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W. Kumari
J. Linkova
Google, LLC

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NAT64 WKP
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Abstract

This document removes the requirement in Section 3.1 of RFC6052 that the NAT64 Well-Known Prefix 64:FF9B::/96 MUST NOT be used to represent non-global IPv4 addresses, such as those defined in [RFC1918] or listed in Section 3 of [RFC5735].

About This Document

This note is to be removed before publishing as an RFC.

Status information for this document may be found at https://datatracker.ietf.org/doc/draft-kumkova-v6ops-nat64-wkp-1918/.

Discussion of this document takes place on the V6Ops Working Group Working Group mailing list (mailto:v6ops@ietf.org), which is archived at https://mailarchive.ietf.org/arch/browse/v6ops/. Subscribe at https://www.ietf.org/mailman/listinfo/v6ops/.

Source for this draft and an issue tracker can be found at https://github.com/furry13/6052-update-wkp1918.

Table of Contents

1. Introduction

Section 3.1 of [RFC6052] prohibits IPv4/IPv6 translators from using the Well-Known Prefix (WKP, 64:FF9B::/96) to represent non-global IPv4 addresses, such as those defined in [RFC1918] or listed in Section 3 of [RFC5735].

This restriction is relatively straightforward to implement in DNS64 [RFC6147]: a DNS64 server simply avoids synthesizing an AAAA record using the WKP if the original A record contains a non-global IPv4 address. However, this requirement introduces significant operational challenges for systems that do not rely on DNS64 and instead use local synthesis such as CLAT (Customer-side Translator, [RFC6877]), or similar approaches.

Enterprise and other closed networks often require IPv6-only nodes to communicate with both internal (e.g., using RFC1918 addresses) and external (Internet) IPv4-only destinations. The restriction in Section 3.1 of RFC6052 prevents such networks from utilizing the WKP and, consequently, from relying on public DNS64 servers.

Using two NAT64 prefixes — the WKP for Internet destinations and a Network-Specific Prefix (NSP) for non-global IPv4 addresses — is not a feasible solution for nodes performing local synthesis or running CLAT. None of the widely deployed NAT64 Prefix Discovery mechanisms ([RFC7050], [RFC8781]) provide a method to map a specific NAT64 prefix to a subset of IPv4 addresses for which it should be used.

According to Section 3 of [RFC7050], a node must use all learned prefixes when performing local IPv6 address synthesis. Consequently, if a node discovers both the WKP and the NSP, it will use both prefixes to represent global IPv4 addresses. This duplication significantly complicates security policies, troubleshooting, and other operational aspects of the network.

Prohibiting the WKP from representing non-global IPv4 addresses offers no substantial benefit to IPv6-only or IPv6-mostly deployments. Simultaneously, it substantially complicates network design and the behavior of nodes.

Given the recent operational experience in deploying IPv6-only and IPv6-mostly networks, it is desirable to allow translators to use a single prefix (including the WKP) to represent all IPv4 addresses, regardless of their global or non-global status. This simplification would greatly improve the utility of the WKP in enterprise networks.

2. Conventions and Definitions

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.

2.1. Terminology

This document reuses the Terminology section of [RFC6052].

3. RFC6052 Update

This document updates Section 3.1 of [RFC6052] ("Restrictions on the Use of the Well-Known Prefix") as follows:

OLD TEXT:

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The Well-Known Prefix MUST NOT be used to represent non-global IPv4 addresses, such as those defined in [RFC1918] or listed in Section 3 of [RFC5735]. Address translators MUST NOT translate packets in which an address is composed of the Well-Known Prefix and a non-global IPv4 address; they MUST drop these packets.

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NEW TEXT:

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The Well-Known Prefix MAY be used to represent non-global IPv4 addresses, such as those defined in [RFC1918] or listed in Section 3 of [RFC5735]. Address translators MUST translate packets in which an address is composed of the Well-Known Prefix and a non- global IPv4 address; they MUST NOT drop these packets.

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4. Operational Considerations

5. Security Considerations

TODO Security

6. IANA Considerations

This document has no IANA actions.

7. References

7.1. 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/rfc/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, <https://www.rfc-editor.org/rfc/rfc6052>.

[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/rfc/rfc8174>.

7.2. Informative References

[RFC7050] Savolainen, T., Korhonen, J., and D. Wing, "Discovery of the IPv6 Prefix Used for IPv6 Address Synthesis", RFC 7050, DOI 10.17487/RFC7050, November 2013, <https://www.rfc-editor.org/rfc/rfc7050>.

[RFC8781] Colitti, L. and J. Linkova, "Discovering PREF64 in Router Advertisements", RFC 8781, DOI 10.17487/RFC8781, April 2020, <https://www.rfc-editor.org/rfc/rfc8781>.

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Authors' Addresses

Warren Kumari
Google, LLC
Email: warren@kumari.net

Jen Linkova
Google, LLC
Email: furry13@gmail.com