

Computer Networking

Basics

Contents

Here's what you'll find in this.

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3. Classification
4. Devices
5. Home Network
6. IP Addresses
7. Protocols
8. DNS & DHCP
9. Network Commands

What is a Computer Network?

**Communication
between two or
more network
Interfaces.**



Components of Computer Network

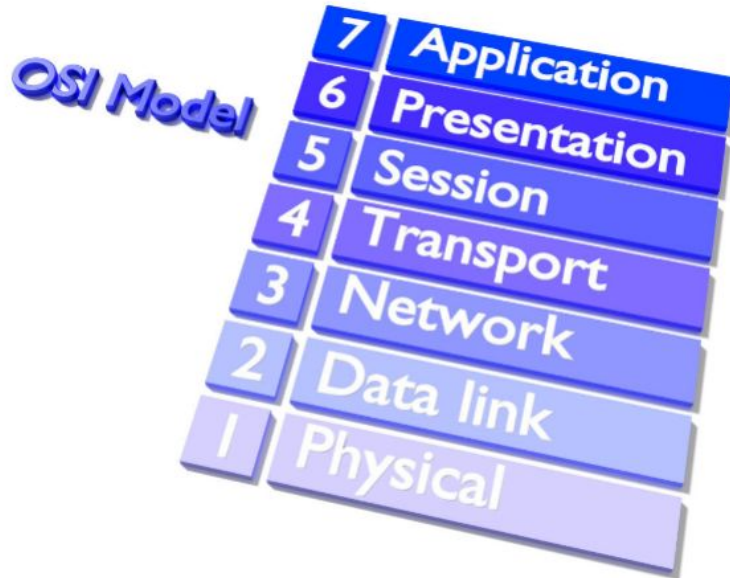
1. Two or more computers/Devices
2. Cables as links between the computers
3. A network interfacing card(NIC) on each
4. computer
5. Switches
6. Routers
7. Software called Network operating system(NOS)

OSI Model

- People around the world uses computer network to communicate with each other.
- For worldwide data communication, systems must be developed which are compatible to communicate with each other.
- There should be standard communication methods & devices.
- ISO (International Organization of Standardization) has developed this standard.

OSI Model

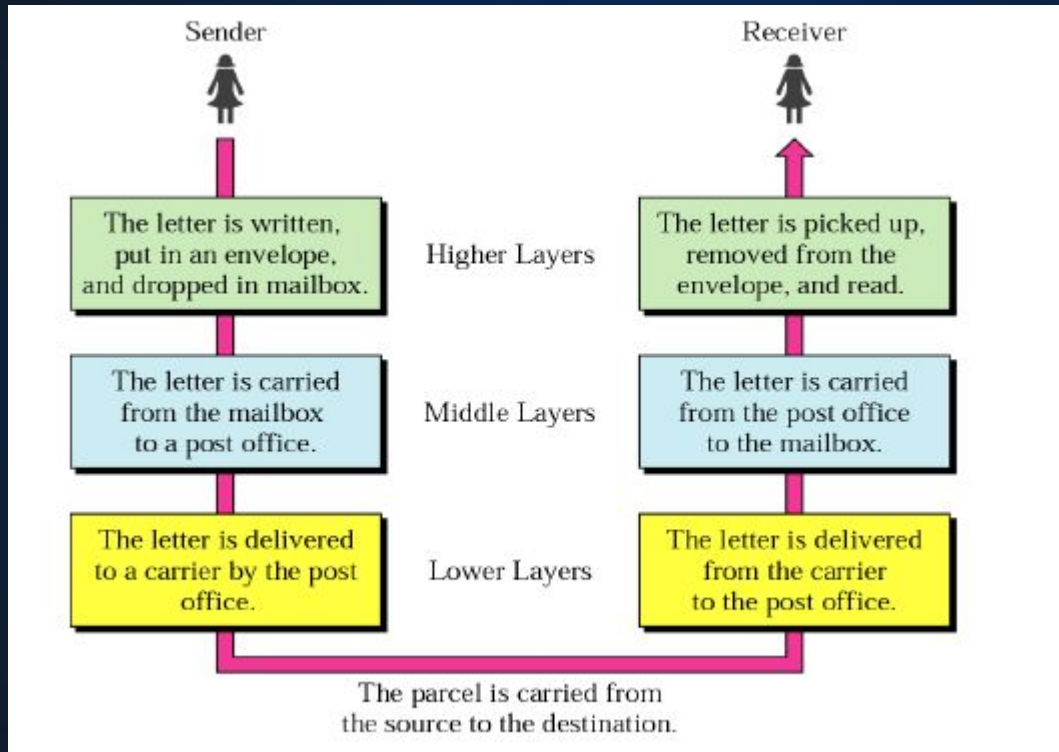
- This communication model is called as **Open System Interconnection (OSI)**.
- ISO-OSI model is a seven layer architecture developed in 1984.



