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**Formats for IPv6 Scope Zone Identifiers in Literal Address Formats**  
**draft-fenner-literal-zone-02**

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Abstract

This document specifies the format to be used when specifying a zone identifier with a literal IPv6 address in URIs and IRIs, and in SMTP and Internet Mail Messages. While this combination is expected to be needed rarely, it is useful to specify the exact syntax.

## 1. Introduction

[RFC 3986](#) [[RFC3986](#)] defines the IPv6address production for the rare case that a literal IPv6 address is required in a URI. IRIs [[RFC3987](#)] copy this syntax. The IPv6 Scoping Architecture [[RFC4007](#)] describes the syntax for specifying a zone ID to disambiguate an ambiguous scoped address. Unfortunately, the IPv6address production does not permit the format including the zone ID, so this document defines a method to specify a zone ID with a literal IPv6 address in URIs and IRIs.

The Simple Mail Transfer Protocol [[RFC2821](#)]'s IPv6-address-literal production provides the same ability for SMTP, so this document defines a similar syntax to specify a zone ID with a literal IPv6 address for SMTP.

While part of the reason for the deprecation of Site-Local scoped addresses [[RFC3879](#)] was due to applications needing to know about scope zones, the formats described in this document do not have the problem described in [section 2.1](#) of that document - specifically, they always contain the zone ID, so are never ambiguous.

## 2. Format in URIs and IRIs

The IPvFuture production in URIs and IRIs was created to allow for flexibility in defining new IP address formats. We use this flexibility in this format, to add a previously unanticipated address format for IPv6. Therefore, strings matching this grammar also match the IPvFuture production in URIs and IRIs. While the form specified in the IPv6 Scoping Architecture [[RFC4007](#)] uses a percent ("%") to separate the zone ID from the address, this form separates the zone ID from the address using an plus sign ("+"), to avoid the special meaning of the percent ("%") in URIs.

```
; An address matching IPv6scoped-literal also matches
; the URI/IRI spec's IP-literal with IPvFuture
IPv6scoped-literal = "[v1." IPv6scoped-address "]"
IPv6scoped-address = IPv6address "+" IPv6zone-id
IPv6zone-id = 1*( unreserved / sub-delims / ":" )
```

## 3. Format in SMTP

Although its usage is expected to be even more rare, there may be a reason to use a zone ID in an IPv6 literal address in SMTP. An addition to the ABNF grammar used in the Simple Mail Transfer



Protocol [[RFC2821](#)] follows.

```
; An address matching IPv6-address-scoped-literal  
; also matches RFC 2821's General-address-literal production  
IPv6-address-scoped-literal: "IPv6z:" IPv6-addr "+" 1*dcontent
```

(Note: while it's possible to use "%" in the SMTP case, we use "+" in order to align the SMTP and URI syntaxes.)

#### **4. Limitations**

The usefulness of a URI or IRI using a literal scoped address is obviously limited to systems within the same scope. The addition of the zone identifier further limits the usefulness to the system for which the URI or IRI was generated, since zone IDs are completely local to a given host. Therefore, care must be taken to not pass these URIs blindly between systems. When both systems are aware of the relevant Zone IDs, e.g., an SNMP manager that is aware of the zone ID configuration of an agent, it is acceptable to pass these URIs between systems.

Caution should be used when storing these URIs or IRIs in files. It is recommended to use an FQDN instead of a literal IPv6 address in a URL, whenever an FQDN is available.

#### **5. IANA Considerations**

IANA is requested to assign the "IPv6z" tag identifying a domain literal. This registry may not have been created yet; it is described in [[RFC2821](#)] but this will be the first assignment.

This is also the first use of the IPvFuture extension mechanism described in [[RFC3986](#)]; that RFC did not create a registry for these mechanisms. Should there be one?

#### **6. Security Considerations**

[RFC 3986](#) [[RFC3986](#)] describes security considerations for URIs; this specification does not add any new security considerations.

#### **7. Acknowledgements**

Margaret Wasserman first pointed out that the original literal IPv6



form didn't support zone IDs. This document was created based on discussions between Steve Bellovin, Brian Carpenter, Roy Fielding, Ted Hardie, Larry Masinter, and Thomas Narten. Further revisions were based on feedback from the IPv6 working group and the IETF applications area.

