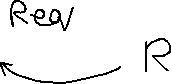
NETWORKING

Syllabus [7 layers of OSI model]:

1. Physical Layer – Cables, Topology, Transmission modes, encoding, lan, devices, modulation
2. Data Link – Stop & wait, go back and Selective Repeat, MAC Protocols, Switching, Error control, Ethernet frame format
3. Network – IP Addressing, routing protocols, IPV4 Header, IPV6 Header
4. Transport – TCP, UDP, Headers
5. Session
6. Presentation
7. Application
8. Network Security

INTRODUCTION

* **Computer Network**: Computer Networking is the practice of connecting computers together to enable communication and data exchange between them. Computer network is a collection of two or more computers. It helps users to communicate more easily.



Computer network generally contains two components – Sender (Client) and Receiver (Server)

When Sender and Receiver are in the same machine (like keyboard and monitor in a laptop), it is called inter-process communication and is controlled by the OS.

When the sender and receiver exist separately, the communication and data exchange is controlled by computer networks.

Functionalities:

* Mandatory – The functions that cannot be neglected when client is sending a request to the server.

Error control, Flow control, MUX DeMUX

* Optional – The functions that cannot be neglected when client is sending a request to the server.

Encryption/Decryption, Checkpoint

So that all of these functionalities are properly maintained and implemented, a standardized model called OSI model is created.

Basic Terminologies:

* Network – A network is collection of computers and devices that are connected together to enable communication and data exchange.
* Nodes – Nodes are devices that are connected to a network. These include Printers, Servers, Printers, Routers, Switches, etc.
* Protocol – A protocol is a set of rules and standards that governs how data is transmitted over a network. E.g. TCP/IP, HTTP, and FTP.
* Topology – Network topology refers to the physical and logical arrangement of nodes over a network. The common network topologies include bus, star, mesh, ring, tree.
* Service Provider Network – These types of networks give permission to take network capacity and functionality on lease from the provider.
* IP Network – An IP address is a unique numerical identifier that is assigned to every device on a network.
* DNS – The Domain Name System (DNS) is a protocol that is used to translate human readable domain names into IP addresses that computers can understand.
* Firewall – A firewall is a security device that is used to monitor and control incoming and outgoing network traffic.
* OSI Model – Open Systems Interconnection (OSI) model is a reference model that specifies standards for communication protocols and also the functionalities of each layer. The OSI, developed by the International Organization of Standardization, is a 7-layer architecture where each layer of OSI has different functions and each layer has to follow different protocols. The 7 layers are physical layer, data-link layer, network layer, transport layer, session layer, presentation layer, application layer.
* Types of Enterprise Computer Networks:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PAN | LAN | CAN | MAN | WAN |
| Full Form | Personal Area Network | Local Area Network | Campus Area Network | Metropolitan Area Network | Wide Area Network |
| Technology | Bluetooth, IrDA, Zigbee | Ethernet and WIFI | Ethernet | FDDI, CDDI, ATM | Leased Line, Dial-Up |
| Range | 1-100 m | Up to 2 km | 1-5km | 5-50 km | Above 50km |
| Transmission Speed | Very High | Very High | High | Average | Low |
| Area | Within a Room | Within office, building | Within University, Corporate Offices | Within a city | Within countries |
| Ownership | Private | Private | Private | Private or Public | Generally Public |
| Maintenance | Very Easy | Easy | Moderate | Difficult | Very Difficult |
| Error Rate and Cost | Very Low | Low | Moderate | High | Very High |

PAN

LAN

CAN

MAN

WAN