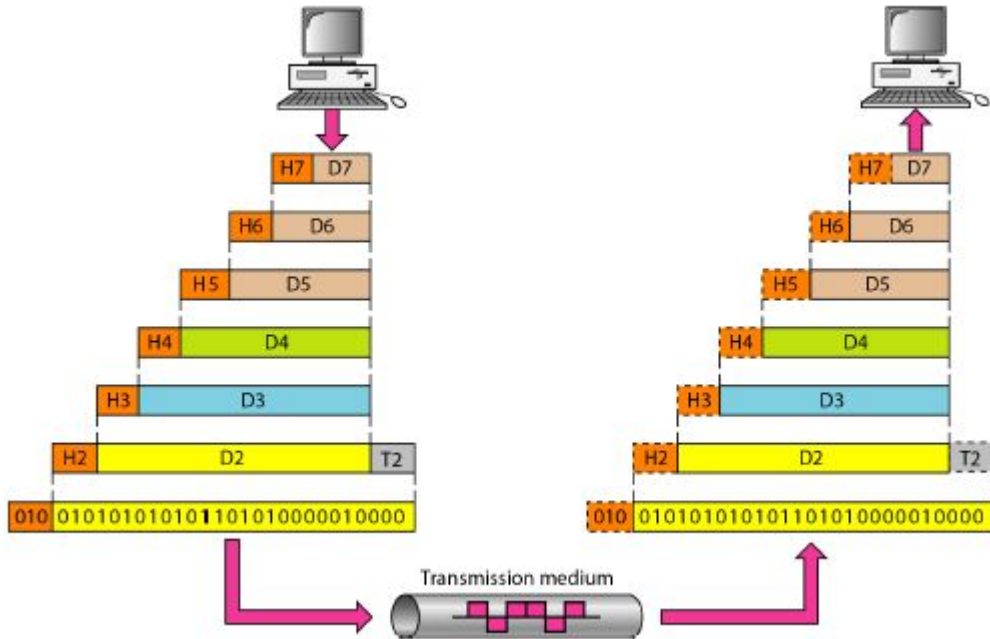
OSI Model

- The basic elements of a layered model are
 - services
 - protocols
 - and interfaces.
1. A service is a set of actions that a layer offers to another (higher) layer.
 2. A Protocol is a set of rules that a layer uses to exchange information.
 3. A Interface is communication between the layers.

Sending - Receiving Letters



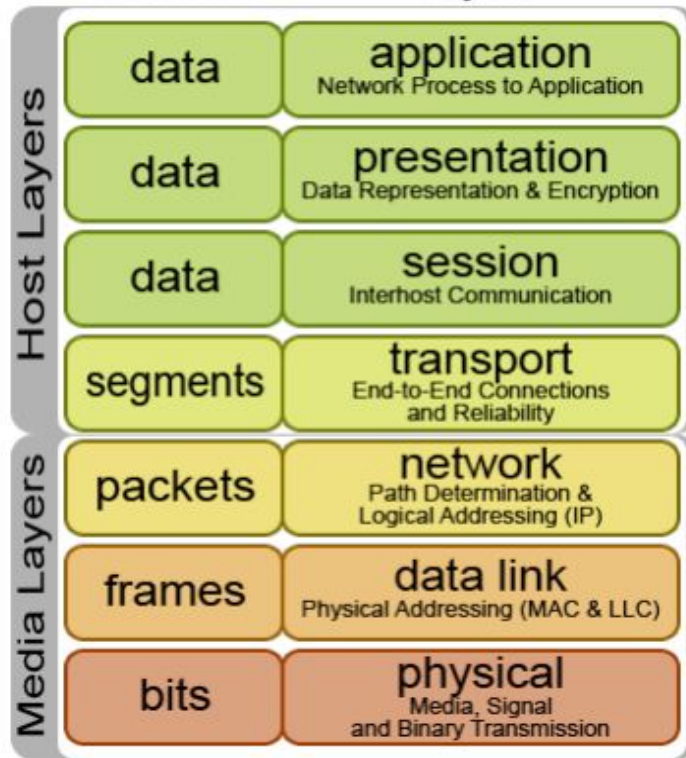
Sending - Receiving Data



OSI Model

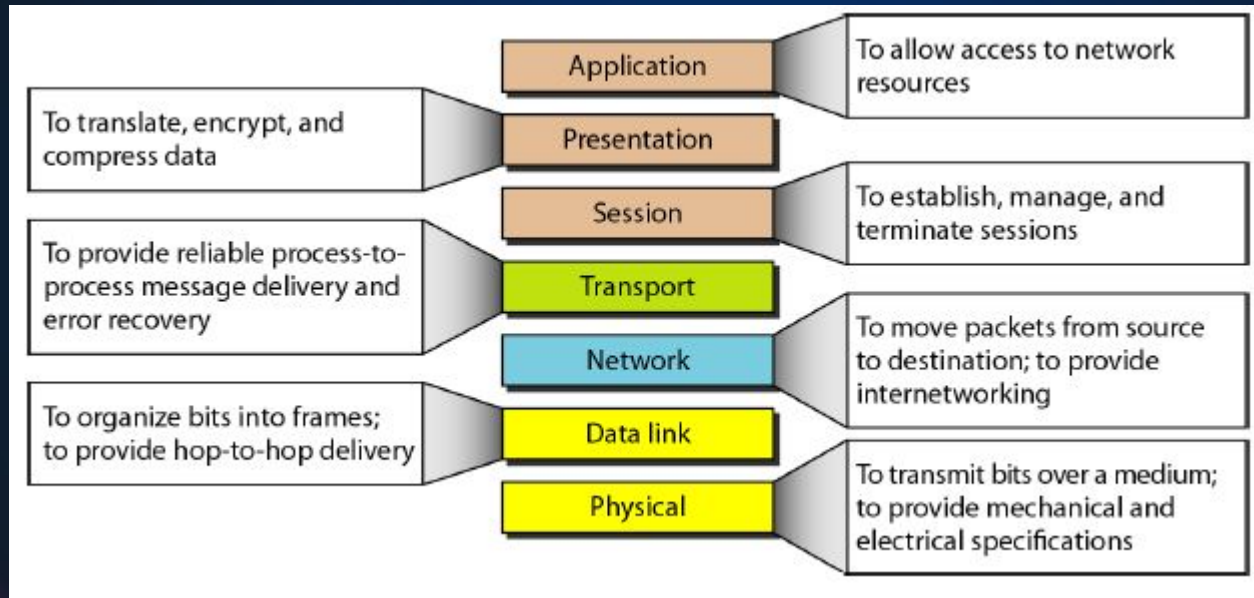
data unit

layers



OSI Model	DoD Model	protocols		devices/apps
layer 5, 6, 7	application	dns, dhcp, ntp, snmp, https, ftp, ssh, telnet, http, pop3... others		web server, mail server, browser, mail client...
layer 4	host-to-host	tcp	udp	gateway
layer 3	internet	ip, icmp, igmp		router, firewall layer 3 switch
layer 2	network access	arp (mac), rarp		bridge layer 2 switch
layer 1		ethernet, token ring		hub

Summary of Layers



Classification of network By Geography

- LAN
 - ◆ Local area Network
- WAN
 - ◆ Wide Area Network
- MAN
 - ◆ Metropolitan area network
- CAN
 - ◆ Campus Area Network
- PAN
 - ◆ Personal Area Network

