

THE COMPUTER CORNER
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Our ORC Secretary Ben Evans (K9UZ) mentioned a problem he had recently with getting into a site he was supposed to have access to. It seems that the server that gives access was looking at his IPv6 address and not his IPv4 address. What is that all about?

IPv4 just means Internet Protocol version 4. As explained in my February 08 article ("URLs and the Hosts File", Computer Corner Article #141, Feb 2008), when you want to visit a site, normally you type in the URL (Uniform Source Locator) address, such as <https://www.majorgeeks.com>. That address is partially letter abbreviations and partially names, and you can pretty much understand it. Many people understand it all. On the other hand, when you type in that address, your computer makes a request to a server somewhere on the web to translate that address into an IP (Internet Protocol) address. The IP address is unique, expressed in numbers, and it is what computers and smart electronic devices use to communicate with each other. The IPv4 address is always just a number like this: 208.101.7.150. Each of the four groups of numbers can be zero to 255, written in decimal and separated by a decimal point. The URL is sort of like the words Stan Kaplan, while the IP is sort of like (262) 268-1949 (my unique telephone number).

So, how can those four groups of numbers (208:101.7.150) handle all the Internet addresses in the world? They can't anymore. Those four numbers are a 32-bit (4 byte) value, so there are only 2^{32} possible addresses, or roughly 4.3 billion. We have already run out of addresses, so some time ago a new standard using 128 bits (16 bytes) was instituted. These are written in hexadecimal and are separated by colons. A valid address might be all this between parentheses (3ffe:1900:4545:3:200:48ff:fe21:67cf). This gives us 2^{128} possible unique addresses, or about 3.4×10^{38} total. Someone computed that this would provide about 5,000 addresses for every square micrometer on the earth's surface, surely enough for the foreseeable future! At least it will work well until we need to provide addresses for other intelligent life forms on other worlds in addition to ours!

So, the server that Ben was trying to access wanted an IP something like this: 198:103:99:16:33:100:17:3, instead of 208.101.7.150. Basically, he just had the wrong password.

It is a good thing these huge, hexadecimal-format IPv6 numbers can be translated to URLs employing groups of letters that are somewhat understandable to us humans!

Happy Computing.