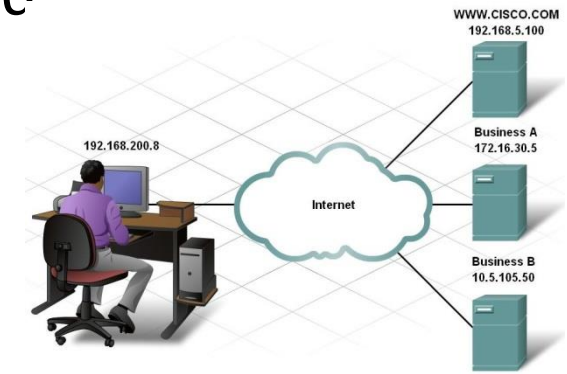
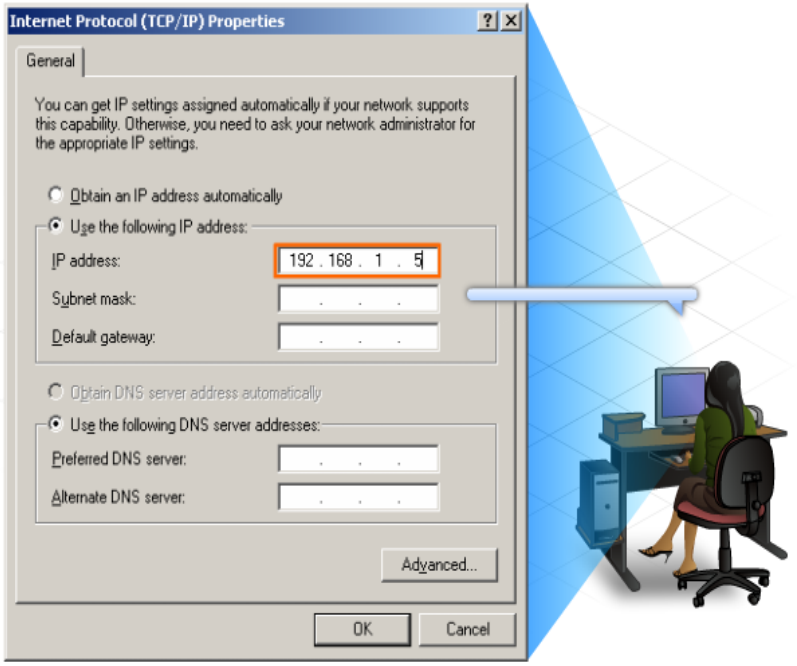
Purpose of an IP Address

- A logical network address that identifies a host
- A host (end-user) must have a NIC card
  - workstations
  - servers
  - printers
  - router interface



- Each packet will contain a source and destination IP address

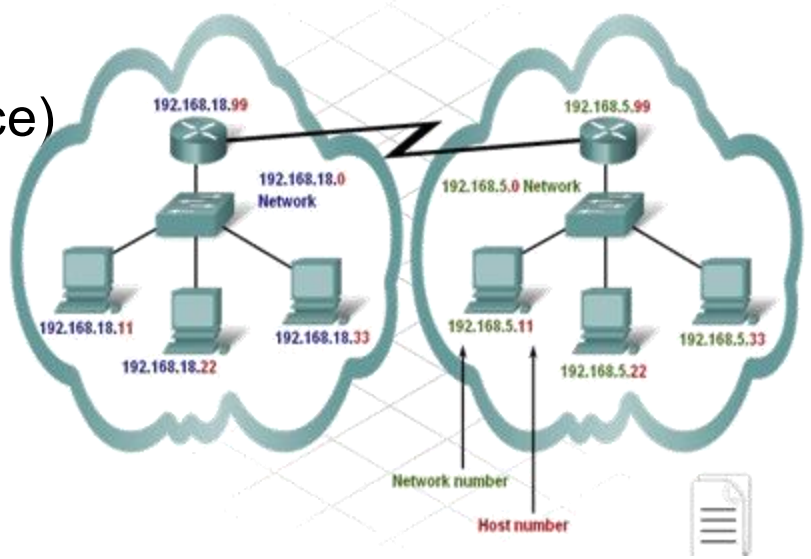
IP addresses



- IP Version 4
  - most common form of IP addresses
- 32 binary digits
- 4 octets
- Dotted decimal notation
- Over 4 billion possible IP addresses
- IP Version 6 will soon become the standard to ensure we have enough addresses to use

Parts of an IP Address

- Hierarchical
  - made up of 2 parts
    - network
    - host(Id's the specific device)
  - determined by IP class



