

BASIC COMPUTER NETWORKING

Network

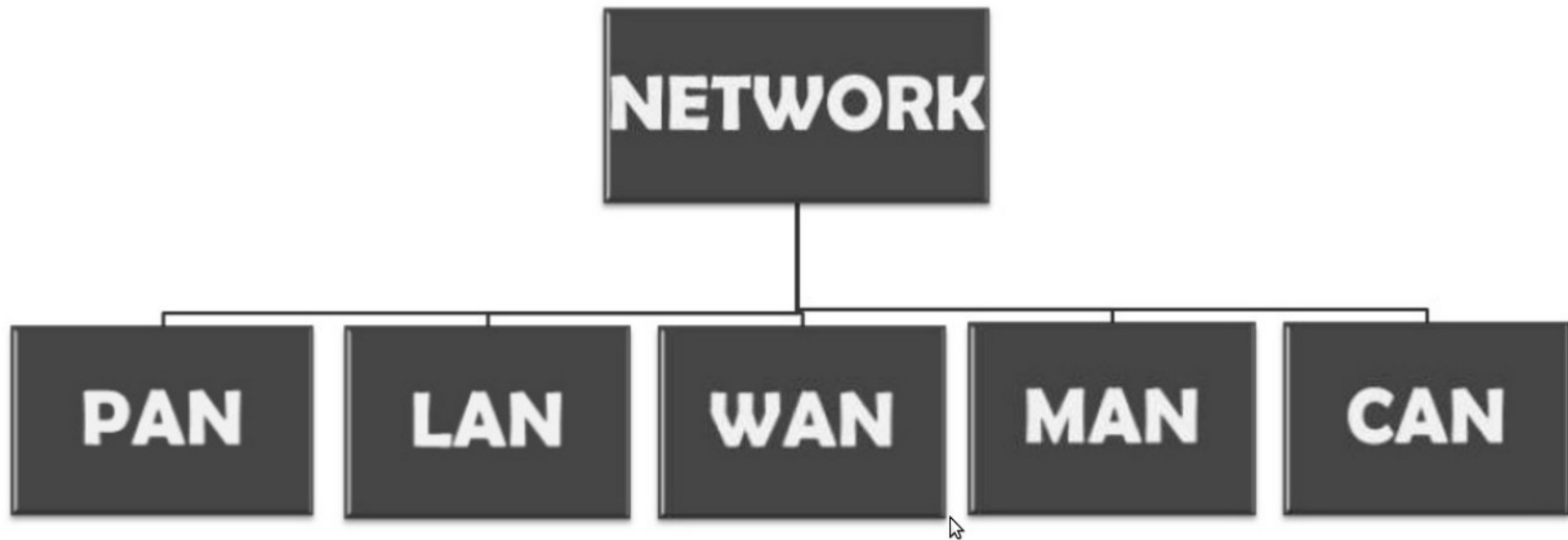
A network is simply a group of two or more Personal Computers linked together.



COMPONENTS OF COMPUTER NETWORK

- Two or more computers
- Cables as links between the computers
- A network interfacing card(NIC) on each computer
- Switches
- Routers
- Software called operating system(OS)

CLASSIFICATION OF AREA BY THEIR GEOGRAPHY



Classification

Networks are usually classified using three properties:

- Topology
- Protocol and
- Architecture.

Topology :

Topology specifies the geometric arrangement of the network. Common topologies are a bus, ring and star.

Protocol :

