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Reserved IPv6 Interface Identifiers

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Abstract

Interface identifiers in IPv6 unicast addresses are used to identify interfaces on a link. They are required to be unique within a subnet. Several RFCs have specified interface identifiers or identifier ranges that have a special meaning attached to them. An IPv6 node autoconfiguring an interface identifier in these ranges will encounter unexpected consequences. Since there is no centralized repository for such reserved identifiers, this document aims to create one.

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1. Introduction

An IPv6 unicast address is composed of two parts: a subnet prefix and an interface identifier (IID) that identifies a unique interface within the subnet prefix. The structure of an IPv6 unicast address is depicted in "IPv6 Addressing Architecture" [RFC4291] and is replicated here for clarity.

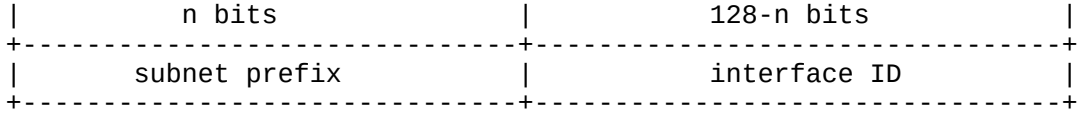

Figure 1: IPv6 Unicast Address Format

For all unicast addresses, except those that start with the binary value 000, Interface IDs are required to be 64 bits long and to be constructed in Modified EUI-64 format [RFC4291]. Examples of mechanisms that generate interface identifiers without a unique token include Cryptographically Generated Addresses [RFC3972], Privacy Addresses [RFC4941], Hash-Based Addresses [HBA], etc. Non-unique interface identifiers can also be allocated using managed address assignment mechanisms like DHCPv6 (Dynamic Host Configuration Protocol for IPv6) [RFC3315].

1.1. Applicability

This document applies only to interface identifiers that are formed in the modified EUI-64 format as defined in Appendix A of [RFC4291]. All other types of interface identifiers are out of its scope.

1.2. Requirements Notation

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

2. Issues with Reusing Reserved Interface Identifiers

Let us assume a node comes up with an interface identifier that has been reserved for use in some other capacity, e.g., an IPv6 node that uses temporary IPv6 addresses [RFC4941] comes up with an IID of fdff:ffff:ffff:ffff. This node will receive requests from all nodes that are requesting a service from a Mobile IPv6 home agent since the above-mentioned interface identifier has been reserved in [RFC2526] to serve as a MIPv6 home agent's anycast address. At best, this is an annoyance to the node that came up with this address. At worst, another node on the link would be denied service and may not look for other methods of acquiring a home agent. Thus, such reserved interface identifiers MUST NOT be used for autonomous autoconfiguration or for managed address configuration.

2.1. Possible Solutions

There are two possible ways to go about avoiding usage of these reserved interface identifiers. One of them would be to add a normative reference to each specification that reserves an interface identifier. The other would be to create an IANA registry for such interface identifiers. There are two disadvantages to the normative reference approach. Firstly, this approach does not scale well because the number of such specifications that would need to be updated is large. Secondly, the maturity level of the document reserving the IID might be lower than the one prohibited from using it; this will cause a downward reference problem. Therefore, the better solution is to create an IANA registry for this purpose.

3. IANA Considerations

This document creates an IANA registry for reserved IPv6 interface identifiers. Initial values for the reserved IPv6 interface identifiers are given below.

Interface Identifier Range	Description
0000:0000:0000:0000	Subnet-Router Anycast [RFC4291]
FDFF:FFFF:FFFF:FF80-FDFF:FFFF:FFFF:FFFF	Reserved Subnet Anycast Addresses[RFC2526]

Table 1: Current Assignments

It is possible that implementations might predate a specific assignment from this registry and hence not be cognizant of the reserved nature of the interface identifier. Hence, future assignments from this registry are discouraged. Future assignments, if any, are to be made through Standards Action [RFC5226]. Assignments consist of a single interface identifier or a range of interface identifiers.

NOTE: The address :: (all zeros in the interface identifier field) is used as the unspecified address and ::/0 is used as a default route indicator, as specified in [RFC5156]. These uses do not conflict with the reserved interface identifiers defined here, since the reserved identifiers defined in this document are used for avoiding conflicts with stateless address autoconfiguration that utilizes a 64-bit prefix length.

4. Acknowledgements

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5. Security Considerations

By utilizing one of the reserved interface identifiers, an IPv6 node might receive requests that it is not authorized to receive. Information that creates or updates a registration in this registry needs to be authenticated and authorized by the IANA based on the instructions set forth by [RFC5226].

6. References

6.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2526] Johnson, D. and S. Deering, "Reserved IPv6 Subnet Anycast Addresses", RFC 2526, March 1999.

[RFC4291] Hinden, R. and S. Deering, "IP Version 6 Addressing Architecture", RFC 4291, February 2006.

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

6.2. Informative References

[HBA] Bagnulo, M., "Hash Based Addresses (HBA)", Work in Progress, October 2006.

[RFC3315] Droms, R., Ed., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, July 2003.

[RFC3972] Aura, T., "Cryptographically Generated Addresses (CGA)", RFC 3972, March 2005.

[RFC4941] Narten, T., Draves, R., and S. Krishnan, "Privacy Extensions for Stateless Address Autoconfiguration in IPv6", RFC 4941, September 2007.

[RFC5156] Blanchet, M., "Special-Use IPv6 Addresses", RFC 5156, April 2008.

Appendix A. List of Potentially Affected RFCs

Implementations of the following RFCs need to be aware of the reserved interface identifier ranges when they allocate new addresses. Future revisions of these RFCs should ensure that this is either already sufficiently clear or that the text is amended to take this into account.

- RFC 2590 - Transmission of IPv6 Packets over Frame Relay Networks Specification
- RFC 3315 - Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
- RFC 3972 - Cryptographically Generated Addresses (CGA)
- RFC 4489 - A Method for Generating Link-Scoped IPv6 Multicast Addresses
- RFC 4862 - IPv6 Stateless Address Autoconfiguration
- RFC 4941 - Privacy Extensions for Stateless Address Autoconfiguration in IPv6
- RFC 4982 - Support for Multiple Hash Algorithms in Cryptographically Generated Addresses (CGAs)
- RFC 5072 - IP Version 6 over PPP

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