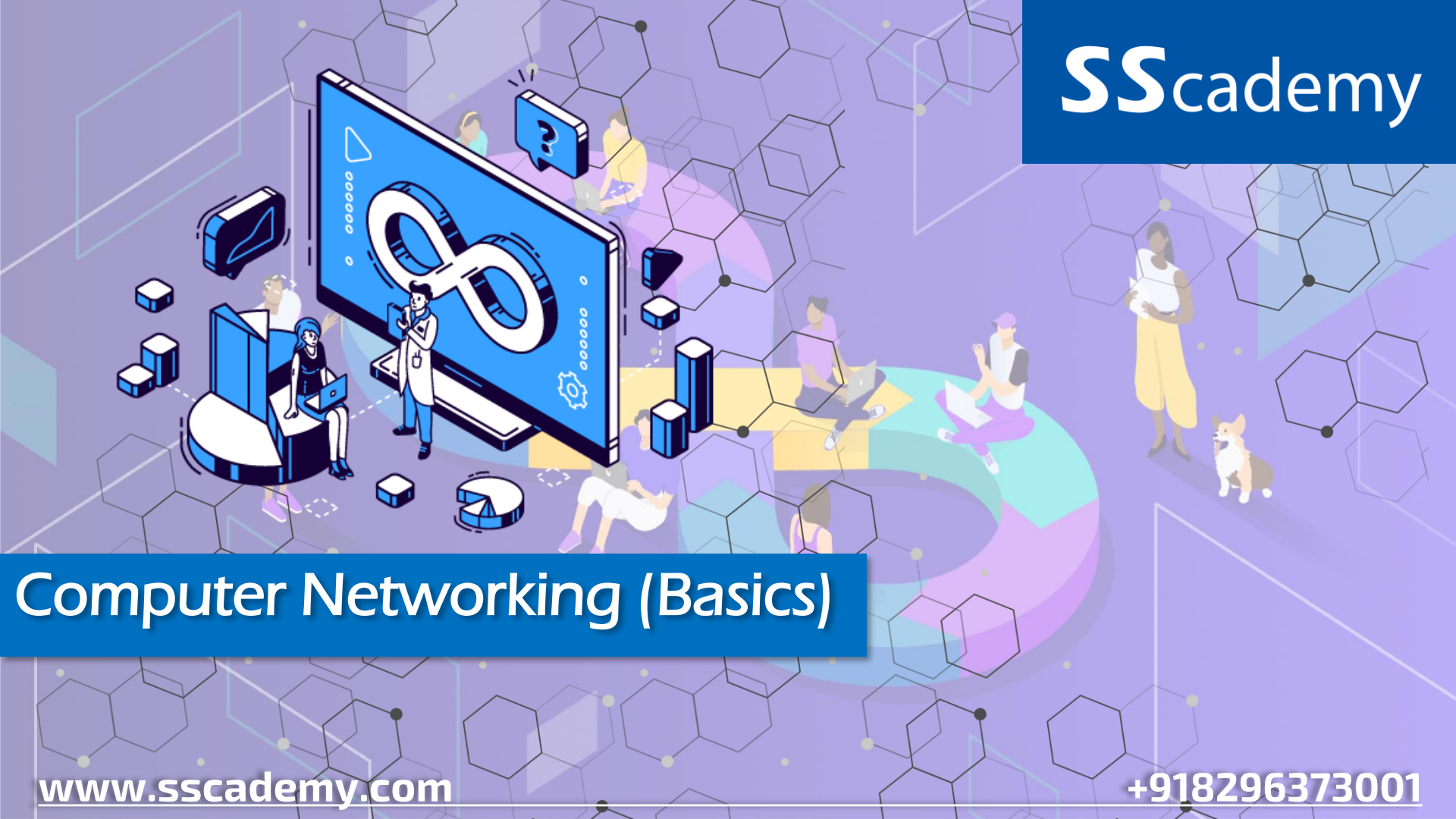

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Computer Networking (Basics)

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Contents

What is computer networking

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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 interface card (NIC) on each
4. Computer
5. Switches
6. Routers
7. Software called operating system(OS)