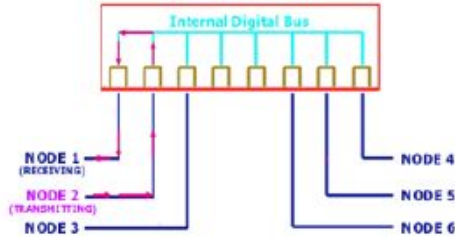
Switches

Switches facilitate the sharing of resources by connecting together all the devices, including computers, printers, and servers, in a small business network

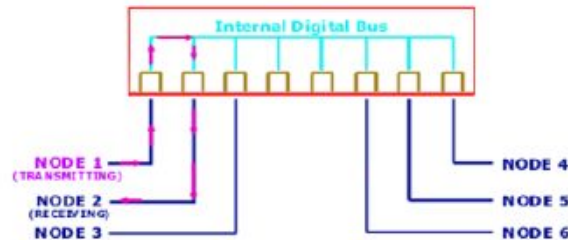
Switches when they are first turned on



Node 2 sends a frame to Node 1



Frame path after MAC/Port is known



ROUTERS

A router receives and sends data on computer networks. Routers are sometimes confused with network hubs, modems, or network switches. However, routers can combine Multiple Networks together.

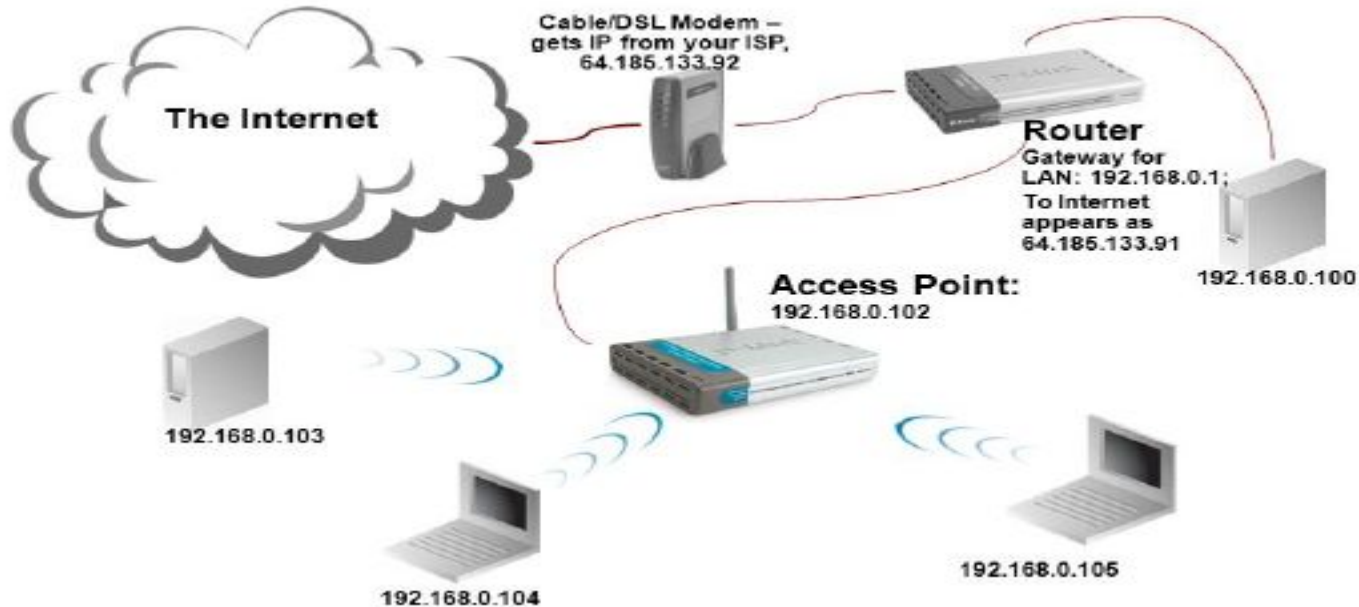


Home Network

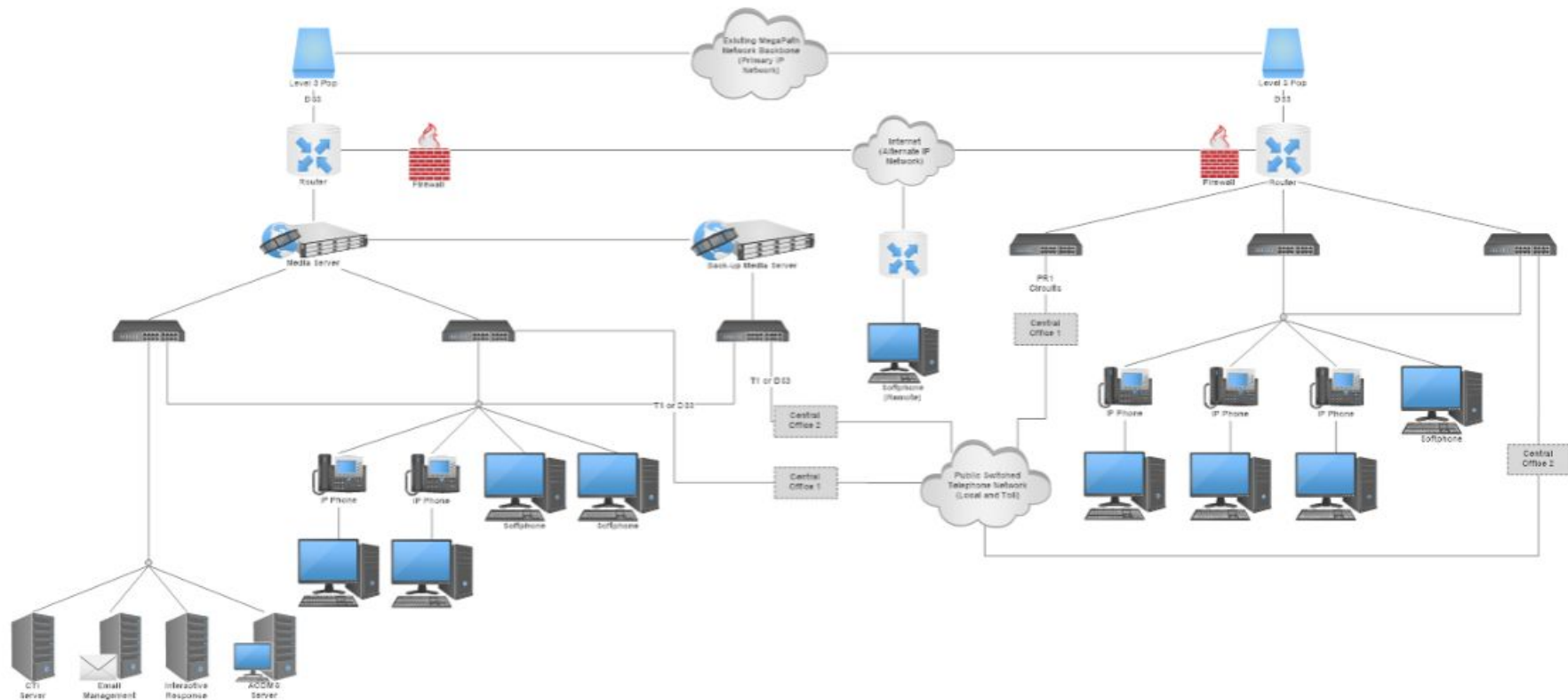


Home Network

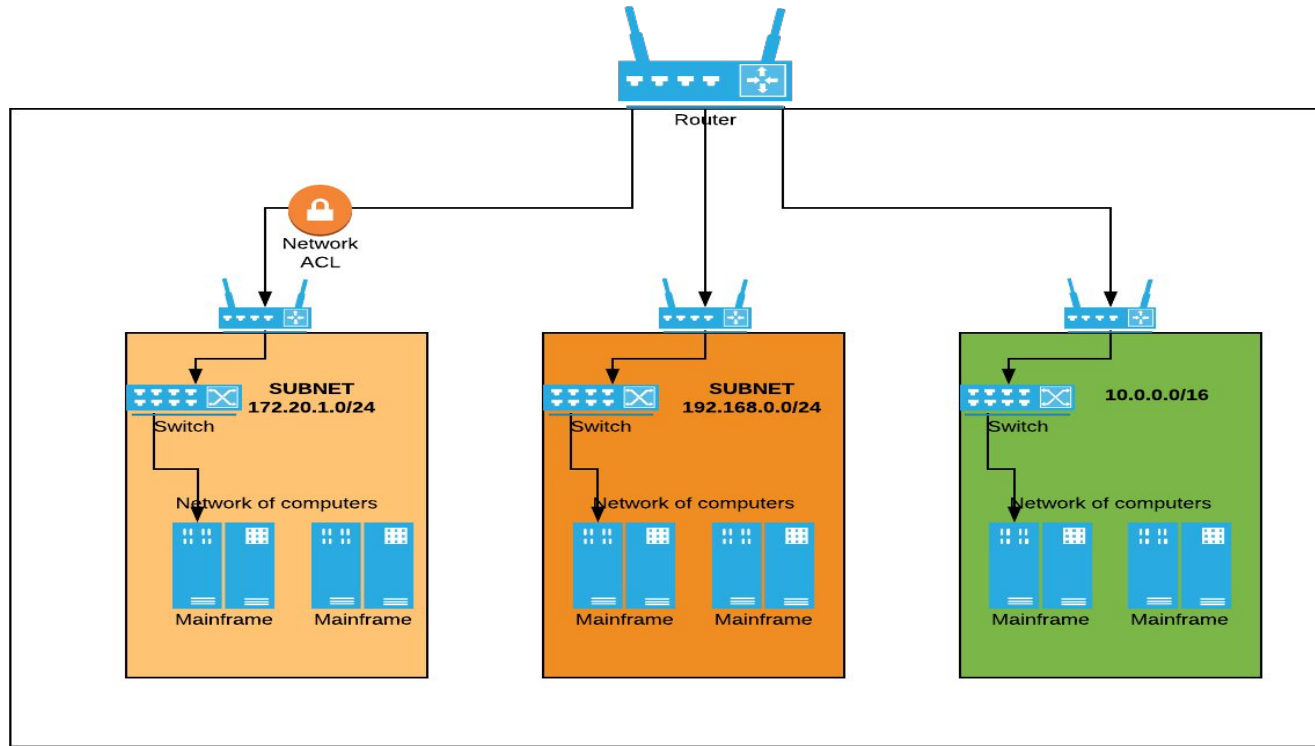
Home Network- IP Addresses



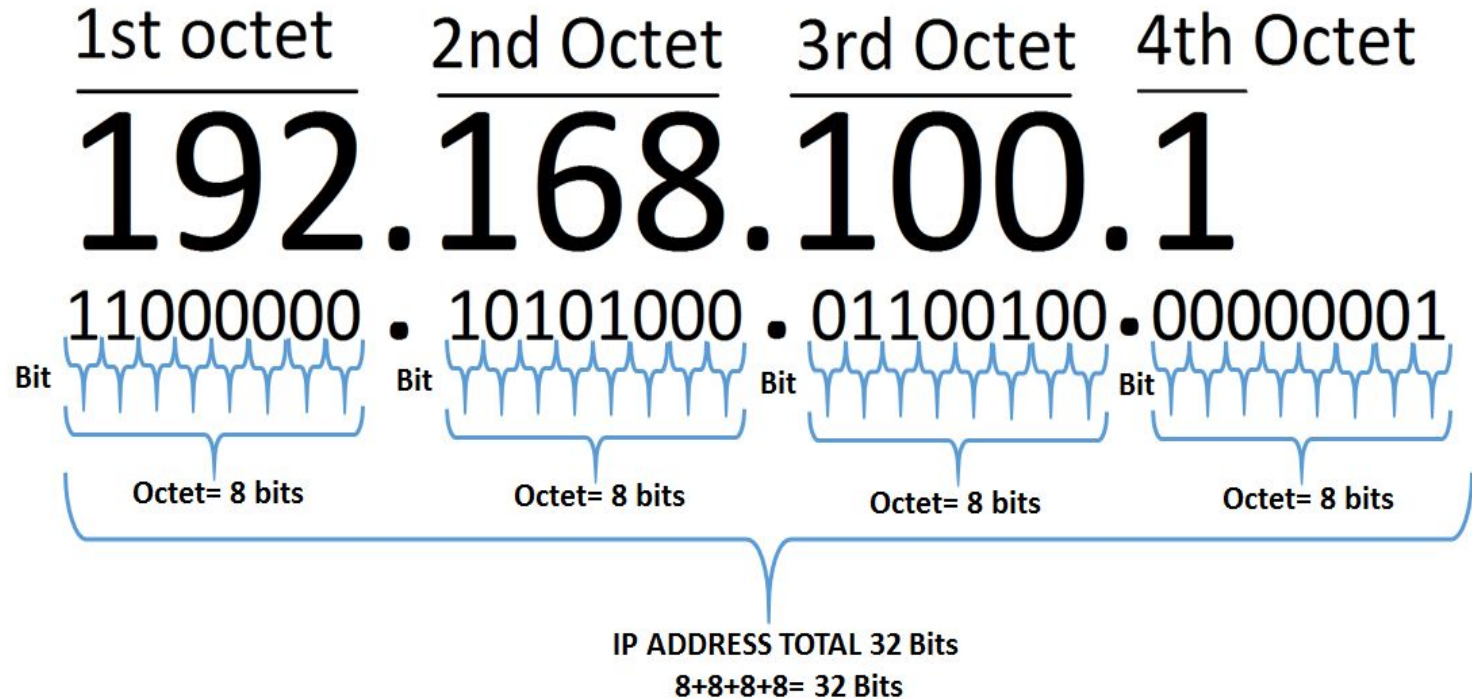
