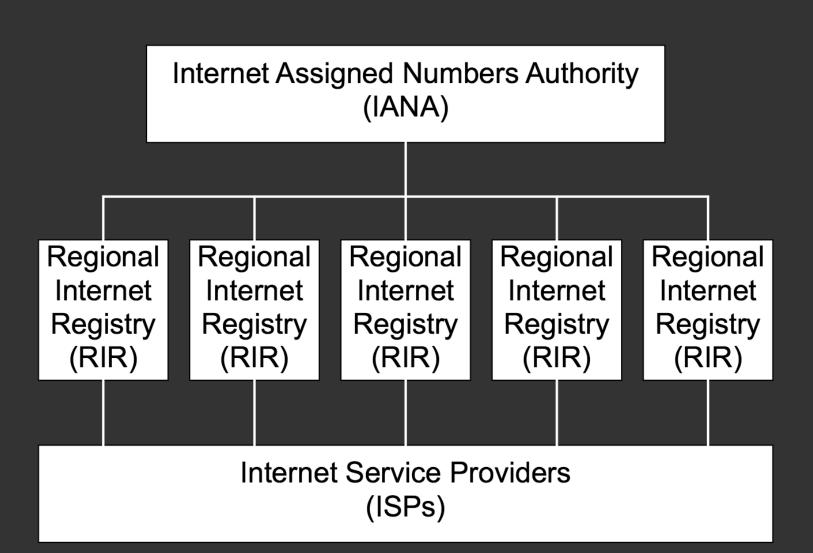
## **Tech Moment**

# IP Addresses

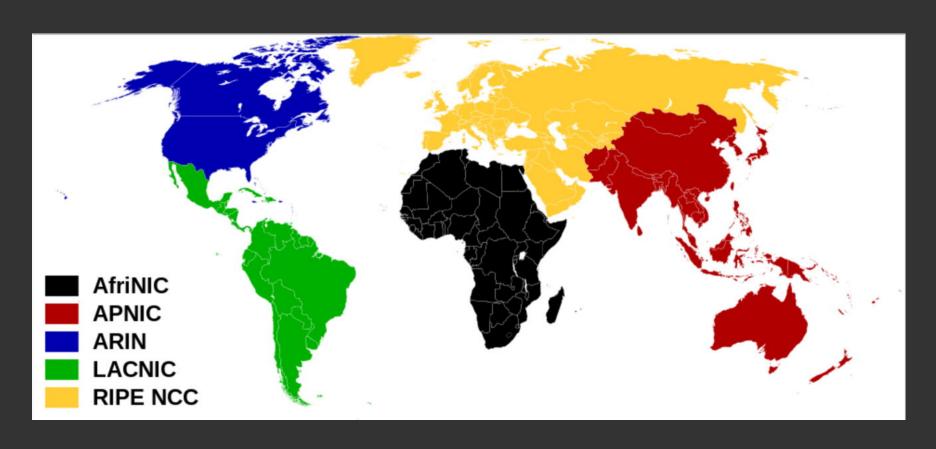
By Tom Thorpe

#### **Definition:**

An Internet Protocol (IP) address is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for communication.



# Regional Internet Registries



#### An IP address consists of 32 bits

Example: The MUG's webserver (sbamug.com)

11010000011100011001101000101000

- Usually expressed in dotted decimal notation
  - e.g. 208.113.154.40

**Bit 31** 

• Each number (0-255) corresponds to 8 binary bits (00000000 to 11111111)

## The original network architecture



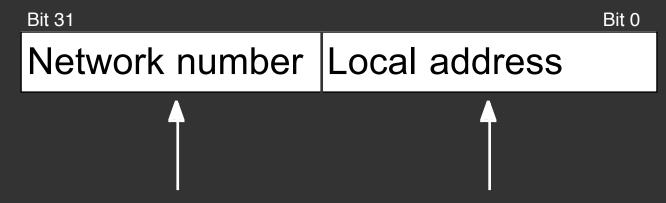
	Number	Number	
<u>Class</u>	<u>Networks</u>	<u>Addresses</u>	<u>Address Range</u>
А	128	16M	0.0.0.0 - 127.255.255.255
В	16k	64k	128.0.0.0 - 191.255.255.255
С	2M	256	192.0.0.0 - 223.255.255.255
D	Multicast		224.0.0.0 - 239.255.255.255
Е	Reserved		240.0.0.0 - 255.255.255.255

