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T. Anderson
Redpill Linpro

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Local-use IPv4/IPv6 Translation Prefix
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Abstract

This document reserves the IPv6 prefix 64:ff9b:1::/48 for local use with IPv4/IPv6 translation mechanisms. It updates RFC6890 in order to reflect this reservation.

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 reserves 64:ff9b:1::/48 for local use with IPv4/IPv6 translation mechanisms. This facilitates the co-existence of multiple IPv4/IPv6 translation mechanisms in the same network without requiring the use of a Network-Specific Prefix assigned from the operator's allocated global unicast address space.

2. Terminology

This document makes use of the following terms:

Network-Specific Prefix (NSP)
: A globally unique prefix assigned by a network operator for use with and IPv4/IPv6 translation mechanism, cf. [RFC6052]

Well-Known Prefix (WKP)
: The prefix 64:ff9b::/96, which is reserved for use with the [RFC6052] IPv4/IPv6 address translation algorithm.

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].

3. Problem Statement

Since the WKP 64:ff9b::/96 was reserved by [RFC6052], several new IPv4/IPv6 translation mechanisms have been defined by the IETF. These target various different use cases. An operator might therefore wish to make use of several of them simultaneously.

The smallest possible prefix supported by the [RFC6052] algorithm is a /96. Because the WKP is a /96, an operator preferring to use a WKP over an NSP can only do so for only one of his IPv4/IPv6 translation mechanisms. All others must necessarily use an NSP.

The WKP is reserved specifically for use with the algorithm specified in [RFC6052]. More recent IETF documents describe IPv4/IPv6 translation mechanisms that use different algorithms. An operator deploying such mechanisms can not make use of the WKP in a legitimate fashion.

Section 3.1 of [RFC6052] imposes certain restrictions on the use of the WKP. These restrictions might conflict with the operator's desired use of an IPv4/IPv6 translation mechanism.

In summary, there is a need for a prefix that facilitates the co-existence of multiple IPv4/IPv6 translation mechanisms (that do not necessarily use the [RFC6052] algorithm).

4. Choosing 64:ff9b:1::/48

The primary reason for choosing 64:ff9b:1::/48 is that it is adjacent to the [RFC6052] WKP 64:ff9b::/96. As these two prefixes are intended for very similar uses, it is prudent to allow them to be referred to using a single aggregate (64:ff9b::/47).

The prefix length of 48 bits was chosen in order to attain the goal of facilitating multiple simultaneous deployments of IPv4/IPv6 translation in a single network. The shortest IPv4/IPv6 translation prefixes reported to the V6OPS working group as being used in production was 64 bits. 64:ff9b:1::/48 will accommodate up to 65536 such prefixes.

While the [RFC6052] algorithm specifies IPv4/IPv6 translation prefixes as short as /32, facilitating for multiple instances of these was considered as too wasteful by the V6OPS working group.

5. Deployment Considerations

64:ff9b:1::/48 is intended as a technology-agnostic and generic reservation. A network operator may freely use it in combination with any kind of IPv4/IPv6 translation mechanism deployed within his network.

By default, IPv6 nodes and applications must not treat IPv6 addresses within 64:ff9b:1::/48 different from other globally scoped IPv6 addresses. In particular, they must not make any assumptions regarding the syntax or properties of those addresses (e.g., the

existence and location of embedded IPv4 addresses), or the type of associated translation mechanism (e.g., whether it is stateful or stateless).

64:ff9b:1::/48 or any other more-specific prefix may not be advertised in inter-domain routing, except by explicit agreement between all involved parties. Such prefixes MUST NOT be advertised to the default-free zone.

When 64:ff9b:1::/48 or a more-specific prefix is used with the [RFC6052] algorithm, it is considered to be a Network-Specific Prefix.

6. Checksum Neutrality

Use of 64:ff9b:1::/48 does not in itself guarantee checksum neutrality, as many of the IPv4/IPv6 translation algorithms it can be used with are fundamentally incompatible with checksum-neutral address translations.

The Stateless IP/ICMP Translation algorithm [RFC7915] is one well-known algorithm that can operate in a checksum-neutral manner, when using the [RFC6052] algorithm for all of its address translations. However, in order to attain checksum neutrality is imperative that the translation prefix is chosen carefully. Specifically, in order for a 96-bit [RFC6052] prefix to be checksum neutral, all the six 16-bit words in the prefix must add up to a multiple of 0xffff.

The following non-exhaustive list contains examples of translation prefixes that are checksum neutral when used with the [RFC7915] and [RFC6052] algorithms:

- 64:ff9b:1:fffe::/96
- 64:ff9b:1:fffd:1::/96
- 64:ff9b:1:fffc:2::/96
- 64:ff9b:1:abcd:0:5431::/96

Section 4.1 of [RFC6052] contains further discussion about IPv4/IPv6 translation and checksum neutrality.

7. IANA Considerations

The IANA is requested to add the following entry to the IPv6 Special-Purpose Address Registry:

Attribute	Value
Address Block	64:ff9b:1::/48
Name	IPv4-IPv6 Translat.
RFC	(TBD)
Allocation Date	(TBD)
Termination Date	N/A
Source	True
Destination	True
Forwardable	True
Global	False
Reserved-by-Protocol	False

The IANA is furthermore requested to add the following footnote to the 0000::/8 entry of the Internet Protocol Version 6 Address Space registry:

64:ff9b:1::/48 reserved for Local-use IPv4/IPv6 Translation [TBD]

8. Security Considerations

The reservation of 64:ff9b:1::/48 is not known to cause any new security considerations beyond those documented in Section 5 of [RFC6052].

9. References

9.1. 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, <http://www.rfc-editor.org/info/rfc2119>.

[RFC6052] Bao, C., Huitema, C., Bagnulo, M., Boucadair, M., and X. Li, "IPv6 Addressing of IPv4/IPv6 Translators", RFC 6052, DOI 10.17487/RFC6052, October 2010, <http://www.rfc-editor.org/info/rfc6052>.

9.2. Informative References

[RFC7915] Bao, C., Li, X., Baker, F., Anderson, T., and F. Gont, "IP/ICMP Translation Algorithm", RFC 7915, DOI 10.17487/RFC7915, June 2016, <http://www.rfc-editor.org/info/rfc7915>.

Appendix A. Acknowledgements

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Author's Address

Tore Anderson
Redpill Linpro
Vitaminveien 1A
0485 Oslo
Norway

Phone: +47 959 31 212
Email: tore@redpill-linpro.com
URI: http://www.redpill-linpro.com