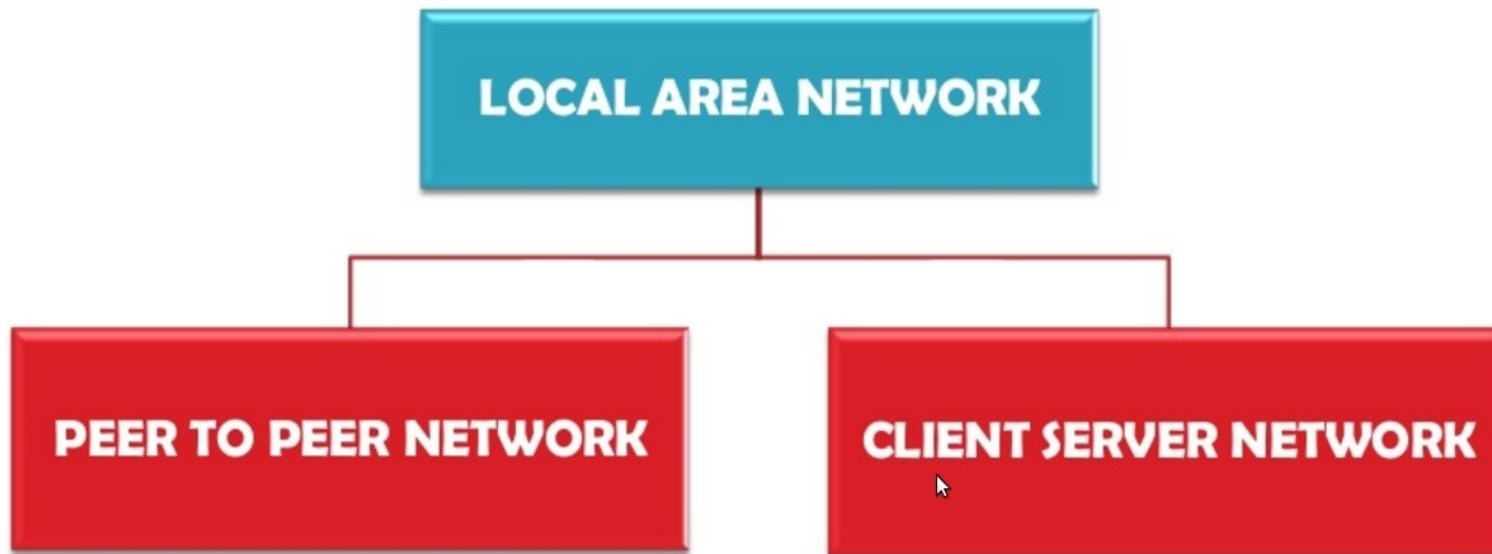
Protocol specifies a common set of rules and signals the computers on the network use to communicate. Most networks use Ethernet, but some networks may use IBM's Token Ring protocol. We recommend Ethernet for both home and office networking. For more information, please select the Ethernet link on the left.

Architecture :

Architecture refers to one of the two major types of network architecture: Peer-to-peer or client/server. In a Peer-to-Peer networking configuration, there is no server, and computers simply connect with each other in a workgroup to share files, printers and Internet access.

NETWORK CLASSIFICATION BY THEIR COMPONENT ROLE

Press Esc to exit full screen



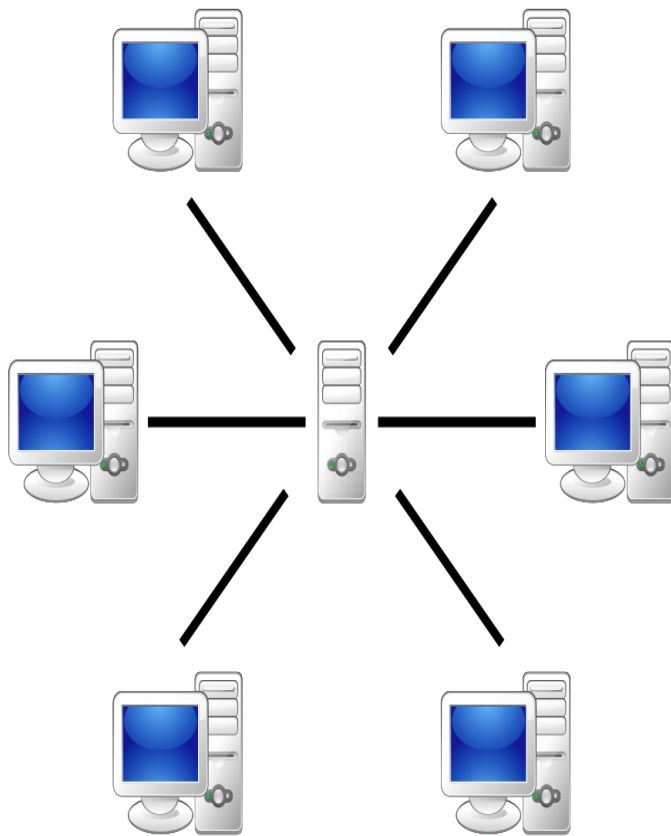
ADVANTAGES & DISADVANTAGES OF PEER TO PEER NETWORK

Advantages:

