v6ops
Internet-Draft
Intended status: Informational
Expires: 22 September 2026

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21 March 2026

IPv6-only and IPv6-Mostly Terminology Definition
draft-palet-v6ops-ipv6-only-11

Abstract

This document defines the terminology regarding the usage of expressions such as "IPv6-only" and "IPv6-Mostly", in order to avoid confusions when using them in IETF and other documents. The goal is that the reference to "IPv6-only" describes the actual native functionality being used, not the actual protocol support.

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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This Internet-Draft will expire on 22 September 2026.

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1. Introduction

Due to the nature of the Internet and the different types of users, parts of a network, providers, flows, etc., there is not a single and easy way to categorically say something such as "IPv6-only".

The goal of this document is to depict this situation and agree in a common language to be used for IETF and other documents, in order to facilitate ourselves and future readers, the correct understanding of what we are talking about.

The term IPv6-only is being used by many IETF documents, with a clear definition of the scope or terminology, for example [RFC6877], [RFC8585] and [RFC8683].

Note that all the references in this document are regarding the actual usage of IPv4/IPv6, not the support of those protocols by nodes. For example, a device or access network may support both IPv4 and IPv6, however actually is only "natively" forwarding IPv6, because the link used for that communication is only natively configured for IPv6. IPv4 may be used as well, but it is being encapsulated or translated by means of IPv6. So, from this perspective, this device is attached to an IPv6-only link.

As such, a network service is considered IPv6-only if it forwards IPv6, not IPv4, even if IPv4 is still supported and enabled but not configured neither used in the nodes participating in the service.

2. Scope is a must

The transition from IPv4 to IPv6 is not something that can be done, in the large majority of the cases, overnight and in a single step in a complete network. Consequently, in general, we are unable to talk about a whole network having a "single and uniform" status regarding the IPv6 support, at least not in the early deployment stages of an operator network.

Even if possible, it is not frequent to deploy new IPv6 networks which have no IPv4 connectivity at all, because at the current phase of the universal goal of the IPv6 deployment, almost every network still need to provide some kind of "access" to IPv4(-only) sites and services. It is not feasible for most of the operators to tell their customers "I can provide you IPv6 service, but you will not be able to access all Internet contents and apps, because some of them still don’t support IPv6, so you will miss every content that it is IPv4-only". Of course, this will change over the time, and there will be less and less dependency on IPv4-only end-sites/services.

Some networks may have IPv6-only support for specific purposes or services. For example, a DOCSIS provider may have decided that is worth the effort to get rid of IPv4 for the management network of the cable-modems. Or a network that provides connectivity only to IoT devices, may be IPv6-only.

However, the "end-networks", in general, need to continue supporting IPv4, as there are many devices or apps, in both corporate and end-user networks (smartTV, IP cameras, etc.), which are IPv4-only and it is not always feasible to update or replace them. Also if customer devices in a LAN are IPv4-only, they will not be able to access IPv6-only services, so this means that IPv6-only services can’t be deployed unless it is done in such way that some transition mechanism solves that problem as well (example an IPv6-only Data Center, requires SIIT-DC).

In IPv6-only access networks, IPv4 support may be provided by mechanisms that allow "IPv4-as-a-service" (IPv4aaS, for example by means of encapsulation and/or translation on top of IPv6).

Consequently, considering the context described above, if we want to be precise and avoid confusing others, we can’t use the terminology such as "IPv6-only" in a generic way, and we need to explicitly indicate what part of the network we are referring to, or to say in another way, what is the specific "scope".

3. Native (IPv4 or IPv6)

"Native" means that IP packets run directly over a layer 2 (logical link layer) interface, for example, IEEE 802 link layer, without anything at layer 3 being encapsulated within an IP packet of another IP protocol.

4. IPv6-Only

"IPv6-Only" in a given scope, means that only IPv6 is native in that scope. IPv4 is not configured neither managed in that scope, even if it may be transported (or encapsulated) on top of IPv6.

5. IPv4-Only

"IPv4-Only" in a given scope, means that only IPv4 is native in that scope. IPv6 is not configured neither managed in that scope, even if it may be transported (or encapsulated) on top of IPv4.

6. Dual-Stack

"Dual-Stack" means that both, IPv4 and IPv6 are native in that scope.