Network Diagram: Telecommunications Network Architecture



Corporate Datacenter



IPv4 Address



IPv4 Range

- 0.0.0.0 – 255.255.255.255
- 00000000.00000000.00000000.00000000 (0.0.0.0)
- 11111111.11111111.11111111.11111111 (255.255.255.255)

Public and Private IP Division

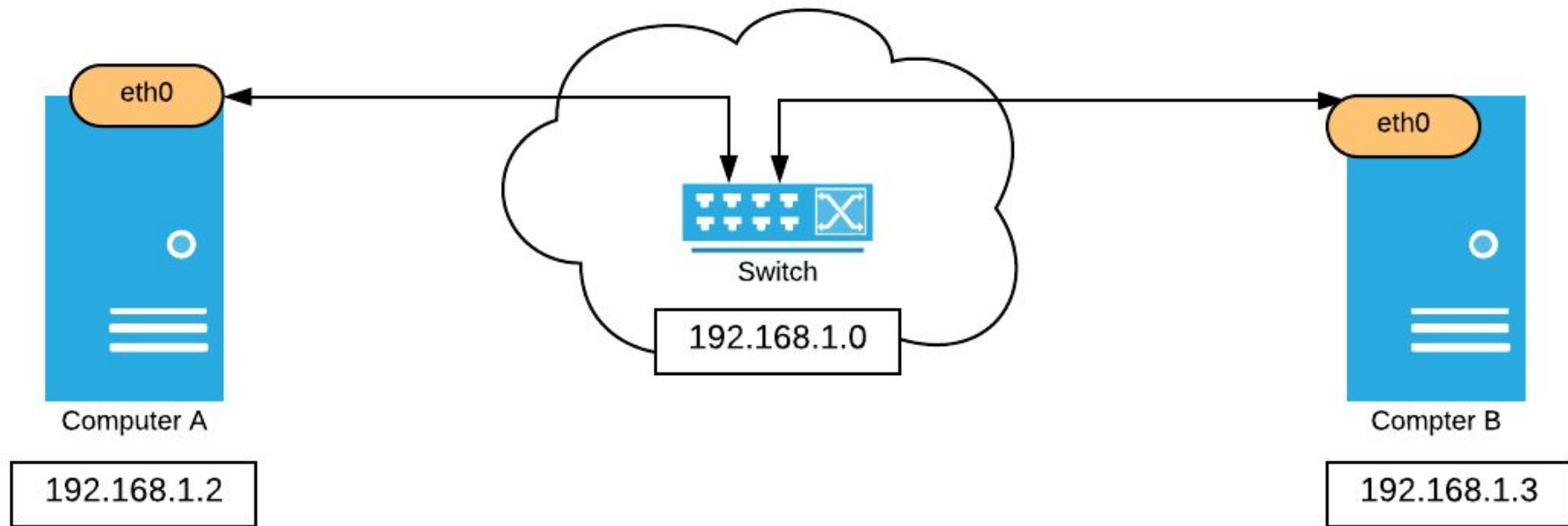
- Public IP => Internet
 - E:g 54.86.23.90
- Private IP => For local network design
 - E:g 192.168.1.10

