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Q: IPV6 Abbreviations (Answered ★★★★★, 1 Comment)

Question

Subject: **IPV6 Abbreviations**
Category: Computers > Internet
Asked by: **solid_foundry-ga**
List Price: $2.00

Posted: 03 Oct 2006 20:32 PDT
Expires: 02 Nov 2006 19:32 PST
Question ID: 770645

What are all the ways you can abbreviate an IPV6 IP address?

Answer

Subject: **Re: IPV6 Abbreviations**
Answered By: **denco-ga** on 03 Oct 2006 21:42 PDT
Rated: ★★★★★

Howdy solid_foundry-ga,

Here is the standrad as outlined by the Internet Engineering Task Force (IETF) in "RFC 4291," which is titled "IP Version 6 Addressing Architecture."
http://tools.ietf.org/html/rfc4291

"There are three conventional forms for representing IPv6 addresses as text strings:

1. The preferred form is x:x:x:x:x:x:x:x, where the 'x's are one to four hexadecimal digits of the eight 16-bit pieces of the address.

Examples:

ABCD:EF01:2345:6789:ABCD:EF01:2345:6789

2001:DB8:0:0:8:800:200C:417A

Note that it is not necessary to write the leading zeros in an individual field, but there must be at least one numeral in every field (except for the case described in 2.).

2. Due to some methods of allocating certain styles of IPv6 addresses, it will be common for addresses to contain long strings of zero bits. In order to make writing addresses containing zero bits easier, a special syntax is available to compress the zeros.

The use of '::' indicates one or more groups of 16 bits of zeros. The '::' can only appear once in an address. The '::' can also be used to compress leading or trailing zeros in an address.

For example, the following [address]

2001:DB8:0:0:8:800:200C:417A
...
may be represented as

2001:DB8::8:800:200C:417A

...

For example, the following are legal representations of the 60-bit prefix 20010DB80000CD3 (hexadecimal):

2001:0DB8:0000:CD30:0000:0000:0000:0000/60
2001:0DB8::CD30:0:0:0:0/60
2001:0DB8:0:CD30::/60

The following are NOT legal representations of the above prefix:

2001:0DB8:0:CD3/60 may drop leading zeros, but not trailing zeros, within any 16-bit chunk of the address

2001:0DB8::CD30/60 address to left of "/" expands to
2001:0DB8:0000:0000:0000:0000:0000:CD30

2001:0DB8::CD3/60 address to left of "/" expands to
2001:0DB8:0000:0000:0000:0000:0000:0CD3
..."

Here is how some websites try to explain the above.

NTT - "IPv6 Service"
http://us.ntt.net/faq/ipv6.cfm

"...
When writing a network address, it is written as an address followed by an extension.

Example: 2001:0102:0000:0000:0000:0000:0000:0000/32

Multiple zeros may be abbreviated as follows:

Within each four-digit section, the lead zero or zeros may be omitted, for example, '0102' may be abbreviated to '102,' and '0000' may be abbreviated to '0.'

Sets of four zeros that are in a row can be abbreviated with two colons (::). However, the double-colon abbreviation may only be used once in each address. The sample address that was given above may be abbreviated as follows.

2001:0102:0000:0000:0000:0000:0000:0000/32

Omitting initial zeros from each four-digit set.

2001:102:0:0:0:0:0:0/32

Replacing consecutive zero sets with a double-colon.

2001:102::/32
..."

FreeBSD - "IPv6"
http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/network-ipv6.html

"The canonical form is represented as: x:x:x:x:x:x:x:x, each ?x? being a 16 Bit hex value. For example FEBC:A574:382B:23C1:AA49:4592:4EFE:9982

Often an address will have long substrings of all zeros therefore one such substring per address can be abbreviated by '::'. Also up to three leading '0's per hexquad can be omitted. For example fe80::1 corresponds to the canonical form fe80:0000:0000:0000:0000:0000:0000:0001.

A third form is to write the last 32 Bit part in the well known (decimal) IPv4 style with dots '.' as separators. For example 2002::10.0.0.1 corresponds to the (hexadecimal) canonical representation 2002:0000:0000:0000:0000:0000:0a00:0001 which in turn is equivalent to writing 2002::a00:1."

Wikipedia - "IPv6"
http://en.wikipedia.org/wiki/Ipv6

"If a four-digit group is 0000, the zeros may be omitted. For example, 2001:0db8:85a3:0000:1319:8a2e:0370:1337 can be shortened as 2001:0db8:85a3::1319:8a2e:0370:1337. Following this rule, any group of consecutive 0000 groups may be reduced to two colons, as long as there is only one double colon used in an address. Leading zeros in a group can also be omitted. Thus, the addresses below are all valid and equivalent:

2001:0db8:0000:0000:0000:0000:1428:57ab
2001:0db8:0000:0000:0000::1428:57ab
2001:0db8:0:0:0:0:1428:57ab
2001:0db8:0:0::1428:57ab
2001:0db8::1428:57ab
2001:db8::1428:57ab

Having more than one double-colon abbreviation in an address is invalid as it would make the notation ambiguous.

A sequence of 4 bytes at the end of an IPv6 address can also be written in decimal, using dots as separators. This notation is often used with compatibility addresses (see below). Thus, ::ffff:1.2.3.4 is the same address as ::ffff:102:304."

Fun technical statistic from the FreeBSD site:

"[T]here are approximately 6.67 * 10^27 IPv6 addresses per square meter on our planet."

If you need any clarification, please feel free to ask.

Search strategy:

Google search on: IPv6 abbreviated
://www.google.com/search?q=IPv6+abbreviated

Looking Forward, denco-ga - Google Answers Researcher

solid_foundry-ga rated this answer:★★★★★ and gave an additional tip of: $1.00

Perfect. Thank you.

Comments

Subject: **Re: IPV6 Abbreviations**
From: **denco-ga** on 05 Oct 2006 23:15 PDT

You are most welcome, solid_foundry-ga, and thanks for the kind comment, 5 star rating, and tips as well.

Looking Forward, denco-ga - Google Answers Researcher
