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ASN Prefix-based Addressing for IPv6
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Abstract

This document describes a method and policy for ASN prefix-based addressing for IPv6.

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

This document defines an address allocation system (called "APbA") whereby an Autonomous System (AS) number is embedded as sub-prefix bits of an IPv6 address, resulting in approximately 1.2 quintillion addresses per AS. Advantages of this mechanism include the ability to get allocate AS-specific and unique address space without an allocation protocol or registration process. This system also makes it easy to determine an association between AS and address, which is useful for debugging and auditing purposes.

This mechanism draws inspiration from [RFC3180]. Unlike that earlier specification however, this system applies specifically to unicast addressing, supports 32-bit ASNs, and provides significantly more addresses per AS. Some administrative challenges identified by [RFC6034] remain and questions about the integration into modern technology such as [RFC6482] are addressed later in this document.

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. Address Space

An IPv6 address with the prefix [IANA-assigned 16-bit prefix] indicates that the adress is a APbA address. The embedded AS follows as a sub-prefix. A 16-bit AS is left-padded with 0s. The remaining 96-bit suffix bits are locally significant and defined by the corresponding AS.

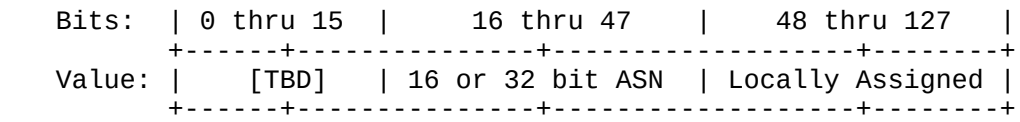

Figure 1: APbA address format

3. Example

Consider, for example AS 64496. Written in hex, we get an IPv6 prefix of 3fff:0:fbf0::/48.

4. Private, Reserved, Special Use, and Unallocated ASNs

AS numbers may be reserved for private or special use. They may also be unallocated. These AS designations MUST be maintained when mapped to APbA addresses, which may render these addresses unavailable or inappropriate for public use.

5. Registry Considerations

Internet registries SHOULD provide service functions and support for APdA addresses.

6. IANA Considerations

This memo requests a 16-bit IPv6 address prefix assignment from IANA.

7. Security Considerations

APdA addresses SHOULD have corresponding ROAs [RFC6482] if externally and publicly routed on the Internet. Network operators MAY reject APdA route announcments otherwise.

8. References

8.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

8.2. Informative References

[RFC3180] Meyer, D. and P. Lothberg, "GLOP Addressing in 233/8", BCP 53, RFC 3180, DOI 10.17487/RFC3180, September 2001, <https://www.rfc-editor.org/info/rfc3180>.

[RFC6034] Thaler, D., "Unicast-Prefix-Based IPv4 Multicast Addresses", RFC 6034, DOI 10.17487/RFC6034, October 2010, <https://www.rfc-editor.org/info/rfc6034>.

[RFC6482] Lepinski, M., Kent, S., and D. Kong, "A Profile for Route Origin Authorizations (ROAs)", RFC 6482, DOI 10.17487/RFC6482, February 2012, <https://www.rfc-editor.org/info/rfc6482>.

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