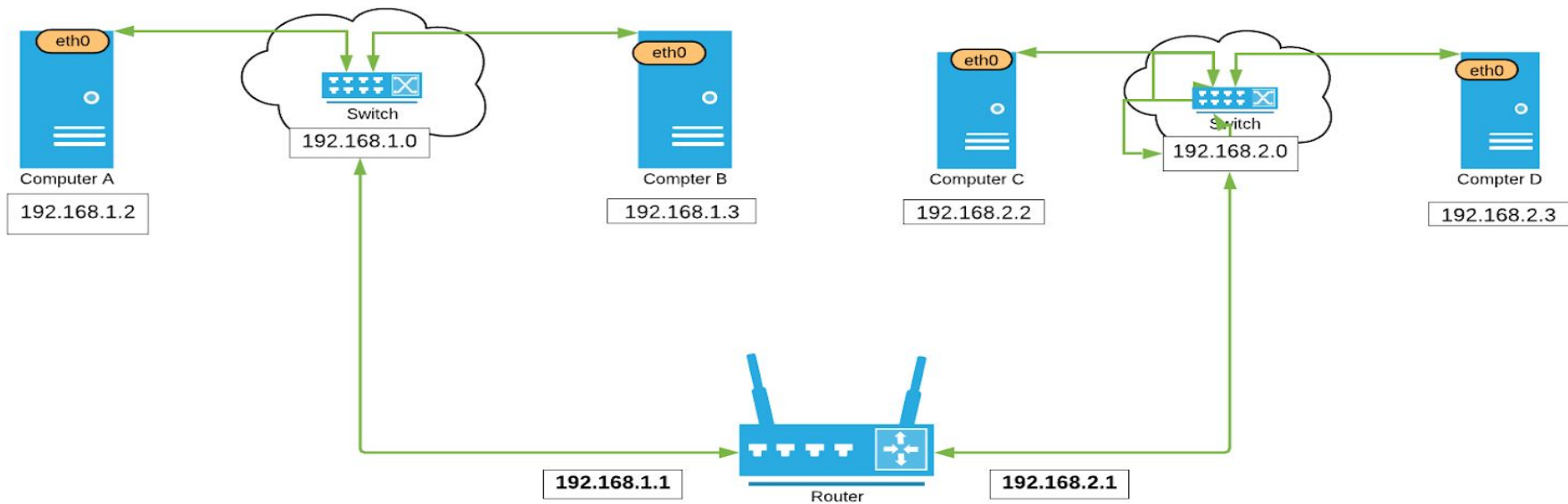
Private IP Ranges

- Class A 10.0.0.0 - 10.255.255.255
- Class B 172.16.0.0 - 172.31.255.255
- Class C 192.168.0.0 - 192.168.255.255

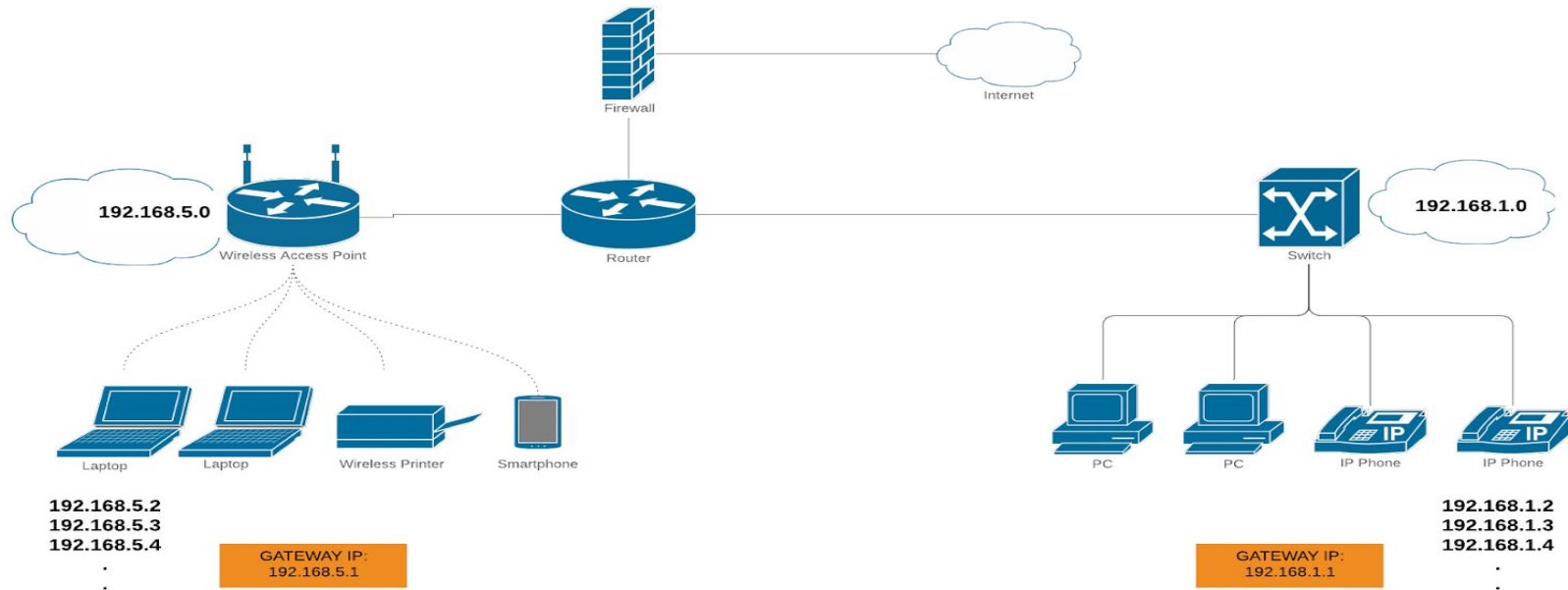
Subnet Masks

- 255.0.0.0
- 255.255.0.0
- 255.255.255.0





Network Diagramme



Protocols

In the networking and communications area, a protocol is the formal specification that defines the procedures that must be followed when transmitting or receiving data. Protocols define the format, timing, sequence, and error checking used on the network.

TCP

- Reliable Protocol
- Connection Oriented
- Performs three ways handshake
- Provision for error detection and retransmission
- Most applications use TCP for reliable and guaranteed transmission
- FTP,HTTP,HTTPS

UDP

- Unreliable Protocol
- Connectionless
- Much faster than TCP
- No acknowledgement waits
- No proper sequencing of data units
- Suitable for applications where speed matters more than reliability
- DNS,DHCP,TFTP,ARP, RARP

Protocols & Port Numbers

Label on Column	Service Name	UDP and TCP Port Numbers Included
DNS	Domain Name Service – UDP	UDP 53
DNS TCP	Domain Name Service – TCP	TCP 53
HTTP	Web	TCP 80
HTTPS	Secure Web (SSL)	TCP 443
SMTP	Simple Mail Transport	TCP 25
POP	Post Office Protocol	TCP 109, 110
SNMP	Simple Network Management	TCP 161,162 UDP 161,162
TELNET	Telnet Terminal	TCP 23
FTP	File Transfer Protocol	TCP 20,21
SSH	Secure Shell (terminal)	TCP 22
AFP IP	Apple File Protocol/IP	TCP 447, 548

