

Network Working Group  
Internet-Draft  
Expires: September 2, 2006

M. Blanchet  
Viagenie  
March 2006

IPv6 Routing Policies Guidelines  
draft-ietf-v6ops-routing-guidelines-00.txt

Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with [Section 6 of BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

This Internet-Draft will expire on September 2, 2006.

Copyright Notice

Copyright (C) The Internet Society (2006).

Abstract

Guidelines on how to manage IPv6 routes are needed for operators of networks, either providers or enterprises. This document is a followup on [RFC2772](#) work but for the production IPv6 Internet. [RFC2772](#) becomes historic.

Internet-Draft

IPv6 Routing Policies Guidelines

March 2006

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">3</a>
<a href="#">2.</a>	Address Types . . . . .	<a href="#">3</a>
<a href="#">2.1.</a>	Node-scoped Unicast . . . . .	<a href="#">3</a>
<a href="#">2.2.</a>	IPv4-Mapped Addresses . . . . .	<a href="#">3</a>
<a href="#">2.3.</a>	Link-scoped Unicast . . . . .	<a href="#">3</a>
<a href="#">2.4.</a>	Site-scoped Unicast . . . . .	<a href="#">3</a>
<a href="#">2.5.</a>	Global Unicast . . . . .	<a href="#">3</a>
<a href="#">2.5.1.</a>	Documentation Prefix . . . . .	<a href="#">4</a>
<a href="#">2.5.2.</a>	6to4 . . . . .	<a href="#">4</a>
<a href="#">2.5.3.</a>	Teredo . . . . .	<a href="#">4</a>
<a href="#">2.5.4.</a>	6bone . . . . .	<a href="#">4</a>
<a href="#">2.6.</a>	Default Route . . . . .	<a href="#">4</a>
<a href="#">2.7.</a>	Multicast . . . . .	<a href="#">5</a>
<a href="#">2.8.</a>	Unknown addresses . . . . .	<a href="#">5</a>
<a href="#">3.</a>	Implementing routing policies . . . . .	<a href="#">5</a>
<a href="#">4.</a>	Security Considerations . . . . .	<a href="#">5</a>
<a href="#">5.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">6.</a>	References . . . . .	<a href="#">6</a>
<a href="#">6.1.</a>	Normative References . . . . .	<a href="#">6</a>
<a href="#">6.2.</a>	Informative References . . . . .	<a href="#">6</a>
	Author's Address . . . . .	<a href="#">7</a>
	Intellectual Property and Copyright Statements . . . . .	<a href="#">8</a>

## 1. Introduction

To maintain stability, efficiency and scalability of the IPv6 Internet, guidelines for routing policies are needed for operators deploying IPv6 networks. Prior experience on IPv6 routing guidelines on the 6bone[RFC2772], practical deployment of the IPv6 internet and IPv6 specifications were used as input to this document.

This document first describes the different types of addresses and then summarizes the suggested policies in RPSL.

"Advertisement" in this document refers to the prefix advertisement, not the next-hop.

## 2. Address Types

### 2.1. Node-scoped Unicast

The node-scoped unicast addresses[RFC4291] such as the loopback (:::1/128), the unspecified (:::/128) must not be advertised in an IGP or EGP and should be filtered out when received.

### 2.2. IPv4-Mapped Addresses

IPv4-mapped addresses (::FFFF:0:0/96)[RFC4291] must not be advertised and should be filtered out.

### 2.3. Link-scoped Unicast

The link-scoped unicast[RFC4291] routes (fe80::/10) must not be advertised in an IGP or EGP and should be filtered out when received.

### 2.4. Site-scoped Unicast

The site-scoped unicast routes, known as Unique-local[RFC4193],

(fc00::/7) may be advertised in an IGP. It must not be advertised in an EGP connected to the global Internet and should be filtered out when received. However, it may be advertised in an EGP between two networks sharing a private interconnect, but must not be advertised outside the scope of these networks. When advertised in an EGP, these routes should be of length /48.

## [2.5.](#) Global Unicast

The global unicast routes (2000::/3)[[RFC4291](#)] may be advertised in an IGP or EGP. A minimal EGP routing policy should filter out routes that exceed a maximum length. Determining the maximum length of a

global Internet route is outside the scope of this document.

A finer EGP routing policy may use only the allocated address space from IANA to registry as specified in <http://www.iana.org/assignments/ipv6-unicast-address-assignments>. This would result in better filtering since the non-allocated prefixes will be filtered out.

An even finer EGP routing policy may use only the assigned address space from registries to providers as available in the registry databases. This would result in the best filtering since the non-assigned prefixes will be filtered out. However, this requires the synchronization of the filters with the registry databases.

### [2.5.1.](#) Documentation Prefix

The 2001:0db8::/32 prefix[[RFC3849](#)] is used for documentation purposes and must not be advertised in an IGP or EGP and should be filtered out when received.

### [2.5.2.](#) 6to4

The 6to4[[RFC4291](#)] prefix (2002::/16) may be advertised in an IGP or EGP, when the site is running a 6to4 relay or offering a 6to4 transit service. However, the provider of this service should be aware of the implications of running such service[[RFC3964](#)], which includes some specific filtering rules for 6to4.