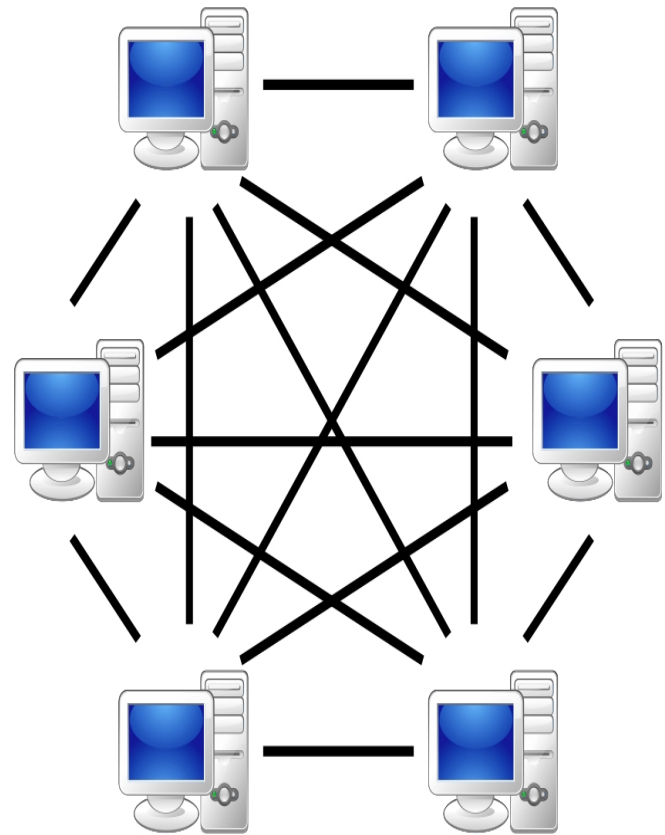
- Use less expensive computer hardware
- Easy to administer
- No NOS required
- More built in redundancy
- Easy setup & low cost

Disadvantages:

- Not very secure
- No central point of storage or file archiving
- Additional load on computer because of resource sharing
- Hard to maintain version control



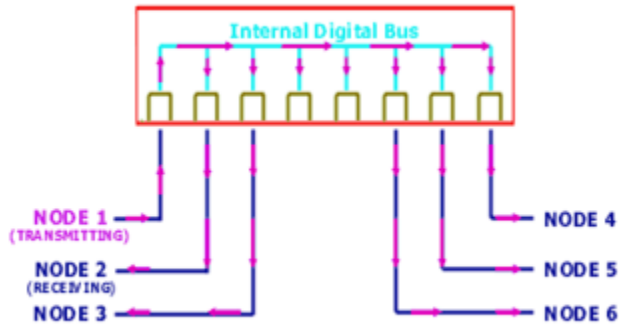
Server-based



P2P-network

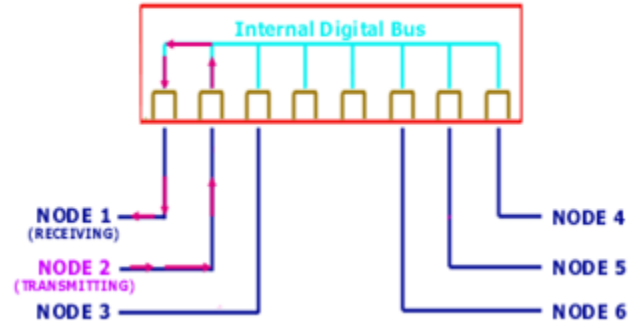
SWITCHES

Switches when they are first turned on

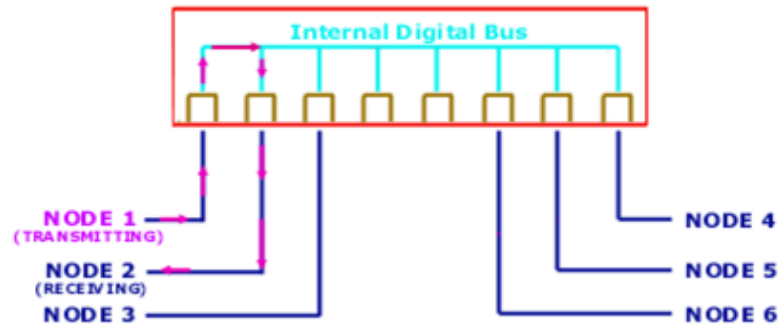


Node 1 transmits data to Node 2 for the first time

Node 2 sends a frame to Node 1



Frame path after MAC/Port is known



Gateway – A gateway, as the name suggests, is a passage to connect two networks together that may work upon different networking models