## 8. Normative References

- [RFC2234] Crocker, D., Ed. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", [RFC 2234](#), November 1997.
- [RFC2821] Klensin, J., "Simple Mail Transfer Protocol", [RFC 2821](#), April 2001.
- [RFC3879] Huitema, C. and B. Carpenter, "Deprecating Site Local Addresses", [RFC 3879](#), September 2004.
- [RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, [RFC 3986](#), January 2005.
- [RFC3987] Duerst, M. and M. Suignard, "Internationalized Resource Identifiers (IRIs)", [RFC 3987](#), January 2005.
- [RFC4007] Deering, S., Haberman, B., Jinmei, T., Nordmark, E., and B. Zill, "IPv6 Scoped Address Architecture", [RFC 4007](#), March 2005.

## [Appendix A.](#) To Do

- o Pick another character if necessary from URI chars available: - . \_ ~ ! \$ & ' ( ) \* + , ; =
- o Check with Keith if text saying why not to use this is sufficient
- o Expand text on 2821 usage?
- o Resolve URI IPv6zone-id vs. SMTP dcontent (make sure they allow more or less the same things); compare with grammar in scoping-arch (more or less no restrictions there?)
  - \* IPv6zone-id = 1\*( unreserved / sub-delims / ":" ) = unreserved = ALPHA / DIGIT / "-" / "." / "\_" / "~" , sub-delims = "!" / "\$" / "&" / "'" / "(" / ")" / "\*" / "+" / "," / ";" / "="
  - \* Atom = 1\*atext = atext = ALPHA / DIGIT / ; Any character except controls, "!" / "#" / ; SP, and specials. "\$" / "%" / ; Used



for atoms "&" / "'" / "\*" / "+" / "-" / "/" / "=" / "?" / "^" /  
 "\_" / "`" / "{" / "|" / "}" / "~"

- \* dcontent = dtext/quoted-pair; dtext = NO-WS-CTL / ; Non white space controls %d33-90 / ; The rest of the US-ASCII %d94-126 ; characters not including "[", ; "]", or "\"
- \* scoping-arch just says "An implementation MAY support other kinds [than numerical -wcf] of non-null strings as <zone\_id>. However, the strings must not conflict with the delimiter character."

\*

U = URI

S = SMTP Atom

A = scoping-arch

sp	!	"	#	\$	%	&	'
A?	ASU	A	AS	ASU	AS	ASU	ASU
(	)	*	+	,	-	.	/
AU	AU	ASU	ASU	AU	ASU	AU	AS
0	1	2	3	4	5	6	7
ASU	ASU	ASU	ASU	ASU	ASU	ASU	ASU
8	9	:	;	<	=	>	?
ASU	ASU	AU	AU	A	ASU	A	AS
@	A	B	C	D	E	F	G
A	ASU	ASU	ASU	ASU	ASU	ASU	ASU
H	I	J	K	L	M	N	O
ASU	ASU	ASU	ASU	ASU	ASU	ASU	ASU
P	Q	R	S	T	U	V	W
ASU	ASU	ASU	ASU	ASU	ASU	ASU	ASU
X	Y	Z	[	\	]	^	_
ASU	ASU	ASU	A	A	A	AS	ASU
`	a	b	c	d	e	f	g
AS	ASU	ASU	ASU	ASU	ASU	ASU	ASU
h	i	j	k	l	m	n	o
ASU	ASU	ASU	ASU	ASU	ASU	ASU	ASU
p	q	r	s	t	u	v	w
ASU	ASU	ASU	ASU	ASU	ASU	ASU	ASU
x	y	z	{		}	~	del
ASU	ASU	ASU	AS	AS	AS	ASU	-

- \* so: we can't use SMTP Atom - use 1\*dcontent. can we get away with updating [[RFC4007](#)] to add something like zone-id = 1\*(ALPHA / DIGIT / "-" / "." / "\_" / "~" / "!" / "\$" / "&" / "'" / "(" / ")" / "\*" / "+" / "," / ";" / "=" / ":")? (This is (I think) the expansion of IPv6zone-id; which is a superset of dcontent.)





- o Check with w3c URI
- o Check with [who did Brian suggest in Paris?]
- o Check with apps area

## [Appendix B](#). Change Log

### [B.1](#). Changes from -01 to -02

Changed "v6" to "v1", since the version number is of the literal form, not of the address.

Changed "\_" to "+", since an underscore disappears when underlined as URLs are wont to be.

Added section on SMTP IPv6z:

Removed list of tradeoffs.



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