Ready, Set, Go - Switch to IPv6

Many of you may have heard by now that the primary IPv4 (Internet Protocol version 4) address pool of the Internet was exhausted on February 3, 2011 and IPv6 (version 6) will succeed IPv4. BBj® and PRO/5® 11.0 are staying one step ahead with built-in support for IPv6, and as a result, most applications written in BBj and/or PRO/5 should be able to use IPv6 without any modifications. Read on for more details about what this all means.

What is IPv4?

An IPv4 address consists of four sections that contain a number in the range from 0 to 255. These numbers create an address that identifies a unique networked device, regardless of where in the world it is located. An example of an IPv4 address is `107.20.236.91`.

Since none of the four numbers can be any bigger than 255, there are 'only' about 4.3 billion possible combinations. While 4.3 billion IP addresses sounds like an enormous number, in reality it is not large enough for the ever-increasing number of global devices connected to the Internet. As a case in point, the Regional Internet Registry (RIR) that assigns IP addresses for the Asia Pacific region became the first region to run down to its last /8 CIDR block of IPv4 addresses and is now reserving its last set of IPv4 addresses for start ups.

What is IPv6?

The new IPv6 address is a 128-bit string divided into eight 16-bit segments, each segment consists of a hexadecimal number that ranges from 0 to ffff (6,535 in decimal). The number of possible combinations is 2^{128}, which is a staggeringly large 39-digit number. To put that into perspective, when BASIS received their allocation of IPv6 addresses, the range included more combinations than IPv4 addresses currently in use in the world! Wikipedia tries to put that large number in perspective a different way: "By comparison, this amounts to approximately 5×10^{28} addresses for each of the 6.8 billion people alive in 2010." An example of an IPv6 address is `2001:4870:a1a5:1ff:643f:fd23:e8a5:3a05`.

In addition to dramatically increasing the total number of IP addresses, IPv6 adds additional features beyond what IPv4 offers. Built-in network security, stateless address auto configuration, and network renumbering are a few of these enhancements that make IPv6 a significantly more advanced and capable Internet protocol.

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In the IPv6 address `2406:da00:ff00::6b14:ec5b`, the `::` is a shorthand notation for a center block that contains all zeros. The complete equivalent IPv6 address is `2406:da00:ff00:0:0:0:6b14:ec5b.`

Another interesting example is the IP address for localhost, a special address that always resolves to the local machine. In IPv4, `127.0.0.1` resolves to localhost and the IPv6 equivalent is simply `::1`.

Using IP Addresses in a BBx Program

BBx® programs may use IP addresses in a variety of circumstances to identify a remote machine with which to communicate. **Figure 1** shows one such use case - a program that makes a socket connection to www.basis.com and prints out its resolved IP address.

```
REM Assumes config.bbx contains an ALIAS N0 TCP
OPEN (1,MODE="host=www.basis.com,port=80")"N0"
PRINT KEY(1)
CLOSE (1)
END
```

Figure 1. Sample code opening a socket connection

This sample program opens a socket to www.basis.com and shows the IP address for the host machine. Since the URL www.basis.com is dual stacked having both an IPv4 and an IPv6 address, the result will depend on whether your Internet service provider and your Internet router supports IPv6. Running this program on a system that has an IPv6 connection to the Internet will cause something like `2406:da00:ff00::6b14:ec5b` to display, as both BBj and PRO/5 rev 11.0 will try to use IPv6 if available. Running it on a system that does not have an IPv6 connection to the Internet will result in something like `107.20.236.91` as both BBj and PRO/5 rev 11.0 will continue to use IPv4 when IPv6 is not available.

Another use case for IP addresses would be opening a file via a PRO/5 Data Server® and identifying the host machine via the IPv6 address.

For example, `10 OPEN (1)"/<fd00::21,port=1100>myfile"` opens a file called **"myfile"** on a data server located at `fd00::21`, which is an IPv6 address. It is written in shorthand notation for `fd00:0:0:0:0:0:0:21`. Any IPv6 address that begins with `fd` is a private IPv6 address similar to the IPv4 equivalent of `192.168.x.x`.

Summary

While it may take some time for everyone to switch over to IPv6, the writing is on the wall and the days of IPv4 are numbered. It won't be long before IPv6 will be required. BBx programmers should prepare for that day. By installing the latest versions of BBj and PRO/5, you and the business environments that you support can be assured of a smooth transition to the new technology. ◼