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J. Palet Martinez
The IPv6 Company
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Reclassifying RFC6052 to Internet Standard
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Abstract

This document reclassifies IPv6 Addressing of IPv4/IPv6 Translators ([RFC6052]) to Internet Standard.

Status of This Memo

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Table of Contents

1. Introduction

This document proposes that IPv6 Addressing of IPv4/IPv6 Translators ([RFC6052]) is advanced Internet Standard, following RFC6410 ([RFC6410]).

(1) There are at least two independent interoperating implementations with widespread deployment and successful operational experience.

IPv6 Addressing of IPv4/IPv6 Translators ([RFC6052]) has been widely implemented by at least a dozen of vendors and its being used in commercial deployments by hundreds of millions of devices.

(2) There are no errata against the specification that would cause a new implementation to fail to interoperate with deployed ones.

IPv6 Addressing of IPv4/IPv6 Translators ([RFC6052]) has no errata filed.

(3) There are no unused features in the specification that greatly increase implementation complexity.

There are no unused features.

(4) If the technology required to implement the specification requires patented or otherwise controlled technology, then the set of implementations must demonstrate at least two independent, separate and successful uses of the licensing process.

None.

2. Implementation Status

Note to RFC Editor: If this document needs to be published, please remove this section before publication, as it is only intended for the IESG evaluation.

This section summarized the known status of existing and interoperable implementations of the protocol subject of this document, as well as closely related protocols. This is following ([RFC7942]) and intended to assist the relevant WGs, IESG and IETF as a whole, in the evaluation of the document for the document progress through the standardization process.

The description of the implementations is does not imply any IETF endorsement and is solely based on public available information, which has not been formally confirmed by specific interoperatbility testing for this document publication; however, it is known to be confirmed by existing commercial working deployments worldwide and without knows interoperability issues.

IPv6 Addressing of IPv4/IPv6 Translators ([RFC6052]) was originally published in October 2010.

([RFC6052]) needs to be implemented when implementing other related protocols (just to name a few of the most relevant ones) such as:

* Stateful NAT64: Network Address and Protocol Translation from IPv6 Clients to IPv4 Servers ([RFC6146]).

* DNS64: DNS Extensions for Network Address Translation from IPv6 Clients to IPv4 Servers ([RFC6147]).

* Mapping of Address and Port using Translation (MAP-T) ([RFC7599]).

* SIIT-DC: Stateless IP/ICMP Translation for IPv6 Data Center Environments ([RFC7755]).

* Stateless IP/ICMP Translation for IPv6 Internet Data Center Environments (SIIT-DC): Dual Translation Mode ([RFC7756]).

* 464XLAT: Combination of Stateful and Stateless Translation ([RFC7877]).

* IP/ICMP Translation Algorithm ([RFC7915]).

Follows a list of known implementations by different products/ vendors, known to be mature and in production products worlwide:

* 6Wind. Implemented in multiple products as part of NAT64 support. https://www.6wind.com/6wind-cg-nat-vrouter-with-nat64/.

* A10. Implemented in multiple products as part of the NAT64 support.

* AlliedTelesis. Implemented in multiple products as part of the NAT64 support.https://www.alliedtelesis.com/sites/default/files/documents/configuration-guides/transitioning_ipv4_to_ipv6_feature_overview_guide.pdf.

* Amazon. Virtual Private Cloud. https://docs.aws.amazon.com/vpc/latest/userguide/nat-gateway-nat64-dns64.html.

* Android (Google). Implemented since earlier CLAT implementation in 2012. https://android.googlesource.com/platform/external/android-clat. Implemented also in Google Cloud. https://cloud.google.com/vpc/docs/ipv6-to-ipv4-overview.

* Apple. Implemented since 2016. https://developer.apple.com/library/archive/documentation/NetworkingInternetWeb/Conceptual/NetworkingOverview/UnderstandingandPreparingfortheIPv6Transition/UnderstandingandPreparingfortheIPv6Transition.html.

* Arista. Implemented in multiple products as part of the NAT64 implementation. https://www.arista.com/en/support/toi/eos-4-24-0f/14495-map-t-border-relay.

* BlueCat. Implemented as part of the DNS64 support. https://docs.bluecatnetworks.com/r/Address-Manager-Administration-Guide/DNS64/9.4.0.

* Bpfnat. Implemented as part of the CLAT support. https://github.com/apalrd/bpfnat.

* Broadcom. Implemented in VMWare. https://techdocs.broadcom.com/us/en/vmware-cis/nsx/nsxt-dc/3-1/administration-guide/network-address-translation/configure-an-nsx-nat64.html.

* Cisco. Implemented in multiple series of products since 2010. https://www.cisco.com/c/en/us/td/docs/routers/ios/config/17-x/ip-addressing/b-ip-addressing/m_iadnat-stateless-nat64.html.