OSI 7 Layer Model

7 Layer

Application Layer

6 Layer

Presentation Layer

5 Layer

Session Layer

4 Layer

Transport Layer

3 Layer

Network Layer

2 Layer

DataLink Layer

1 Layer

Physical Layer

TCP/IP Protocol

Application

telnet

FTP

DHCP

TFTP

HTTP

SMTP

DNS

SNMP

TCP

Transport

UDP

Internet

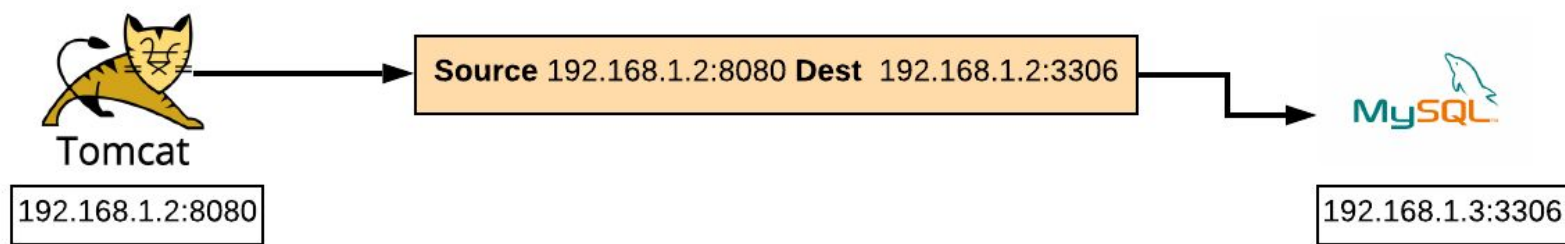
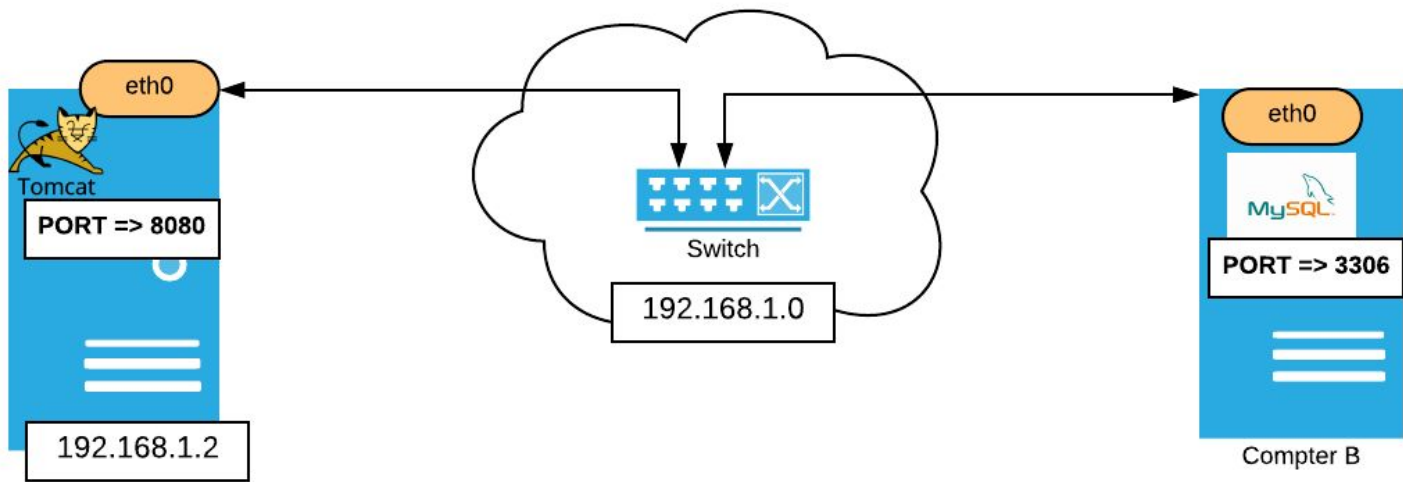
ICMP