7. IPv6-Mostly

"IPv6-Mostly" is similar to dual-stack, with two additional key elements: a NAT64 ([RFC6146]) and DHCPv4 infrastructure operating Option 108 ([RFC8925]). Optionally there may be also a DNS64 ([RFC6147]). This way, in a dual-stack network scope, it can support a mix of IPv4-only, dual-stack or IPv6-only clients, depending on the client capabilities or configuration. It can be seen as a way to provide IPv4 support on demand.

8. API Scope

For the foreseeable future, it is not expected that APIs are IPv6-Only, and typically will be IPv4-Only (worst case) if they haven’ t been updated, or dual-stack.

9. Usage examples and practical applicability

A typical example will be a service provider network, which has different types of IPv4/IPv6 support in different parts of the network. Typically it will be a "dual-stack core", "dual-stack upstream", "dual-stack BGP", "dual-stack router", but "IPv6-only access".

As of this writing, most end-user networks and hosts need to support IPv4, due to many global resources being only available over IPv4. Transition technologies may allow islands to be connected to the broader Internet over a IPv6-only access networks acting as an underlay for legacy IPv4 traffic. An organization aiming to switch to an IPv6-only end-user network will need to ensure that all host/routers are capable of IPv6-only operation and need to ensure that all off-network resources are available over IPv6 (either as IPv6-only or dual-stacked).

IPv6-only server, data-center and cloud environments are entirely possible as of this writing, as long as:

* All host/routers are capable of IPv6-only operation.

* All accessed resources (DNS resolvers, NTP servers, software update servers, network management services, and other external resources) are available over IPv6 (either IPv6-only or dual-stacked).

* All inbound communications are capable of IPv6, either due to all external endpoints supporting IPv6 or due to all legacy IPv4 traffic being relayed through a gateway (such as reverse proxy, SIIT-DC gateway, CDN, etc).

Data-centers and cloud enviroments may also support IPv6-only WAN and at the same time internal dual-stack but using only private IPv4 addresses ([RFC1918]).

10. Security Considerations

This document does not have any specific security considerations.

11. IANA Considerations

This document does not have any IANA considerations.

12. Acknowledgements

The author would like to acknowledge the inputs from Tim Chown, Noah Maina, Lee Howard, Azael Fernandez Alcantara, Marcos Sanz Grosson, Robert M. Hinden, Henri Alves, Brian E. Carpenter, Erik Nygren, Jeremy Duncan, David Farmer, Nick Buraglio, Stan Barber, Goetz Goerisch, Mark Andrews, Michael Richardson, XiPeng Xiao and ...

13. References

13.1. Normative References

[RFC1918] Rekhter, Y., Moskowitz, B., Karrenberg, D., de Groot, G. J., and E. Lear, "Address Allocation for Private Internets", BCP 5, RFC 1918, DOI 10.17487/RFC1918, February 1996, <https://www.rfc-editor.org/info/rfc1918>.

[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>.

[RFC6877] Mawatari, M., Kawashima, M., and C. Byrne, "464XLAT: Combination of Stateful and Stateless Translation", RFC 6877, DOI 10.17487/RFC6877, April 2013, <https://www.rfc-editor.org/info/rfc6877>.

[RFC8585] Palet Martinez, J., Liu, H. M.-H., and M. Kawashima, "Requirements for IPv6 Customer Edge Routers to Support IPv4-as-a-Service", RFC 8585, DOI 10.17487/RFC8585, May 2019, <https://www.rfc-editor.org/info/rfc8585>.

[RFC8683] Palet Martinez, J., "Additional Deployment Guidelines for NAT64/464XLAT in Operator and Enterprise Networks", RFC 8683, DOI 10.17487/RFC8683, November 2019, <https://www.rfc-editor.org/info/rfc8683>.

[RFC8925] Colitti, L., Linkova, J., Richardson, M., and T. Mrugalski, "IPv6-Only Preferred Option for DHCPv4", RFC 8925, DOI 10.17487/RFC8925, October 2020, <https://www.rfc-editor.org/info/rfc8925>.

13.2. Informative References

[I-D.ietf-v6ops-6mops] Buraglio, N., Caletka, O., and J. Linkova, "IPv6-mostly Networks: Deployment and Operations Considerations", Work in Progress, Internet-Draft, draft-ietf-v6ops-6mops-07, 2 March 2026, <https://datatracker.ietf.org/doc/html/draft-ietf-v6ops-6mops-07>.

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