* CLATD. Implemented in Linux, as part of the CLAT implementation. https://github.com/toreanderson/clatd.

* Ecdysis. Implemented as part of the NAT64 support. http://ecdysis.viagenie.ca/.

* F5. Implemented in multiple products as part of the NAT64 support. https://techdocs.f5.com/kb/en-us/products/big-ip_ltm/manuals/product/cgn-implementations-11-6-0/2.html.

* Fortinet. Implemented in multiple products as part of the NAT64 support. https://docs.fortinet.com/document/fortigate/7.4.6/fortinet-carrier-grade-nat-field-reference-architecture-guide/891965/nat64.

* Huawei. Implemented in multiple series of products. https://support.huawei.com/enterprise/en/doc/EDOC1100278545/fe351de4/nat64-configuration.

* Infoblox. Implemented as part of the DNS64 support. https://www.a10networks.com/products/thunder-cgn/.

* Jool. Implmemented since 2014. https://nicmx.github.io/Jool/en/index.html.

* Juniper. Implemented in multiple series of products as part of the NAT64 support. https://www.juniper.net/documentation/us/en/software/nce/nce-nat64-ipv6-ipv4-depletion/topics/concept/ipv6-nat64-ipv4-depletion-overview.html.

* Microsoft. Implemented for the CLAT support in 2016. https://techcommunity.microsoft.com/blog/networkingblog/core-network-stack-features-in-the-creators-update-for-windows-10/339676.

* Nokia. Implemented in multiple products as part of the NAT64 support. https://documentation.nokia.com/html/0_add-h-f/93-0262-HTML/7750_SR_OS_MSISA_Guide/Application-Assurance-NAT.pdf.

* OpenWRT. Implemented as part of the support of CLAT. https://github.com/openwrt.

* Palo Alto. Implemented in muliple products as part of the NAT64 support. https://docs.paloaltonetworks.com/ngfw/networking/nat64.

* Sophos. Implemented in multiple products as part of the NAT64 support. https://news.sophos.com/en-us/2025/04/08/sophos-firewall-v21-5-early-access-is-now-available/.

* Tayga. Implemented as part of the NAT64 support. https://github.com/openthread/tayga.

* VPP. Implemented as part of the NAT64 support. https://docs.fd.io/vpp/17.07/nat64_doc.html.

* ZTE. Implemented in multiple products as part of the NAT64 support. https://www.zte.com.cn/global/product_index/ip_network_en/68e_e/zxr10-6800e/zxr10-6800e.html.

Note that even an effort has been done to compile an extensive list (including a relevant URL), there may be many more implementations not publicly known, so this list doesn’t pretent to be exclusive, just an indication of a sufficient number of implementations, as required for the evaluation of the current implementation status.

3. References

3.1. Normative References

[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/info/rfc6052>.

[RFC6410] Housley, R., Crocker, D., and E. Burger, "Reducing the Standards Track to Two Maturity Levels", BCP 9, RFC 6410, DOI 10.17487/RFC6410, October 2011, <https://www.rfc-editor.org/info/rfc6410>.

3.2. Informative References

[RFC6146] Bagnulo, M., Matthews, P., and I. van Beijnum, "Stateful NAT64: Network Address and Protocol Translation from IPv6 Clients to IPv4 Servers", RFC 6146, DOI 10.17487/RFC6146, April 2011, <https://www.rfc-editor.org/info/rfc6146>.

[RFC6147] Bagnulo, M., Sullivan, A., Matthews, P., and I. van Beijnum, "DNS64: DNS Extensions for Network Address Translation from IPv6 Clients to IPv4 Servers", RFC 6147, DOI 10.17487/RFC6147, April 2011, <https://www.rfc-editor.org/info/rfc6147>.

[RFC7599] Li, X., Bao, C., Dec, W., Ed., Troan, O., Matsushima, S., and T. Murakami, "Mapping of Address and Port using Translation (MAP-T)", RFC 7599, DOI 10.17487/RFC7599, July 2015, <https://www.rfc-editor.org/info/rfc7599>.

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[RFC7756] Anderson, T. and S. Steffann, "Stateless IP/ICMP Translation for IPv6 Internet Data Center Environments (SIIT-DC): Dual Translation Mode", RFC 7756, DOI 10.17487/RFC7756, February 2016, <https://www.rfc-editor.org/info/rfc7756>.

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

[RFC7942] Sheffer, Y. and A. Farrel, "Improving Awareness of Running Code: The Implementation Status Section", BCP 205, RFC 7942, DOI 10.17487/RFC7942, July 2016, <https://www.rfc-editor.org/info/rfc7942>.

Author’s Address

Jordi Palet Martinez
The IPv6 Company
Molino de la Navata, 75
28420 La Navata - Galapagar Madrid
Spain
Email: jordi.palet@theipv6company.com
URI: http://www.theipv6company.com/