

# Networking Basics

# What is Networking?

- Networking is the process of linking computers to each other so that they can send and receive data between them.
- Network has three basic types.
- WAN(Wide Area Network), LAN(Local Area Network),  
MAN(Metropolitan Area Network). There are more than 3 types so we will learn about LAN in this webinar.

# What is IP address(Internet Protocol)?

- An Internet Protocol address is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication.Eg.192.168.1.2
- An IP is represented in two types
- IPv4 and Pv6 are IP types.
- There are 5 classes of IPv4 range.
- They are listed in the picture nearby.

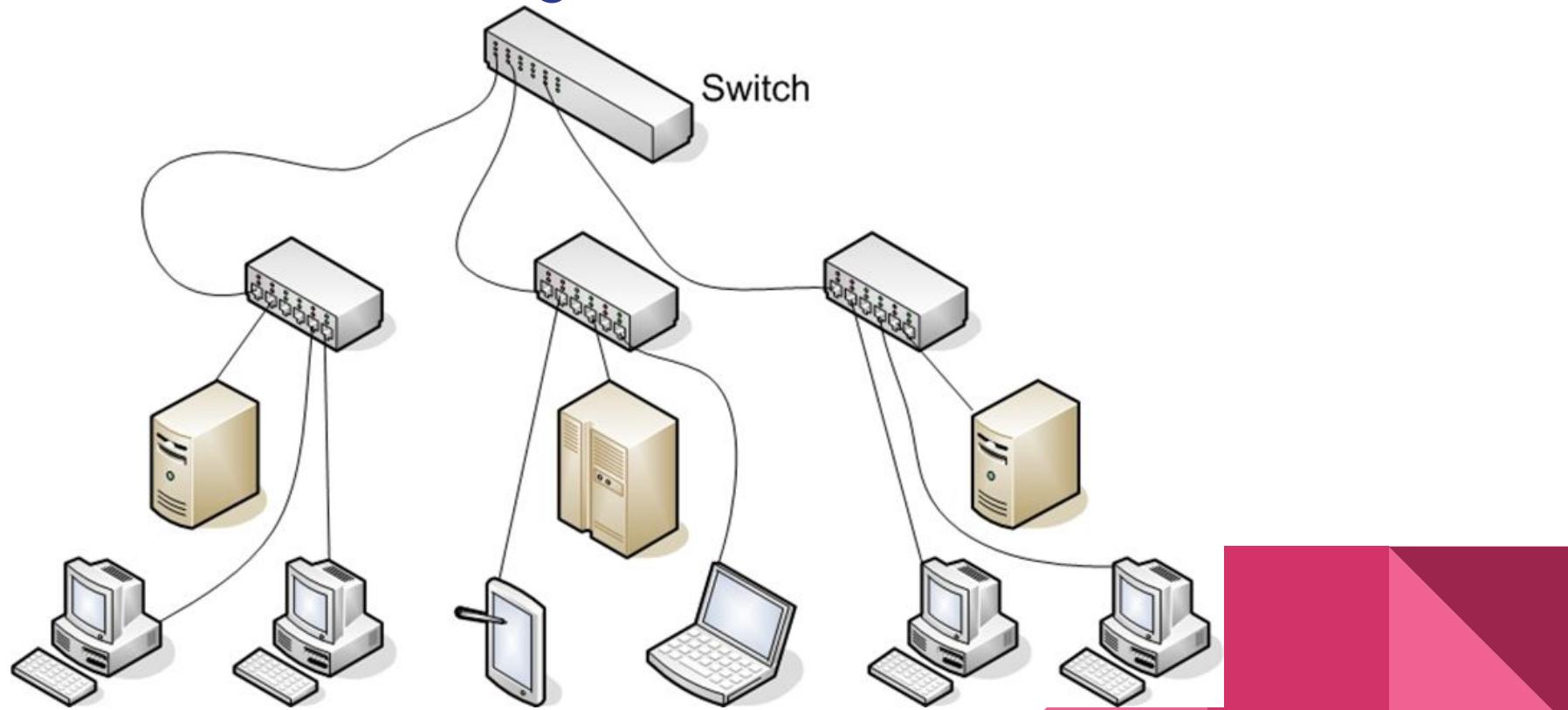
Class	IP Range	Use
A	0-127	Used for large networks. All of them have been used
B	128-191	Large corporate and government networks. All of them have been used
C	192-223	Most common group of IP addresses.
D	224-239	Reserved for multicasting
E	240-255	Reserved for experimental use.

