templin-6man-lla-type-01

Abstract

IPv6 link-local addresses are formed from the prefix fe80::/10 which is followed by 54 "zero" bits, then followed by a 64-bit Interface Identifier. There are multiple methods for generating link-local addresses, and multiple may be in use by nodes on the same link (and sometimes even the same interface) at the same time. This document defines an IPv6 link-local address "Type" field that identifies the type of link-local address being used.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

The IPv6 link-local address prefix is defined in [RFC4291] as the prefix fe80::/10 followed by 54 "zero" bits, then followed by a 64-bit interface identifier. There are multiple methods for generating link-local addresses, and multiple may be in use on the same link (and sometimes even the same interface) at the same time.

For example, [I-D.ietf-6man-rfc4941bis], [RFC7217], [RFC4291], [RFC3972], [I-D.templin-6man-omni-interface] and possibly others define diverse methods for generating interface identifiers for constructing link-local addresses on a given interface. Administrative configuration (e.g., manually setting the interface ID) is also an option available to all interfaces.

IPv6 multi-addressing allows each interface to assign multiple IPv6 addresses, and even multiple IPv6 link-local addresses. On some interfaces, it may even be the case that multiple link-local addresses of different types would be configured at the same time. But, since the diverse methods for generating interface identifiers are not coordinated with one another, some interfaces may need a way to differentiate the types of link-local addresses as well as to avoid collisions and duplication.

This document defines a Type field in the link-local address prefix for differentiating link-local address construction types. The Type field also has a companion Function field which can be used to perform Type-specific functions such as Prefix Delegation (PD).

This document updates [RFC4291].

2. Terminology

The terminology in the normative references applies.

3. The IPv6 Link-Local Address Type Field

[RFC4291] defines the IPv6 link-local address format as the prefix fe80::/10, followed by 54 zero bits, then followed by a 64-bit Interface Identifier as shown in Figure 1:

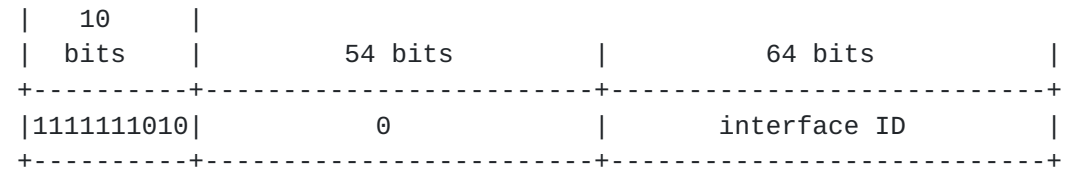

Figure 1: IPv6 Link-Local Address Format

In this format, there is currently no use for the 54 bits of 0s, and existing IPv6-over-(foo) documents such as [RFC2464] expect them always to be zero regardless of the method used in generating the Interface ID.

However, new IPv6-over-(foo) documents could benefit from having a coded indication of the link-local address construction type. This would not only allow the interface to differentiate between the address construction methods used by the sender in packets received with link-local addresses, but it would also provide a means for avoiding address duplication between diverse address autoconfiguration methods used on the same link.

This document defines a new Type field in the IPv6 link-local address prefix. The Type field and a companion Function field occupy the least significant 16 bits of the 64-bit link-local address prefix as shown in Figure 2:

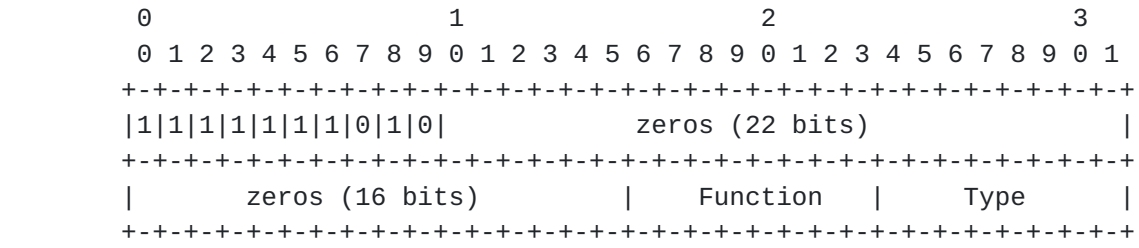

Figure 2: IPv6 Link-Local Prefix with Type Field

In this format, Type is an 8-bit field that identifies the link-local address type on IPv6-over-(foo) interfaces that recognize the field,

and Function is an 8-bit Type-specific field. The Type and Function fields are present only when preceded by the prefix fe80::/48, and are not present when preceded by any other prefix. The values for Type that are currently defined are:

Link-Local Format	Type
Unspecified (default)	0
Administratively Configured	1
RFC4941bis	2
RFC7217	3
RFC4291	4
RFC3972	5
OMNI	6

Figure 3

For example, on IPv6-over-(foo) interface types that recognize the Type field, an IPv6 link-local address formed according to [RFC7217] would be written as: fe80:0:0:3::[Interface ID], while one formed according to [RFC3972] would be written as: fe80:0:0:5::[Interface ID]. For some link types, it is possible that multiple types would be assigned on the same link and possibly even on the same interface.

For Types '2' (RFC4941bis) and '6' (OMNI), PD clients set the Function field to a non-zero prefix length value between 1 and 64 in the source addresses of messages used to request a PD. For 'Type 6' (OMNI), PD servers set the Function field to a non-zero prefix length value between 1 and 64 in the destination addresses of messages used to deliver a PD. For all other cases, the Function field is set to the value 0 unless otherwise specified in a new link-local address format specification, or in an update to this document.

Note that for existing IPv6-over-(foo) link types, the Type and Function fields are always set to the value 0 (unspecified) and the link local address format fe80::/64 still applies as it always has.

4. IANA Considerations

This document defines a Type field for IPv6 link-local addresses, for which IANA is instructed to create and maintain a new registry entitled "IPv6 Link-Local Address Type values". Initial values are given below; future assignments are to be made through Expert Review [RFC8126]:

Link-Local Format	Type
Unspecified (default)	0
Administratively Configured	1
RFC4941bis	2
RFC7217	3
RFC4291	4
RFC3972	5
OMNI	6

Figure 4: IANA IPv6 Link-Local Address Type Registry

5. Security Considerations

Security considerations for IPv6 [RFC8200] apply.

6. Acknowledgements

This document is aligned with the IETF 6man (IPv6) working group.

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7. References

7.1. Normative References

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[RFC8200] Deering, S. and R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", STD 86, RFC 8200, DOI 10.17487/RFC8200, July 2017, <https://www.rfc-editor.org/info/rfc8200>.

7.2. Informative References

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