IP Addressing and Routing 10,000 Foot View

IPv4 Addresses

The IPv4 address is **a 32-bit number that uniquely identifies a network interface on a system**, as explained in How IP Addresses Apply to Network Interfaces. An IPv4 address is written in decimal digits, divided into four 8-bit fields that are separated by periods. Each 8-bit field represents a byte of the IPv4 address.

128 +64+ 32+16 +8 +4 +2 +1 = 255

1   1   1   1   1   1   1   1   = 255

11000110.01101100.00100100.00000000 = 198.108.36.0/24

Green is network address

Red is host addresses in this case 254 (1 to 254) total host available with 0 being the network and 255 being broadcast.

Public and Private Addresses

- Early in the development of the Internet certain IP addresses were set aside for private use (addresses not routed in the public network)
  - 10.0.0.0 to 10.255.255.255
  - 172.16.0.0 to 172.31.255.255
  - 192.168.0.0 to 192.168.255.255
- Publicly routed IP addresses are assigned by a routing registry. In North American the routing registry is ARIN (American Registry for Internet Numbers) www.arin.org
  - IPv4 and IPv6 IP addresses
  - Autonomous System Number (ASN)

Autonomous System

- An Autonomous System (AS) is a set of Internet routable IP prefixes belonging to a network or a collection of networks that are managed, controlled and supervised by a single organization. An AS utilizes a common routing policy controlled by the organization. The AS is assigned a globally unique 16 digit identification number, known as the autonomous system number or ASN.

- Global routable ASN range from 1 to 64511. 64512 to 65535 is reserved for private non routed purposes.

- Border Gateway Protocol (BGP) is the protocol that manages the routed peering, prefix advertisement and routing packets between different organizations (AS) across the Internet.

Routing Protocols

- Interior Gateway Protocols (IGP)
  - IGP is a dynamic route update protocol used between routers that run on TCP/IP host within a single autonomous system. The routers use this protocol to exchange information about IP routes.
    - Routing Information Protocol (RIP) version 1&2
    - Routing Information Protocol Next Generation (RIPing extension of RIPv2 with IPv6 capability)
    - Interior Gateway Protocol Routing Protocol (IGRP)
    - Open Shortest Path First (OSPF)
    - Intermediate system to intermediate system (IS-IS)
- Border Gateway Protocol (BGP)