# Some basic things to know about IP

Routers have an internal IP of 192.168.1.1 and when devices connect to it they have a IP of range 192.168.1.1/255 you should remember that the IP of all devices connected inside a router is private IP addresses and They all share a common Public IP which is used to call them across the world.

If someone tried to visit a website while being connected in the modem the public IP of the modem will be sent to it not the private IP.

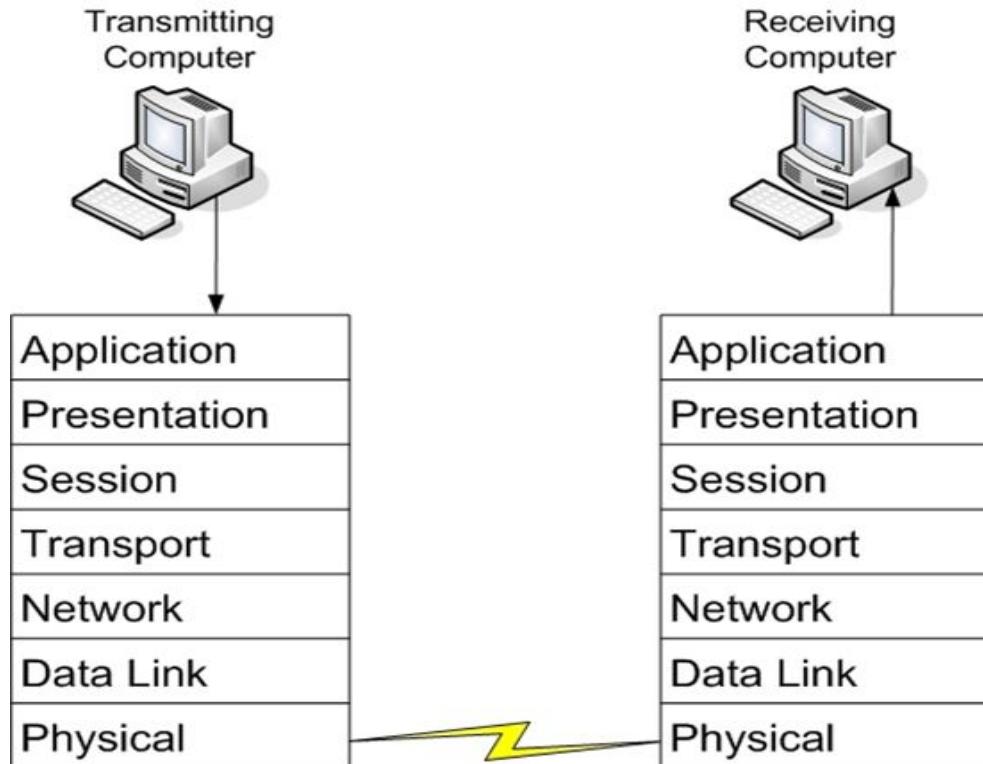
# Basic Network Diagram



# MAC address

- A media access control (MAC) address is a unique identifier assigned to a network interface controller (NIC) for use as a network address in communications within a network segment.
- Every network card has a MAC id.
- The Address Resolution Protocol (ARP) is a communication protocol used for discovering the link layer address, such as a MAC address, associated with a given internet layer address, typically an IPv4 address.
- There is an ARP Table in router where the IP and MAC id of connected devices are updated regularly.