Types of IP Addresses

- Class A
  - Range 1-127
  - N.H.H.H
  - First bit in octet will be a 0
  - Default subnet mask
    - 255.0.0.0
  - can create over 16 million host addresses – the most host addresses available in networking
    - $2^{24} – 2 = 16,777,214$ to be exact
    - why do you subtract 2???
  - Used in large organizations

Types of IP Addresses

- Class B
  - Range 128-191
  - N.N.H.H
  - 16 bits for network and 16 bits for host
  - Default subnet mask
    - 255.255.0.0
  - can create over 65,000 host addresses
    - $2^{16} – 2 = 65,534$ to be exact
  - Used in medium-sized organizations

Types of IP Addresses

- Class C
  - Range 192 -223
  - N.N.N.H
  - First two bits in octet will be a 11
  - Default subnet mask
    - 255.255.255.0
  - can create 254 useable hosts
    - $2^8 – 2 = 254$ to be exact
  - Used in small organizations

Types of IP Addresses

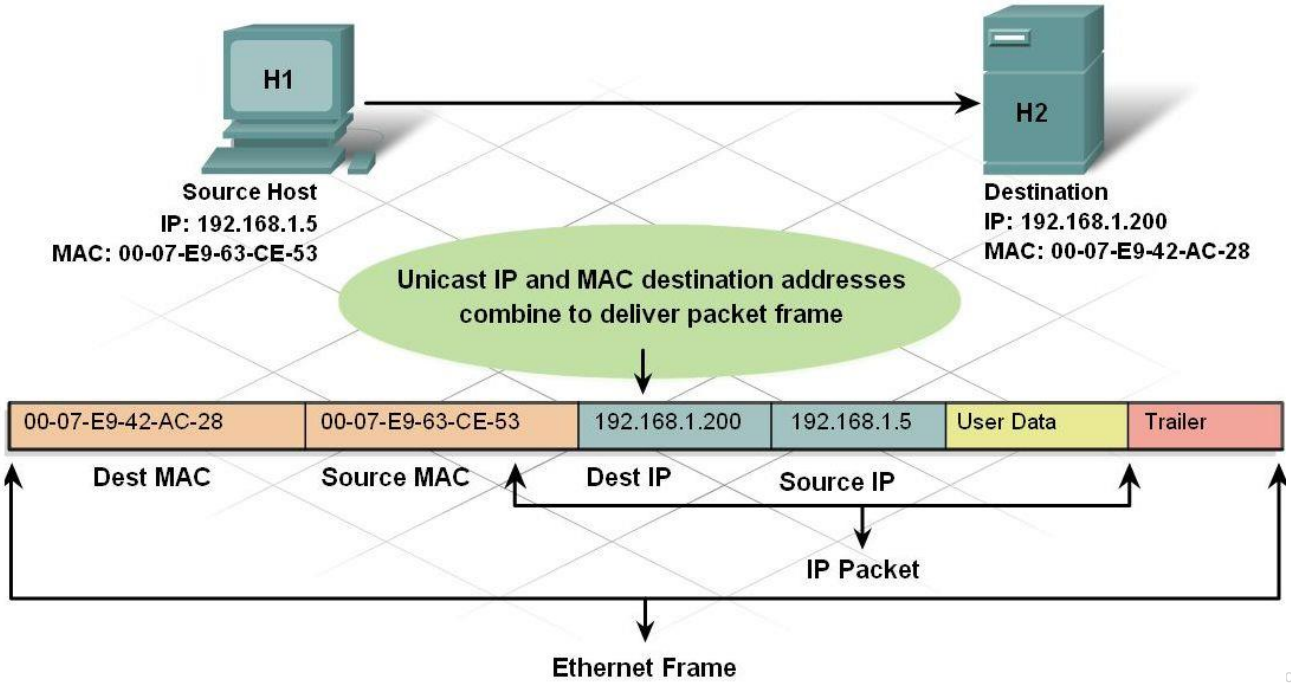
- Class D
  - Range 224 - 239
  - used for **multicasting**
  - not for commercial use
- Class E
  - Range 240 - 255
  - reserved for experimental use
  - not for commercial use

Private IP Addresses

- Solves the issue of a finite number of available public IP addresses
- Allows hosts to communicate locally without each device needing a public IP address
- Not routed on the Internet; blocked by the ISP router
- Private address ranges
- Class A – 10.0.0.0
- Class B – 172.16.0.0 – 172.31.0.0
- Class C – 192.168.0.0 – 192.168.255.0