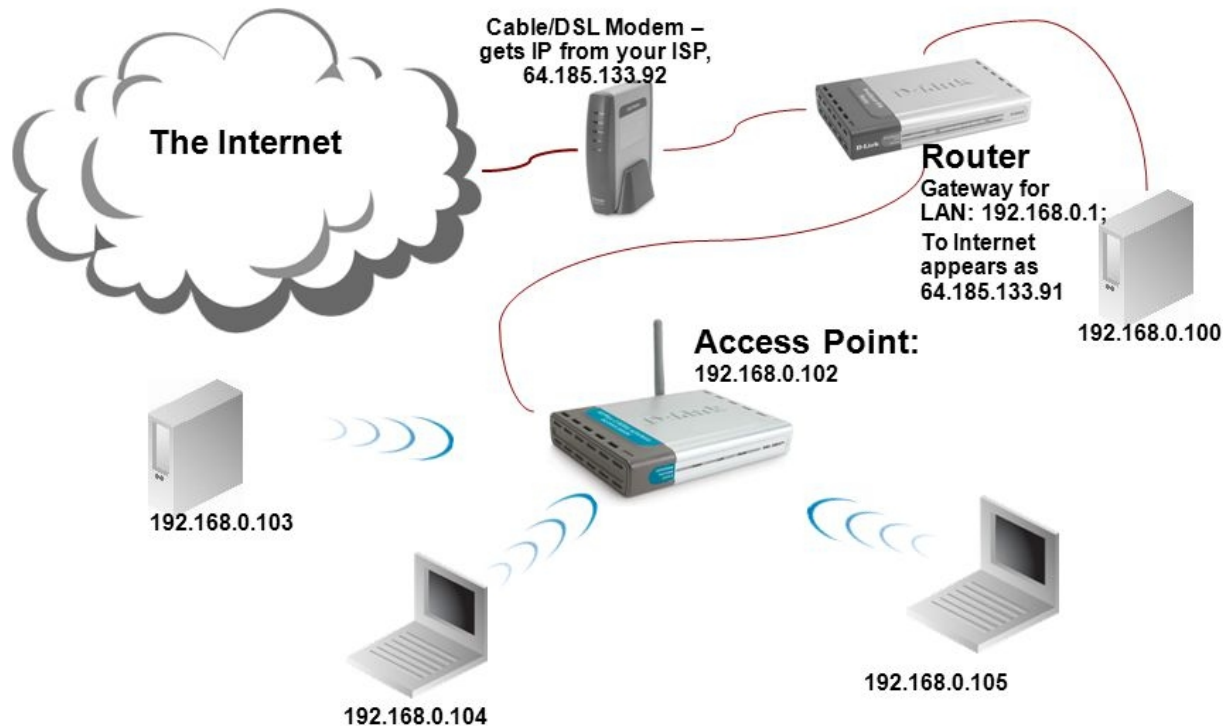
Router

What Is Router In Networking And How It Works

- All routers have a WAN port, the cabled connection that connects the router to your cable or DSL. Then, there's a multitude of LAN ports — local area network connections that allow you to wire everything, from your Xbox to your DVR, to the Internet.

Network Architecture

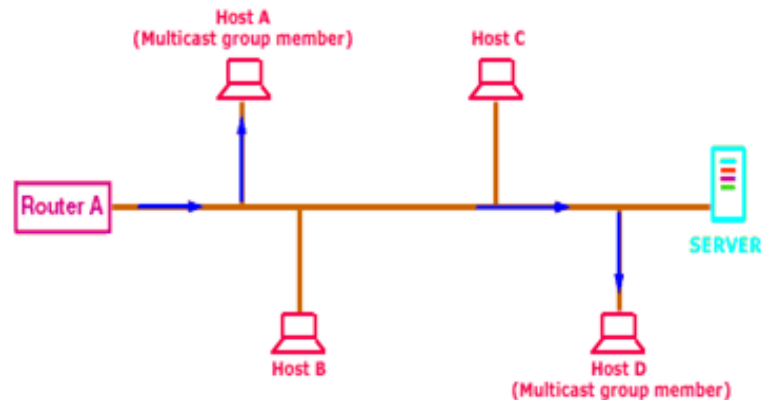
Home Network- IP Addresses



The amount of network traffic generated varies with the 3 types of data transmissions:

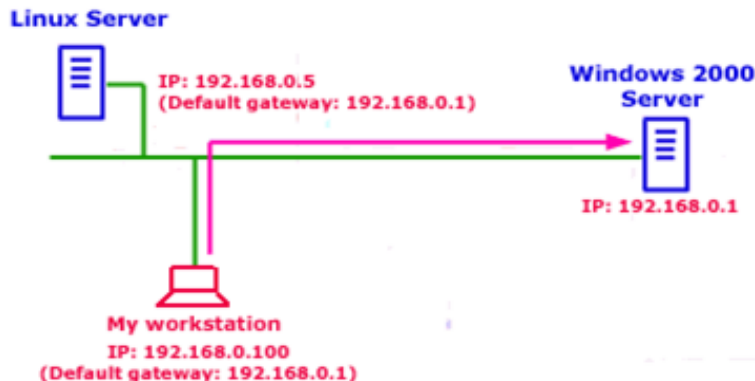
- Broadcast
- Multicast
- Unicast

A Simple Multicast Example



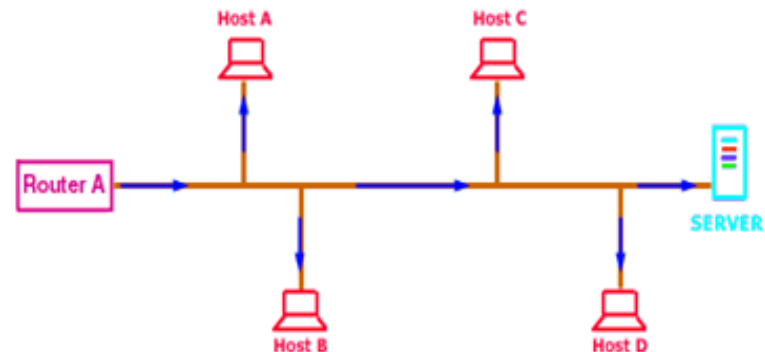
*The router in this network sends a **multicast** packet which is received and processed by members of the Multicast group*

A Simple Unicast Example



My workstation sends a Unicast packet to the Windows 2000 server. All computers on the network see this packet but they won't process it.

A Broadcast Example



*The router in this network sends a **broadcast** packet which is received and processed by all hosts on the network*

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

UDP

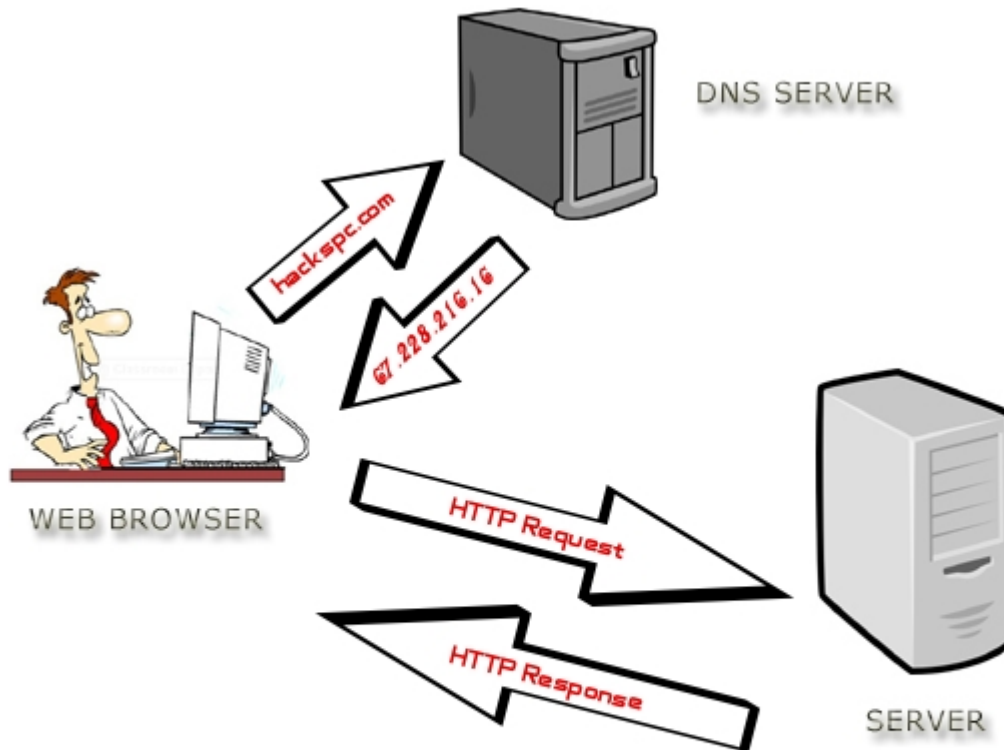
- Reliable Protocol
- Connection Oriented
- Performs three ways handshake
- Provision for error detection and retransmission
- Most applications use TCP for reliable and guaranteed transmission
- FTP,HTTP,HTTPS