OSI Model

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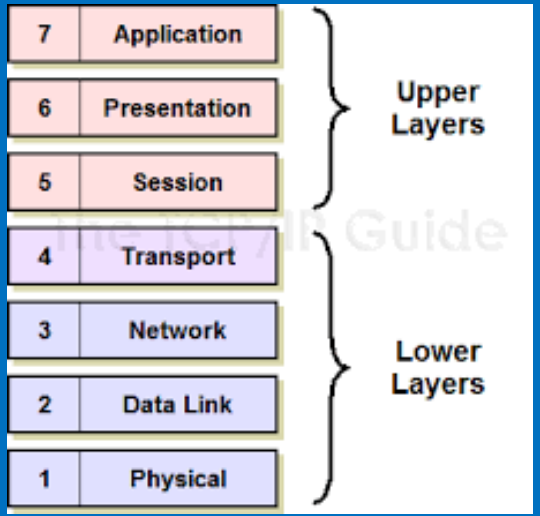
- People around the world uses computer network to communicate with each other
- For worldwide data communication, system must be developed which are compatible to communicate with each other
- There should be standard communication methods & devices
- **ISO (International Organization of Standardization)** has developed this standard
- This communication model is called as **Open System Interconnection (OSI)**
- ISO-ISI model is a seven layer architecture developed in 1984



OSI Model

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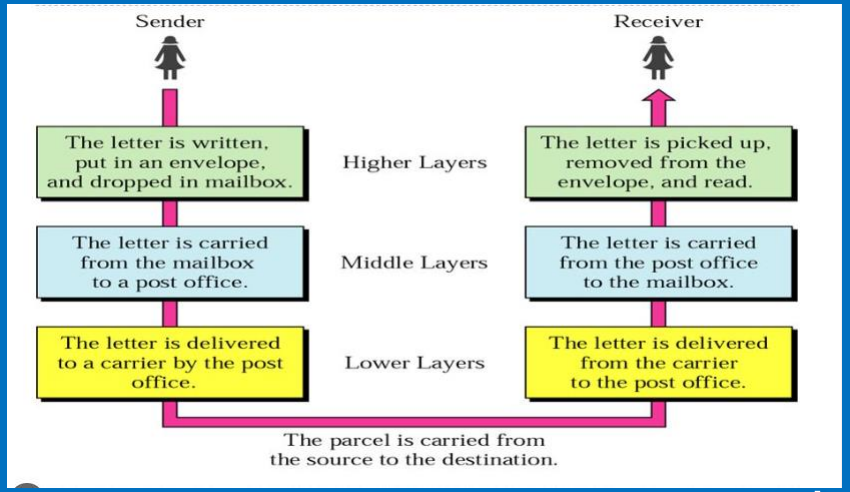
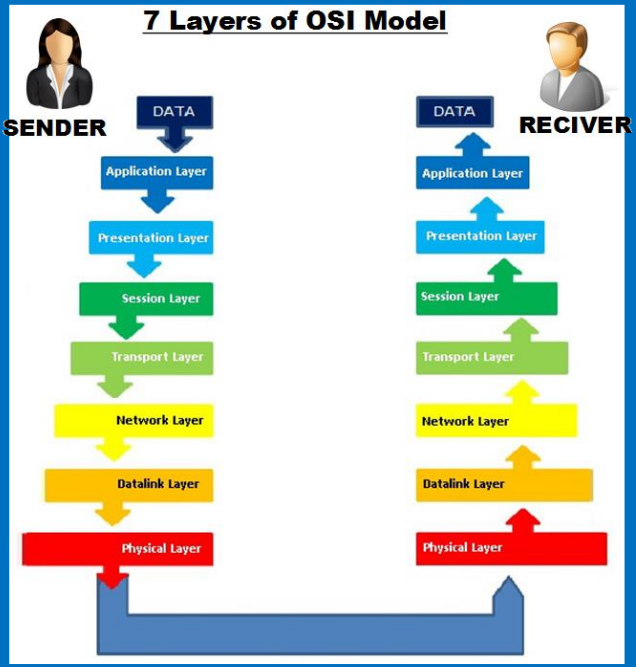
The basic elements of a layered model are

- Services
- Protocols
- And Interfaces

1. A Service is a set of actions that a layer offer 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





OSI Model

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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

Classification of Network by Geography

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1. LAN (Local Area Network)
2. WAN (Wide Area Network)
3. MAN (Metropolitan Area Network)
4. CAN (Campus Area Network)
5. PAN (Personal Area Network)

Switches

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

Routers

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A Router receives and sends data on computer networks. Routers are sometime confused with network Hubs, modems, or network switches. However, routers can combine multiple networks together.

