Unit - IV (Common Network Architecture)

#1 Connection Oriented and Connection-less Services

- Connection oriented services involves setting up a dedicated path between the source and the destination before data transfer begins.
- These service ensure that data is delivered in the correct sequence and without errors.
- In Connection-oriented services, the Handshake method is used to establish the connection between sender and receiver. Before the transmission start, connection-oriented services create a dedicated communication between the sender and recipent.

Key feature

- ↳ Dedicated connection
- ↳ Reliable transmission
- ↳ Sequencing
- ↳ Higher overhead

- Connection-less services send data without establishing a dedicated ~~connection~~ path between the source and destination.
- Each data packet is treated independently, and there is no guarantee of delivery or sequencing. Also not give a guarantee of reliability.
- In this packet do not follow the same path to reach their destination. Connection-less services deliver individual data packet without first maping a connection.

Key features

- ↳ No Connection setup
- ↳ Independent packets
- ↳ Faster transmission
- ↳ Unreliable.

(#) Difference between Connection - Oriented and Connection - less Services

Connection - Oriented

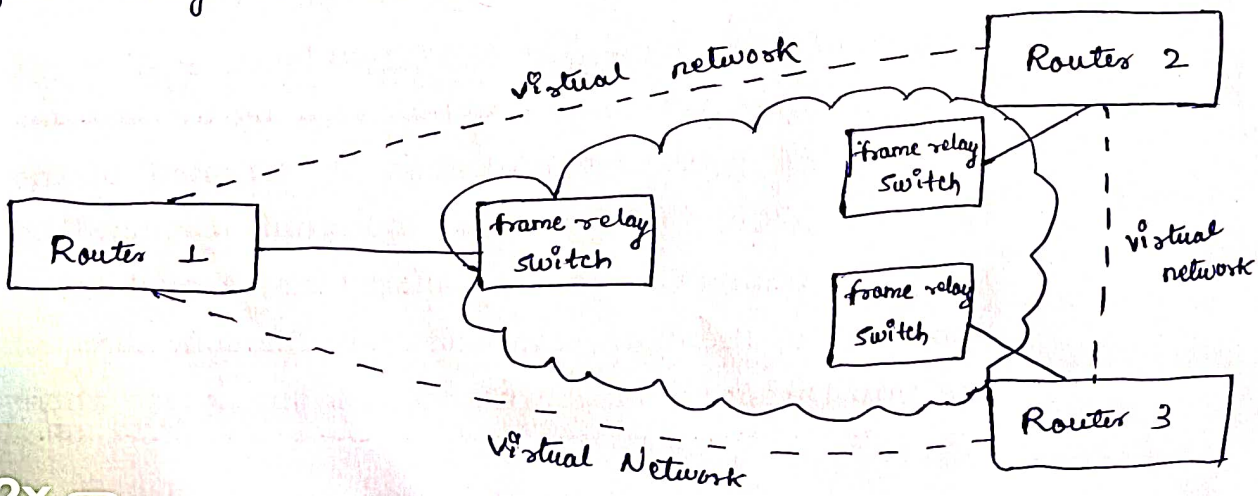
- It is related to telephone system
- Connection - oriented service is necessary.
- Connection - oriented service is feasible
- Congestion is not possible
- Includes error detection and correction
- Ex - TCP (transmission control protocol)

Connection - less

- It is related to postal system
- Connection less service is not compulsory.
- Connection less service is not feasible
- Congestion is possible
- No error handles, errors are not corrected.
- Ex - UDP (User datagram protocol)

(#) Frame Relay

- Frame Relay is a packet - switching network protocol that is designed to work at the data - link layer of the network. It is used to connection Local Area Network (LAN) and transmit data across wide Area Network (WAN).
- It allows transmission of different size packet and dynamic bandwidth allocation. It does not have an error control and flow management mechanism.



Working of frame Relay

frame relay uses packet switching technology, this means that it breaks data, into smaller packets also known as frames, to transmit it through a shared frame relay network.

These data packets are then reassembled at the data's destination. frame Relay has long been used as part of many companies.

frame Relay network is established between Local area Network (LAN) such as routers. and (WAN) wide Area Network.

for data transmission, LAN's router send the data packet over the access link. The packet sent by LAN is examined by frame relay switch to get the Data link Connection Identifier (DLCI).