- 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

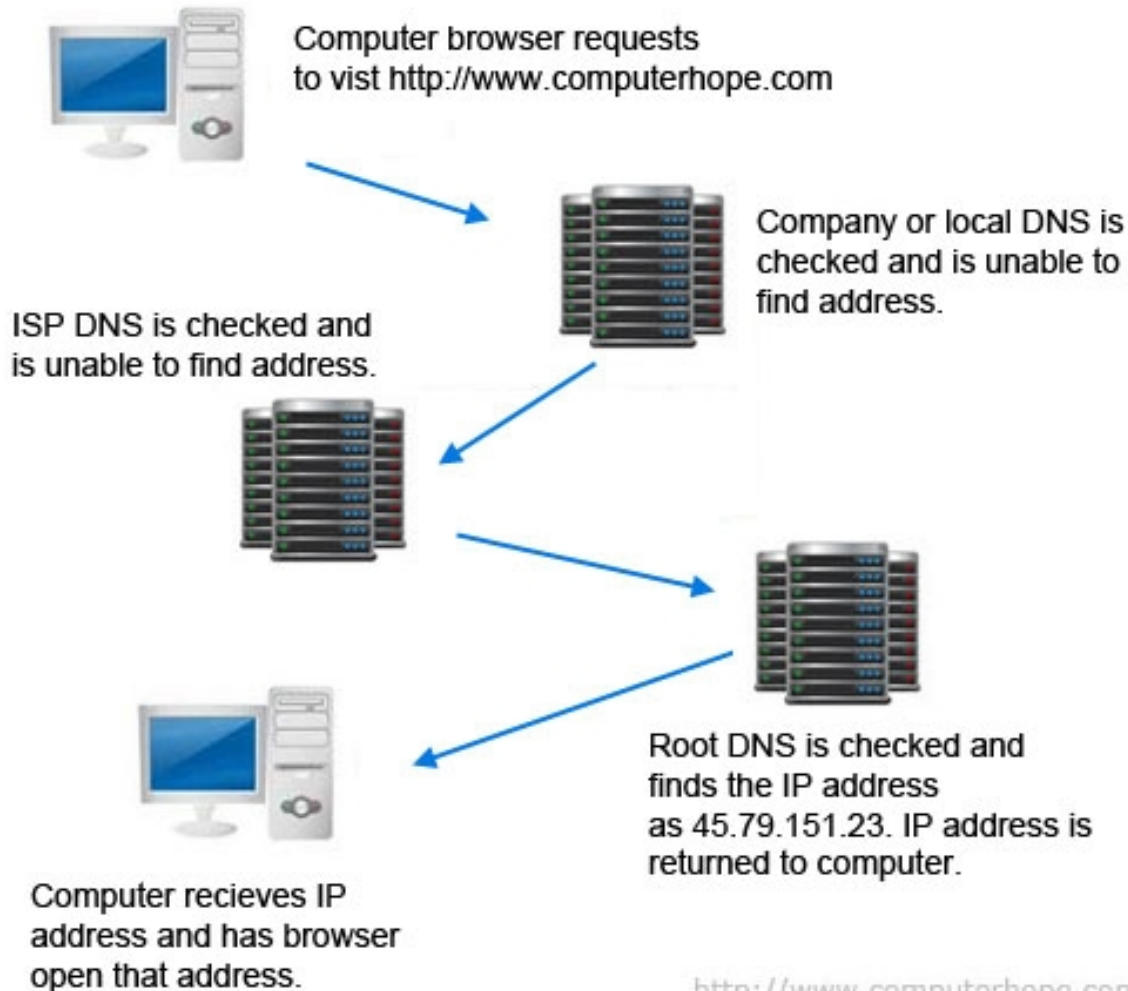
Protocols & Port numbers

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

DNS

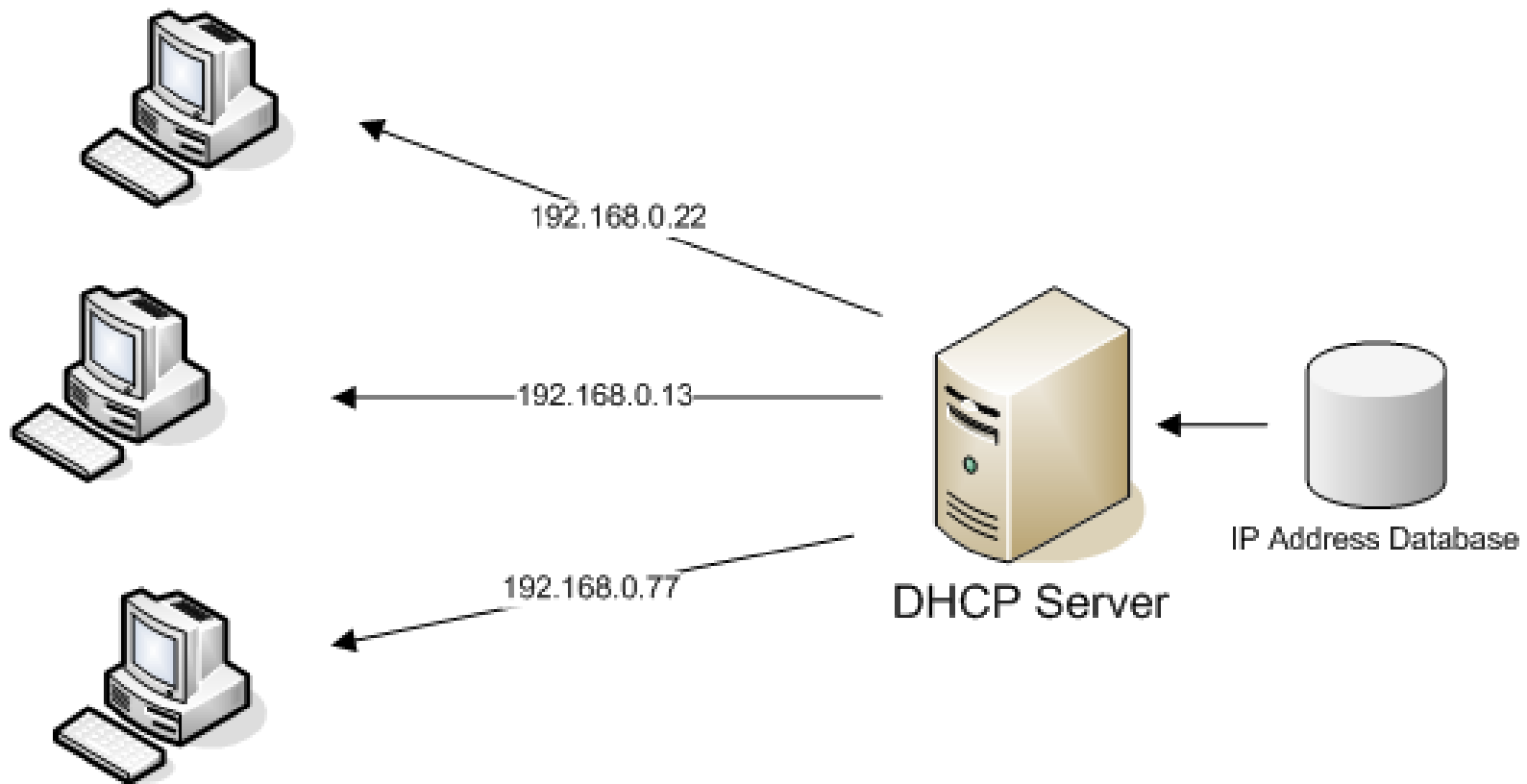


How DNS Works



<http://www.computerhope.com>

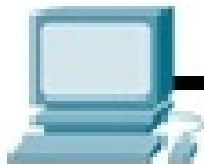
DHCP



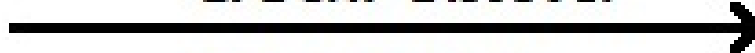
DHCP

DHCP client

DHCP server



1. DHCP Discover



2. DHCP Offer



3. DHCP Request



4. DHCP Ack