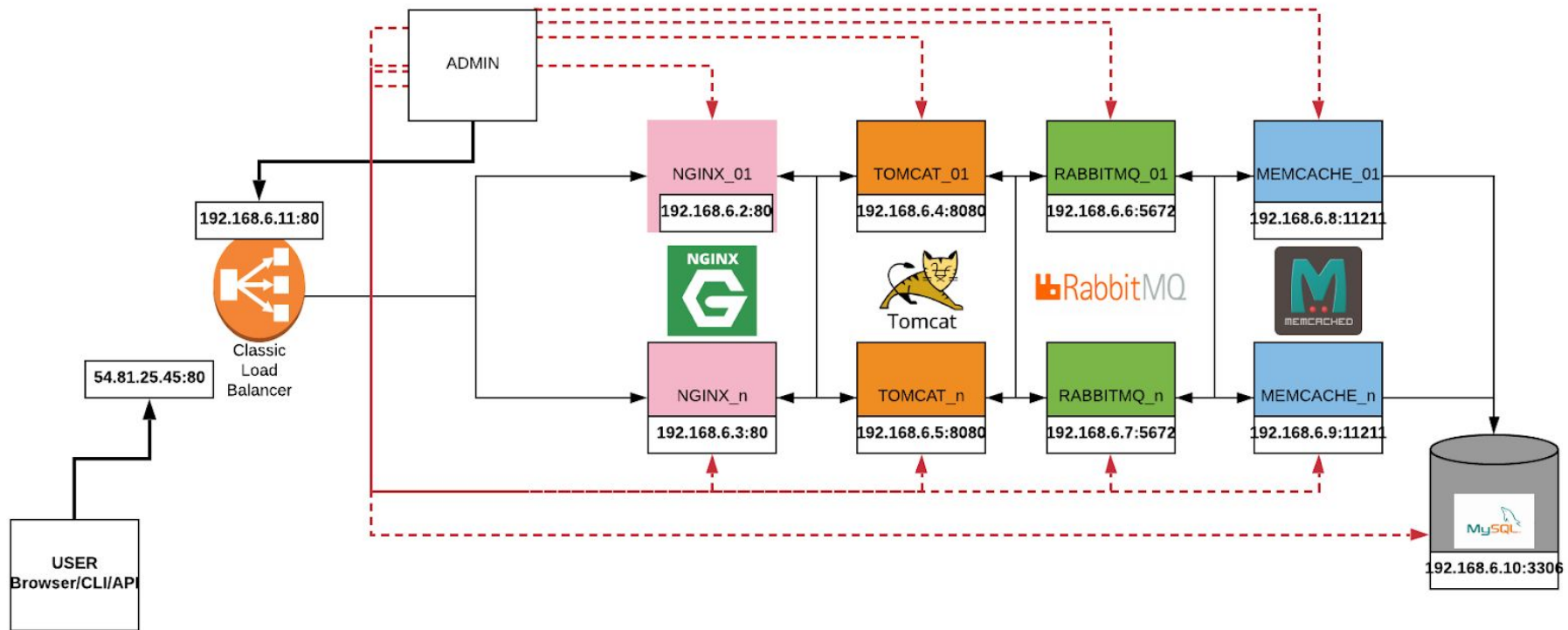
ARP

RARP

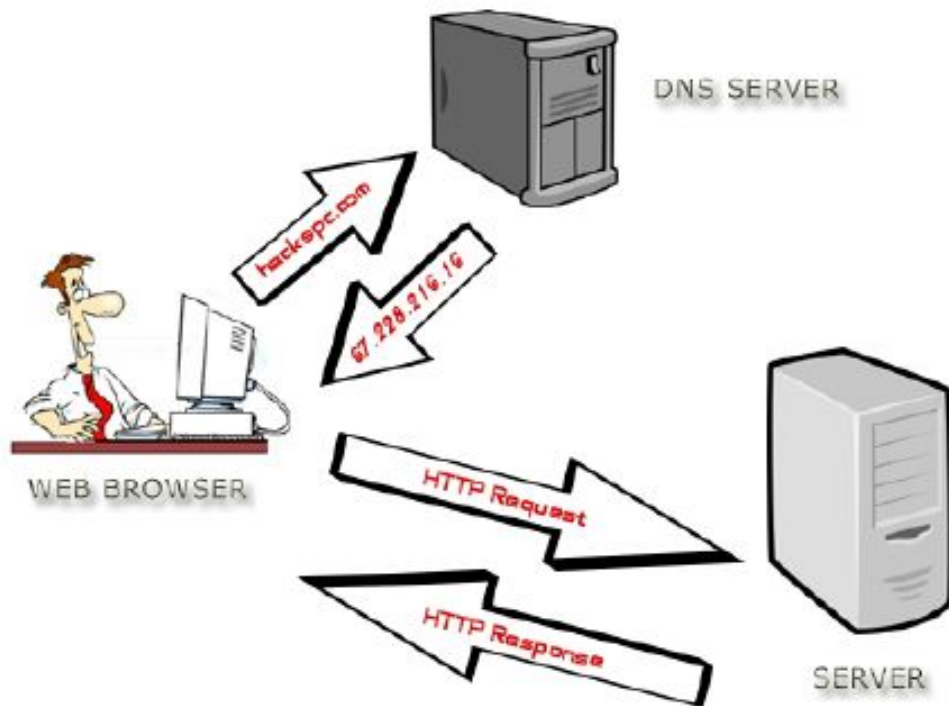
IP

Network Interface

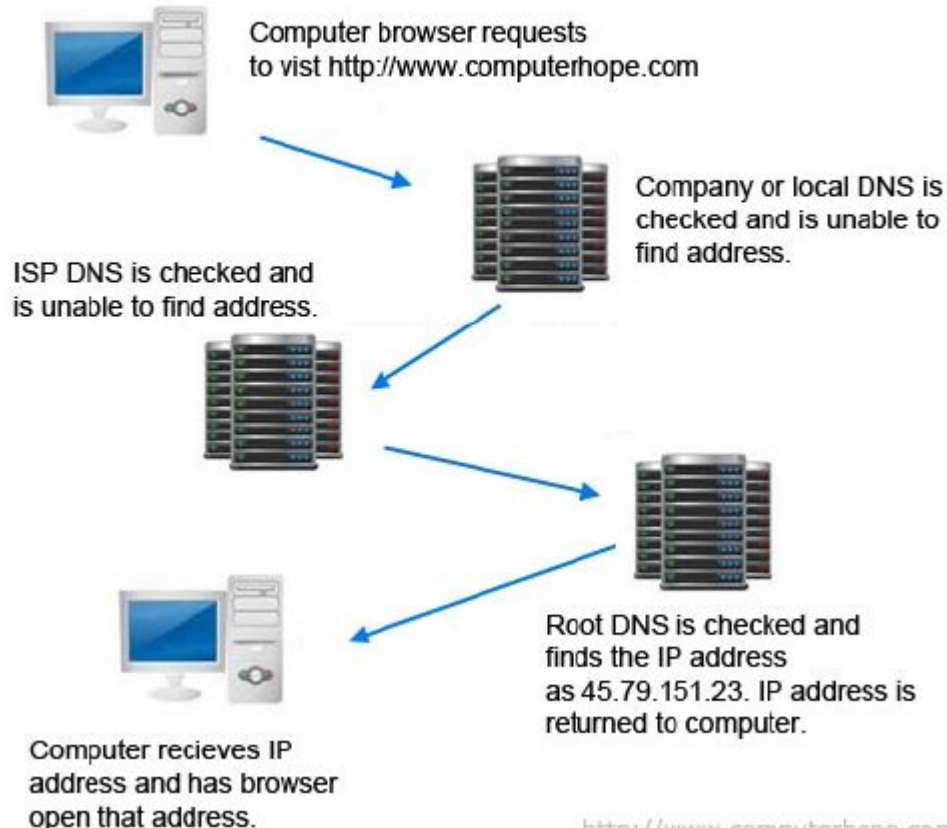




DNS



How DNS Works



DHCP