Advantages

- ↳ High speed
- ↳ Reduce network congestion
- ↳ Cost effilent
- ↳ secured connection

Disadvantages

- ↳ Lacks error control mechanism
- ↳ less reliable

(#) ATM Ethernet

ATM and Ethernet are two different networking technologies that have been used for data transmission.

ATM (Asynchronous Transfer Mode)

- ATM is a high speed, connection oriented technology that uses fixed size cells (53 bytes) for data transmission.
- It was designed to handle both traditional high throughput data traffic and real time, low latency content such as voice and video.
- Connection Oriented Services

- It operates primarily at data link layer of OSI model.

Ethernet

- Ethernet is a widely used networking technology that uses variable sized packet for data transmission.
- It is a connectionless technology meaning it does not establish a dedicated path between the sender and receiver before data transmission.
- It is commonly used in Local area network (LAN) and operates at data link layer of OSI model.

Wireless LAN's

- A wireless Local Area Network (WLAN) is a type of network that allows devices to connect and communicate wirelessly within a specific area lik in office, home etc.
- WLAN transmit data over radio signals and the data is sent in the form of a packet. Each packet consist of layer, labels and instruction with unique mac address.
- A WLAN is a collection of nodes interconnected with each other for the purpose of data sharing, transmitting message over the internet.

Characteristics

- ↳ Seamless operation
- ↳ Low power for battery use
- ↳ Simple management
- ↳ Robust transmission technology
- ↳ Reliability.

(#) Bradband Network

Broadbank networks are a type of high speed internet connection that is always on and faster.

These network use a wide bandwidth to transmit multiple signal and data simultaneously. allowing for efficient communication and data transfer.

ISDN

- Integrated Service Digital Network
- The Integrated Service Digital Network (ISDN) is a set of communication protocols that enables the simultaneous digital transmission of voice, video, data and other network service.
- ISDN is a circuit - switched telephone network system that transmit both data and voice over a digital line.

Types

(1) Basic Rate Interface (BRI)

- BRI is the lower tier of service. It only provide basic needs at a lower cost.
- BRI has two B channel (Bearer channel) and one D channel (Data channel)
- Commonly used for small business, homes and offices.

(2) Primary Rate Interface (PRI)

- PRI is the main service. It provides a better connection, more reliable service, and faster speed.
- PRI has 23 B channel and 1 D channel.
- PRI is typically used by large business, government agencies and telecommunication companies.

Internet and Protocols

WWW

- World wide Web, it is also simply known as web.
- WWW is a collection of website or webpage that are stored in a web server and connected to local computer through the internet.

  Website contains text pages, images, audio, video etc.
- The building block of web are web pages which are formatted in the "HTML" and connected through link known as "hypetext".
- It was invented by Sir Tim berners Lee in 1989 while he was working at CERN, Europen organization for nuclear researth
- The web allows user to navigate between the web pages connected between using hyperlink that connect one pages to another.
- WWW has became an integral past of life, enabling everything from social networking and online shopping to remote work and e-learning.

DNS

- DNS stands for Domain Name System
- DNS is a fundamental component of internet that translate human readable domain names like, www.example.com into machine readable IP address like 192.0.2.1.

  This translation process is crucial because as human uses domain names to access to website like wise computer and network equipment uses IP address to route information.
- It enables ~~da~~ computer to locate and communicate with each other on internet.
- Types of Domain
  - ↳ Generic domain - .com (Commercial), .edu (educational).
  - ↳ Country domain - .in (India), .us, .uk
  - ↳ Inverse domain

E-mail

- E-mail stands for Electronic mail.
- It is a method of exchanging message from one computer to another through the internet.
- It allows communicating with people all over the world.

Basics

① An email address - Unique address for each user
Ex- name @ domain . com.

② An email clint - This is a software program used to send, receive and manages email. Ex- Gmail, outlook.

③ An email server - This is a computer system responsible for sending email to their recipents.

- An email is one of the most widely used services of internet. This services allows user to send messages in a formatted manner know as mail through the internet.

Uses :-

↳ Used in various sector, big organization and large group of people
↳ It allows to send and receive messages, audio, video etc.
↳ E mail can also be used for personal communication.