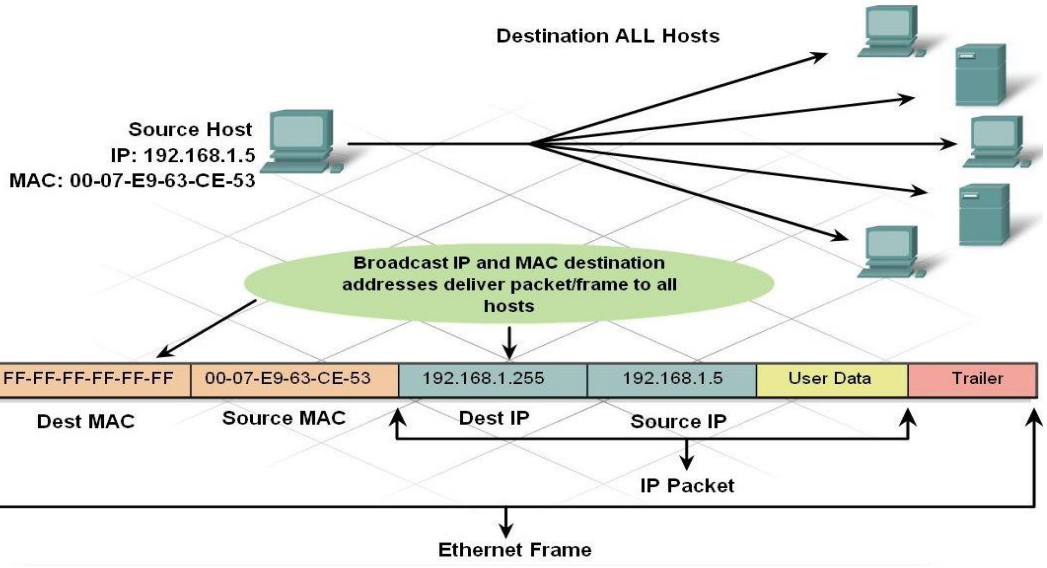
Unicast Address

- Most common type of address
- Intended for a specific host, has a specific IP Address
- Talking to a person on the phone is an example
- Must have both destination IP and MAC in the header



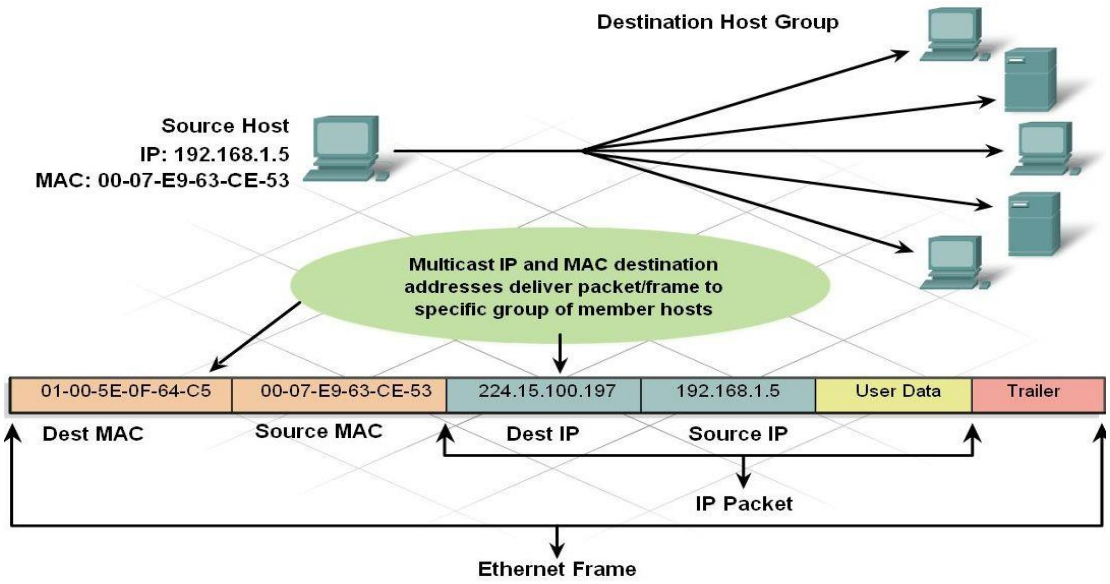
Broadcast Address

- All ones in the host portion of the IP address
  - Class C address: 204.33.4.0 (N.N.N.H)
  - Broadcast address: 204.33.4.255
- MAC address all Fs
  - FF-FF-FF-FF-FF-FF



Multicast Address

- Send packet to a group of devices
- Must use multicast address range
- Range 224.0.0.0 – 239.255.255.255
- Used for remote gaming
- Destination MAC address begins with:
  - **01-00-5E**



Using Dynamic IP Addressing

- Automatic assignment of IP addresses
- Useful if frequent change in users (wireless hotspot)
- Uses DHCP (Dynamic Host Configuration Protocol) server
- IP addresses leased for a period of time
  - if host is removed from the network (turned off), the IP address goes back into the pool of IP address
- Preferred method for large networks
  - reduces the burden of network support