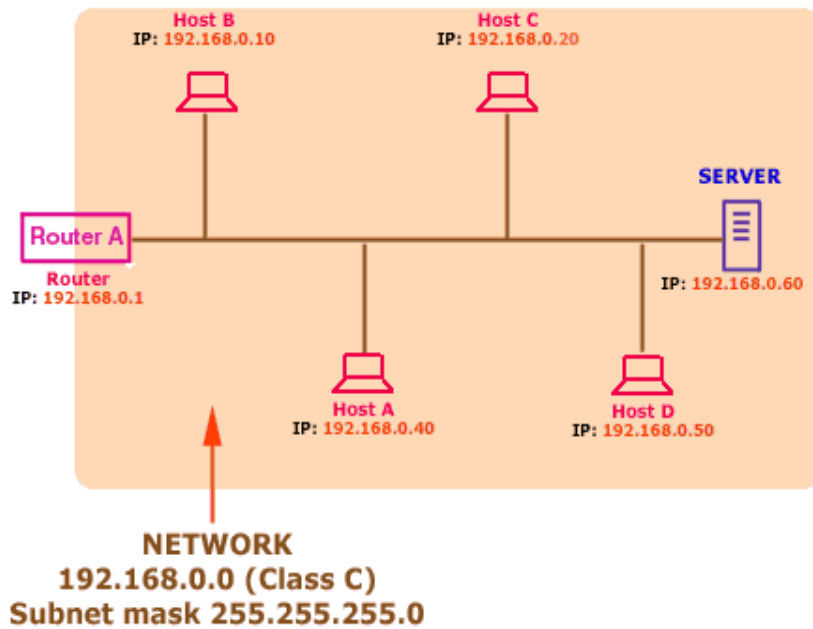
IP ADDRESSING AND SUBNETTING

Class	Class Range	Address Range	Supports
Class A	0-126	10.0.0.0 to 10.255.255.255	16 million hosts on each of 127 networks.
Class B	128-191	172.16.0.0 to 172.31.255.255	65,000 hosts on each of 16,000 networks.
Class C	192-223	192.168.0.0 to 192.168.255.255	254 hosts on each of 2 million networks.
Class D	224-239	NA	Reserved for Multicasting
Class E	240-255	NA	Experimental; used for research