E mail protocols

① SMTP

- simple mail transfer protocol
- SMTP is used to send mail over the internet. SMTP is an application layer and connection oriented protocol. SMTP is efficient and reliable for sending emails.
- SMTP uses TCP as transport layer as protocol.
- It handles the sending and receiving of messages between email server over the TCP / IP network..

(2) POP

- Post office protocol.
- POP is an application layer protocol that is used to retrieve email for a single client. POP 3 is a current version of POP used.
- It allows to access mail offline, thus needs less internet time. To access message it has to be downloaded.
- POP allows only a single mailbox to be created on the mail server.
- POP does not allow search facilities.

(3) IMAP

- Inesthet message access protocol
- IMAP is an application layer protocol that is used to retrieve email for a multiple client. Several version of IMAP is IMAP 2, IMAP 3, IMAP 4 etc.
- It allows to access emails without downloading them and also supports email downloads.
- IMAP allows multiple mailbox to be created on the multiple server. These email are maintained by remote server.
- IMAP allows serch facilities.

(4) MIME

- Multipurpose Internet mail extension protocal.
- MIME is an additional email protocols.
- It allows user to send and receive data like images, audios, videos etc. and other application program on internet.
- It allows to send multiple attachment with single message. It allows to send message of unlimited length.

FTP

- FTP stands for file transfer protocol.
- FTP is one of the easiest and common forms of transferring files on the internet.
- FTP is located in application layer of OSI model
- FTP is basic system that helps in transferring files between a client and a server.
- FTP is a client server protocol that has two communication channel, command channel for conversation and data channel for file content.
- FTP can works in different modes like in Active and passive mode.

Characteristics

- ↳ FTP uses TCP as transport layer protocol.
- ↳ It is good for simple file transfer
- ↳ Errors in transmission must be handle
- ↳ Uses only one connection known as port 69.

HTTP

- Hypertext transfer protocol
- HTTP is a main way web browser and server communicate to share information on internet. It was invented by Tim berner.
- Hypertext is a type of text that is specially coded with the help of standard coding language known as Hypertext Markup language (HTML)
- HTTP has several version HTTP/2, HTTP/3 is the latest version introduced in 2022.
- The difference between HTTPS and HTTP is HTTPS is a secure version of HTTP, it adds a security layer to Hyper Text Transfer Protocol.

TELNET - Remote Communication protocol

- TELNET stands for teletype network. It is a client/server application protocol.
- TELNET is a type of protocol that enables one computer to connect to the local computer. It is used as TCP/IP Protocol for virtual terminal which is provided by ISO.

  The computer which starts the communication is known as local computer and the computer which is connected to the local computer is known as remote computer.

Logging in TELNET

Logging process can be categorized into two types :-

1. Local Login

   whenever user log into local system it is known as local login.
2. Remote login

   whenever user logs into remote computer then it is known as Remote login.

Uses

- ↳ Remote administration and management
- ↳ Network diagnostic
- ↳ Automation
- ↳ Understanding command line interface.

Advantages

- Saves lot of time
- Provide remote access to someone's computer system

Proxy Server

- Proxy server refers to the server that act as intermediary between the request made by clients and particular server for some services or request for some resource.
- There are different types of proxy server available that are put into use according to the purpose of request made by the client to the server.

- The basic purpose of proxy server is to protect the direct connection of Internet clients and Internet resources. There are many proxy provider in the market that provide services to both individual and business.

Need of Proxy Server

- ↳ Deafet Hackers.
- ↳ filtering of Content
- ↳ Privacy benefits
- ↳ Security

Reason of Using Proxy Server

- ↳ Improving your privacy
- ↳ Improving your online security
- ↳ Blocking Access to unwanted website
- ↳ providing faster speed.

(#) Working of Internet Application

The actual of internet takes place with the help of client and server. Here the client is a laptop that is directly connected to the internet and the server are the coputers connected indirectly to the internet they are having all website stored in the large computer.

Each website has its domain name as it is difficult for any person to remember the long number or string. so whenever you search for any domain name in search bar of browser the request will be sent to the server and that server try to find the IP address of domain name because it cannot understand the domain name. After getting the IP address server will try to search the IP address of domain name in DNS server.

The browser will pass further request to respective server and server will process the request to display the content of website which the clients wants.