### [2.5.3.](#) Teredo

The Teredo[RFC4380] prefix (2001::/32) may be advertised in an IGP or EGP, when the site is running a Teredo relay or offering a Teredo transit service.

#### [2.5.4.](#) 6bone

The 6bone experimental network used some experimental allocations, such as 5f00::/8[RFC1897] and 3ffe::/16[RFC2471] that were later returned to IANA[RFC3701]. These prefixes should not be advertised in an EGP unless IANA reallocates them subsequently.

#### [2.6.](#) Default Route

The default unicast route (::) may be advertised in an IGP. In an EGP, it may be only advertised to the downstream but must not be advertised in the core.

Blanchet

Expires September 2, 2006

[Page 4]

---

Internet-Draft

IPv6 Routing Policies Guidelines

March 2006

#### [2.7.](#) Multicast

Multicast addresses (ff00::/8)[[RFC4291](#)] have a scope in the address field. In the multicast routing, the routes should be announced according to the scope, similar to unicast routes. Multicast routes must not appear in unicast routing tables.

#### [2.8.](#) Unknown addresses

Any non listed address above must not be advertised and should be filtered out. Future work might reserve additional address space for protocol use which might require specific routing guidelines. The reader should refer to newer versions of the normative references in this document to verify the existence of newer protocol address space.

### [3.](#) Implementing routing policies

This document focuses on protocol addresses and their use in the networks. It does not discuss any allocation policies and their impact on the routing policies, such as /48 Micro-allocations for

infrastructure providers or maximum length of a unicast prefix. As such, to implement a complete routing policy, one should augment these guidelines with the current registry allocation policies and by appropriate ingress filtering techniques[RFC3704].

The Route Policy Specification Language(RPSL)[[RFC4012](#)] used in route registries supports the policies described in this document and should be considered to manage route policies.

The following RPSL code implements the policies described in this document. This code should be considered as an example and should be adapted to its target usage.

TBD: RPSL code to fill

#### [4.](#) Security Considerations

This document list guidelines to improve the security of networks by filtering of routing prefixes.

#### [5.](#) Acknowledgements

Florent Parent, Pekka Savola, Tim Chown, Alain Baudot, Stig Venaas, Vincent Jardin, Olaf Bonness, David Green, Gunter Van de Velde,

Blanchet

Expires September 2, 2006

[Page 5]

---

Internet-Draft

IPv6 Routing Policies Guidelines

March 2006

Michael Barnes and Fred Baker have provided input and suggestions to this document.

#### [6.](#) References

##### [6.1.](#) Normative References

[RFC1897] Hinden, R. and J. Postel, "IPv6 Testing Address Allocation", [RFC 1897](#), January 1996.

[RFC2471] Hinden, R., Fink, R., and J. Postel, "IPv6 Testing Address Allocation", [RFC 2471](#), December 1998.

[RFC3849] Huston, G., Lord, A., and P. Smith, "IPv6 Address Prefix

Reserved for Documentation", [RFC 3849](#), July 2004.

- [RFC4012] Blunk, L., Damas, J., Parent, F., and A. Robachevsky, "Routing Policy Specification Language next generation (RPSLng)", [RFC 4012](#), March 2005.
- [RFC4193] Hinden, R. and B. Haberman, "Unique Local IPv6 Unicast Addresses", [RFC 4193](#), October 2005.
- [RFC4291] Hinden, R. and S. Deering, "IP Version 6 Addressing Architecture", [RFC 4291](#), February 2006.
- [RFC4380] Huitema, C., "Teredo: Tunneling IPv6 over UDP through Network Address Translations (NATs)", [RFC 4380](#), February 2006.

## 6.2. Informative References

- [RFC2772] Rockell, R. and B. Fink, "6Bone Backbone Routing Guidelines", [RFC 2772](#), February 2000.
- [RFC3701] Fink, R. and R. Hinden, "6bone (IPv6 Testing Address Allocation) Phaseout", [RFC 3701](#), March 2004.
- [RFC3704] Baker, F. and P. Savola, "Ingress Filtering for Multihomed Networks", [BCP 84](#), [RFC 3704](#), March 2004.
- [RFC3964] Savola, P. and C. Patel, "Security Considerations for 6to4", [RFC 3964](#), December 2004.

### Author's Address

Marc Blanchet  
Viagenie

Email: [Marc.Blanchet@viagenie.ca](mailto:Marc.Blanchet@viagenie.ca)

Blanchet

Expires September 2, 2006

[Page 7]

---

Internet-Draft

IPv6 Routing Policies Guidelines

March 2006

Intellectual Property Statement



The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in [BCP 78](#) and [BCP 79](#).

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at [ietf-ipr@ietf.org](mailto:ietf-ipr@ietf.org).

#### Disclaimer of Validity

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

#### Copyright Statement

Copyright (C) The Internet Society (2006). This document is subject to the rights, licenses and restrictions contained in [BCP 78](#), and except as set forth therein, the authors retain all their rights.

#### Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.