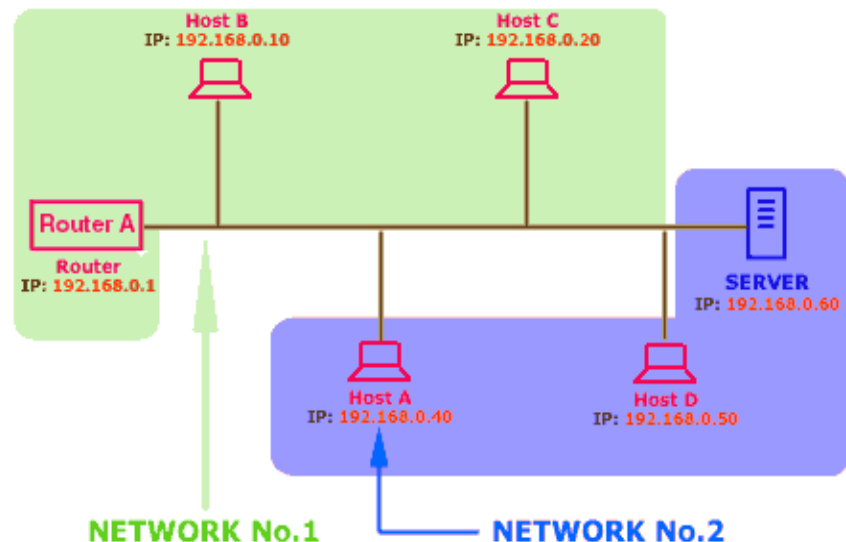
Subnetting :

When we Subnet a network, we basically split it into smaller networks.

A Class C network with its default subnet mask



Changing the default Subnet mask



By changing the default subnet mask to 255.255.255.224 our Class C network has been partitioned into smaller logical networks. For simplicity reasons, I am only showing 2 of these smaller networks.

Classes	Default Subnet mask
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0