Note: This scheme was abandoned in 1993

The Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of the IP address space for private internets

	Number	Addresses
<u>Address Range</u>	<u>Networks</u>	per network
10.0.0.0 - 10.255.255.255	1	16M
172.16.0.0 - 172.31.255.255	16	64k
192.168.0.0 192.168.255.25	5 256	256

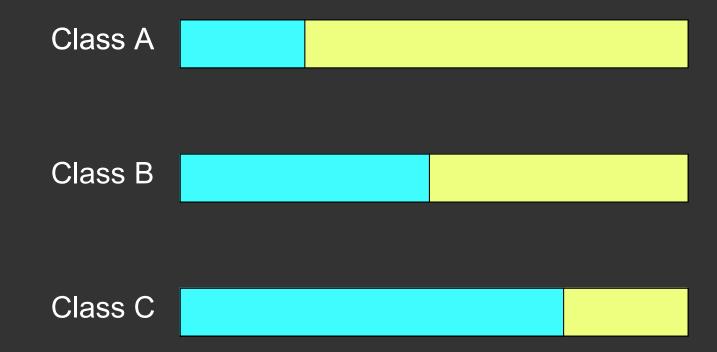
## An IP address has two parts



From your network device's perspective, these bits call out the physical interface

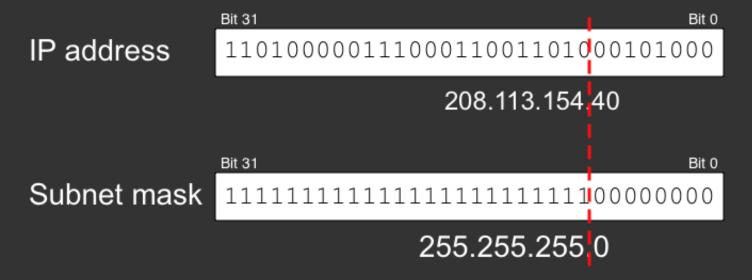
These bits are your address on that physical interface

## Network number vs Local address

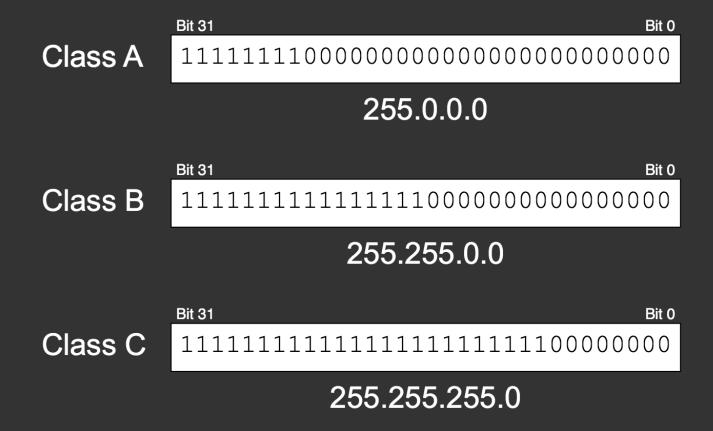


- Q. How do you tell the two parts apart?
- A. A subnet mask

### The MUG's webserver



### Default subnet masks



### Custom subnet masks

- The defaults work for most networks
- For complex networks you may have to specify a subnet mask

Rule: All devices on a given network must use the same subnet mask

### IP addressing is described in IETF publication RFC 791

- This is the fourth version of this protocol (give or take) so IP addressing is commonly referred to as IPv4
- Most traffic on the internet uses IPv4
- The address space is limited to 4,294,967,296 (2<sup>32</sup>) unique addresses
- This address space was exhausted in 2011

# However, a successor protocol, IPv6, has been defined and is in various stages of production deployment

- IPv6 expands the number of possible IP addresses

#### Summary

- IP address assignments are managed globally and allocated down to your ISP
- IPv4 addresses are 32-bits long
- There are three blocks of IP address space set aside for private internets
- Run with the default subnet masks unless you have a good reason to deviate
- We're out of IPv4 addresses, look for IPv6 in the future