IP Address

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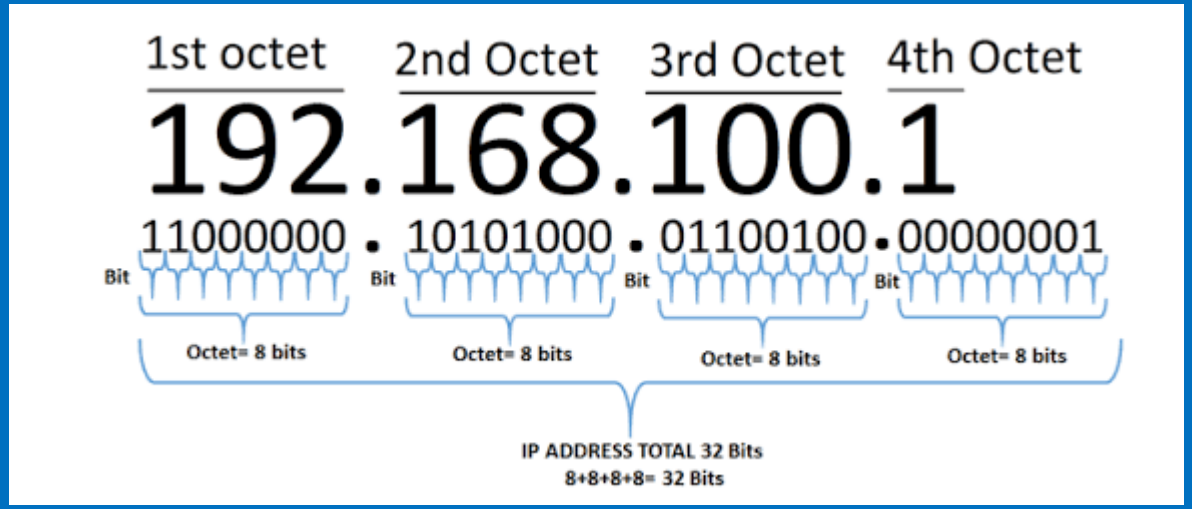
IPv4 Address: IPv4 is a 32-bit binary number which we mostly see in decimal format. Like 192.168.100.1



IPv4 Range

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- 0.0.0.0 – 255.255.255.255
- 00000000.00000000.00000000.00000000 (0.0.0.0)
- 11111111.11111111.11111111.1111111 (255.255.255.255)

Public & Private IP Division

- Public IP => Internet
  E.g. 54.86.23.90
- Private IP => For local network design
- E.g. 192.168.1.1

IP Address Classes

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- Class A : 0.0.0.0 – 127.255.255.255
- Class B : 128.0.0.0 – 191.255.255.255
- Class C : 192.168.0.0 – 223.255.255.255
- Class D & Class E : It is used for research and multi-casting

Protocols

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

TCP

- Slower but more reliable transfers
- Typical Applications:
  - File Transfer Protocol (FTP)
  - Web Browsing HTTP, HTTPS
  - Email

unicast

UDP

- Faster but not guaranteed transfers ("best effort")
- Typical Applications:
  - Live Streaming
  - Online Games
  - VoIP

DNS, DHCP, TFTP, ARP, RARP

unicast multicast broadcast

Protocols and Port numbers

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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

Networking Commands

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- ifconfig
- ping
- vi /etc/hosts
- tracert www.google.com
- netstat –antp : It will show all the TCP open ports
- ss –tunlp : Its new command
- dig www.google.com
- nslookup www.google.com
- route –n
- route
- mtr www.google.com
- telnet 192.168.1.100 22
- history

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QUESTION & ANSWERS

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