# Open Systems Interconnect (OSI) model



<b>Layer</b>	<b>Description</b>	<b>Protocols</b>
<b>Application (7)</b>	<b>This layer interfaces directly to applications and performs common application services for the application processes</b>	<b>POP, SMTP, DNS, FTP, Telnet, HTTP</b>
<b>Presentation (6)</b>	<b>Relieves the application layer of concern regarding syntactical differences in data representation within the end-user systems.</b>	<b>Network Data Representation (NDR), Lightweight Presentation Protocol (LPP)</b>
<b>Session (5)</b>	<b>Provides the mechanism for managing the dialogue between end-user application processes</b>	<b>NetBIOS</b>
<b>Transport (4)</b>	<b>Provides end-to-end communication control</b>	<b>TCP, UDP</b>

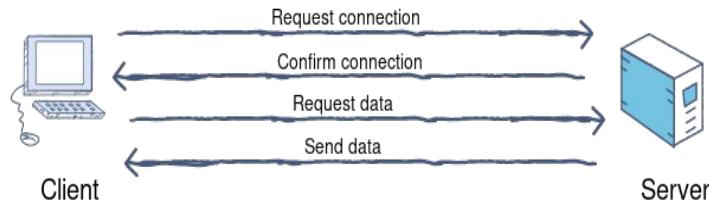
<b>Network (3)</b>	<b>Routes information in the network</b>	<b>IP,ARP,ICMP</b>
<b>Data Link (2)</b>	<b>Describes the logical organisation of data bits transmitted on a particular medium. The data link layer is divided in two sublayers: the Media Access Control Layer (MAC) and the Logical Link Control Layer (LLC)</b>	<b>SLIP, PPP</b>
<b>Physical (1)</b>	<b>Describes the physical properties of various communication media as well as the electrical properties and interpretation of the exchanged signals. The physical layer is the actual NIC and the Ethernet cable.</b>	<b>IEEE 1394, DSL, ISDN</b>

# TCP and UDP Protocols

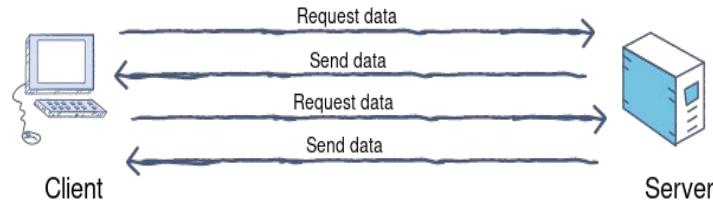
- Transmission Control Protocol (TCP) ensures a reliable and ordered delivery of a stream of bytes from user to server or vice versa.
- Transmission Control Protocol is a connection-oriented protocol.
- Acknowledgement segments
- Handshake- SYN, SYN-ACK, ACK
- Protocols that use TCP:HTTP, HTTPS, FTP, SMTP, Telnet
- Check for errors and heavyweight header in packet
- User Datagram Protocol (UDP) is not dedicated to end to end connections and communication does not check readiness of receiver.
- User Datagram Protocol is a connectionless protocol.
- No Acknowledgement
- No Handshake
- Protocols that use UDP:DNS, DHCP, TFTP, SNMP, RIP, VOIP
- Doesn't check for errors and lightweight header in packet

# TCP and UDP representation

TCP



UDP



# Data Packets

- Data is sent and received in packets.
- A packet can have multiple headers. In fact, most packets will have at least three headers. The IP header has information such as IP addresses for the source and destination, as well as what protocol the packet is. The TCP header has information such as port number. The Ethernet header has information such as the MAC address for the source and destination. If a packet is encrypted with Transport Layer Security (TLS), it will also have a TLS header.

# Types of Protocols

Protocol	Purpose	Port
FTP (File Transfer Protocol)	For transferring files between computers	20,21
SSH (Secure Shell)	A secure way to transfer files and remotely login to a system	22
Telnet	Remotely login to a system	23
SMTP (Simple Mail Transfer Protocol)	For sending emails	25
WhoIS	A command to query a target for information	43
DNS (Domain Name Service)	For translating URLs to IP addresses	53

TFTP (Trivial File Transfer Protocol)	Quick but less reliable FTP server	69
HTTP (Hypertext Transfer Protocol)	For displaying web pages	80
POP3 (Post Office Protocol v3)	Retrieves email	110
NNTP (Network News Transfer Protocol)	Used for network news group	119
NetBIOS	An old Microsoft protocol for naming systems on a local network	137,138,139
IRC (Internet Relay Chat)	Chat Room	194
HTTPS (Secure Hypertext Transfer Protocol)	Encrypted HTTP (SSL/TLS)	443
SMB (Server message Block)	Used by Microsoft Active Directory	445

# Network Certifications

# Cisco Certifications

