Abstract

This document describes how the Zone Identifier of an IPv6 scoped address can be represented in a Uniform Resource Identifier that includes a literal IPv6 address. It updates RFC 3986 and RFC 4007.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

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."

This Internet-Draft will expire on June 9, 2012.

Copyright Notice

Copyright (c) 2011 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust’s Legal Provisions Relating to IETF Documents (http://trustee.ietf.org/license-info) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.
Table of Contents

1. Introduction .............................................. 3
2. Specification .............................................. 3
3. Security Considerations ................................. 5
4. IANA Considerations ....................................... 5
5. Acknowledgements ......................................... 5
7. References ................................................. 5
  7.1. Normative References ................................... 5
  7.2. Informative References ................................. 6
Authors’ Addresses ........................................... 6
1. Introduction

[RFC3986] defined how a literal IPv6 address can be represented in the "host" part of a Uniform Resource Identifier (URI). Subsequently, [RFC4007] extended the text representation of limited-scope IPv6 addresses such that a zone identifier may be concatenated to an address, for purposes described in that RFC. Zone identifiers are especially useful in contexts where literal addresses are typically used, for example during fault diagnosis, when it may be essential to specify which interface is used for sending to a link local address. It should be noted that zone identifiers have purely local meaning within the host where they are defined, and they are completely meaningless for any other host.

[RFC 4007] does not specify how zone identifiers are to be represented in URIs. Practical experience has shown that this feature is useful, in particular when using a web browser for debugging with link local addresses, but as it is undefined, it is not implemented consistently in URI parsers or in browsers.

This document updates [RFC3986] by adding syntax to allow a zone identifier to be included in a literal IPv6 address. It also clarifies some statements in [RFC4007].

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].

2. Specification

According to RFC 4007, a zone identifier is attached to the textual representation of an IPv6 address by concatenating "%" followed by <zone_id>, where <zone_id> is a string identifying the zone of the address. However, RFC 4007 gives no precise definition of the character set allowed in <zone_id>. There are no rules or de facto standards for this. For example, the first Ethernet interface in a host might be called %0, %1, %en1, %eth0, or whatever the implementer happened to choose.

In a URI, a literal IPv6 address is always embedded between "[" and "]". This document specifies that <zone_id> may contain any ASCII character classified in RFC 3986 as "unreserved", which conveniently excludes "]" in order to simplify parsing.

There is an additional complication in that "%" is always treated as an escape character in a URI, and according to RFC 3986 it must therefore itself be escaped in a URI, in the form "%25". Thus, the
scoped address fe80::a%en1 would appear in a produced URI as http://[fe80::a%en1].

In RFC 3986, the IPv6 literal format is formally defined in ABNF [RFC5234] by the following rule:

\[
\text{IP-literal} = \text{"[ (IPv6address / IPvFuture ) "+"]}\\n\]

To provide support for a zone identifier, firstly a new rule is added:

\[
\text{ZoneID} = 1*15\text{unreserved}\\n\]

Then two options are possible (to be discussed).

OPTION 1:

The existing syntax of IPv6address is extended by adding a specific option for the case of link-local addresses. The following definition of IPv6address replaces that given in RFC 3986:

\[
\text{IPv6address} = 6( h16 ":" ) 1s32\\n/ "::" 5( h16 ":" ) ls32\\n/ [ h16 ] "::" 4( h16 ":" ) 1s32\\n/ [ *1( h16 ":" ) h16 ] "::" 3( h16 ":" ) ls32\\n/ [ *2( h16 ":" ) h16 ] "::" 2( h16 ":" ) ls32\\n/ [ *3( h16 ":" ) h16 ] "::" 1s32\\n/ [ *4( h16 ":" ) h16 ] "::" ls32\\n/ [ *5( h16 ":" ) h16 ] "::" h16\\n/ [ *6( h16 ":" ) h16 ] "::"\\n/ "fe80::" [ *3( h16 ":" ) h16 ] % ZoneID\\n\]

OPTION 2:

The existing syntax of IPv6address is retained, and a zone identifier may be added optionally to any literal address. This allows flexibility for unknown future uses. The rule quoted above from RFC 3986 is replaced by two rules:

\[
\text{IP-literal} = \text{"[ (IPv6addrz / IPvFuture ) "+"]}\\n\]

\[
\text{IPv6addrz} = \text{IPv6address [ "%" ZoneID ]}\\n\]

The rules in [RFC5952] SHOULD be applied in producing URIs, and the user MUST replace "%" by "%25" when manually constructing such a URI.
3. Security Considerations

The security considerations of [RFC3986] and [RFC4007] apply. In particular, this URI format creates a specific pathway by which a deceitful zone index might be communicated, as mentioned in the final security consideration of RFC 4007. It is emphasised that the format is intended only for debugging purposes, but of course this intention does not prevent misuse.

IF OPTION 2 IS CHOSEN:

To limit this risk, implementations SHOULD NOT allow use of the format except for link local addresses under prefix fe80::/10.

4. IANA Considerations

This document requests no action by IANA.

5. Acknowledgements

The lack of this format was pointed out by Kerry Lynn. Valuable comments and contributions were made by...

This document was produced using the xml2rfc tool [RFC2629].

6. Change log [RFC Editor: Please remove]

draft-carpenter-v6ops-label-balance-00: original version, 2011-12-07.

7. References

7.1. Normative References


7.2. Informative References


Authors' Addresses

Brian Carpenter
Department of Computer Science
University of Auckland
PB 92019
Auckland, 1142
New Zealand

Email: brian.e.carpenter@gmail.com

Robert M. Hinden
Check Point Software Technologies, Inc.
800 Bridge Parkway
Redwood City, CA 94065
US

Email: bob.hinden@gmail.com