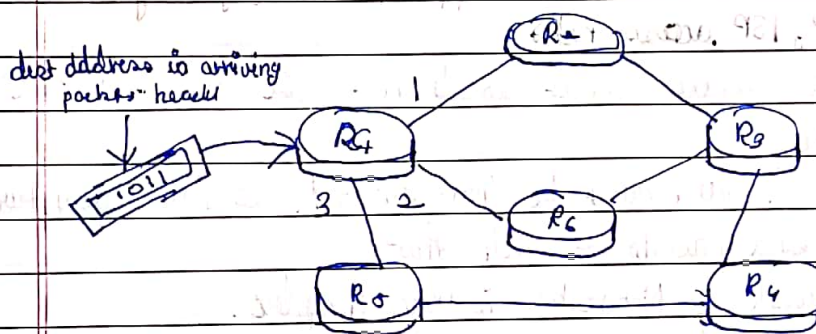


CN Questions

Q1) Explain with a diagram the routing and forwarding that happens in packet switching networks.

- Packet switching: In packet switching hosts breaks the application-layer messages into packets.
- ~~In packet switching~~ ^{Then} the packets are forwarded from one router to the next, across links on path from source to destination.
- Each packet is transmitted at full link capacity.
- Routing: It determines the source-destination route taken by packets.
- Forwarding: It moves packets from Router's Input to appropriate router output.



Q2) Differentiate Between Packet Switching & Circuit Switching

- | Circuit Switching | Packet Switching |
|---|--|
| 1) In Circuit Switching there are 3 phases: <ul style="list-style-type: none"> i) Connection Establishment ii) Data Transfer iii) Connection Release | 1) In packet switching data transfer takes place directly. |
| 2) In Circuit Switching, data is processed at source system only. | 2) In Packet Switching, data is processed at all intermediate nodes including source system. |
| 3) Delay between data units in circuit switching is uniform. | 3) Delay Between data units in packet switching is not uniform. |

4) Circuit Switching is more Reliable.

4) Packet Switching is less Reliable.

5) Wastage of resources are in Circuit Switching

5) less Wastage of resources as compared to Circuit Switching

6) It is not a store & forward technique

6) It is a store & forward technique

7) Recording of packet is not possible in Circuit Switching

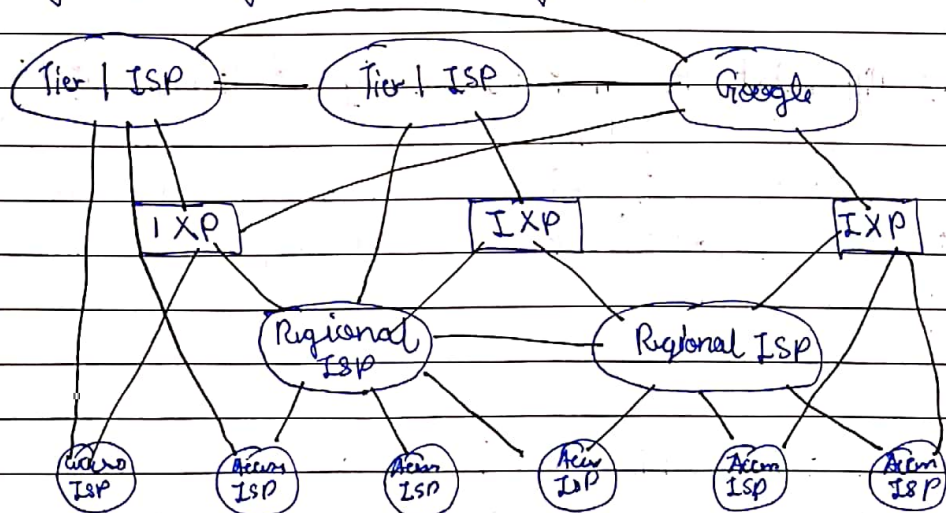
7) Recording of packet is possible in packet switching

3) Demonstrate the Internet with an appropriate figure for the same having IXP, ISP access rnts

Sol) → End systems connect to Internet via access ISP's (Internet Service Providers)

→ Access ISP's in turn must be interconnected so that any two hosts can send packets to each other

→ Resulting Network of Networks is very complex



→ Customer and provider ISP's have economic agreement, But if one global ISP is viable business, there will be Competitions which must be interconnected. and regional networks may arise to connect access rnts to ISPs, and the content provider Networks (eg. Google) may run their own network, to bring services, content close to end users.

4) Explain the practically Implemented network-model and its list the functionalities of each of the layer.

Sol) The ~~OSI Model~~ Open System Network model is a conceptual framework used to describe the functions of a networking system. The network-model characterizes computing functions into a universal set of rules & requirements in order to support interoperability between different softwares

→ The layers are:

1) Physical layer: The lowest layer of the OSI reference model is the physical layer. It is responsible for the actual physical connection between the devices

→ The functions are

a) Bit synchronization

b) Bit rate Control

c) Physical topologies

2) Data link layer: The data link layer is responsible for the node-to-node delivery of the message, Functionalities are

a) Framing

b) Physical addressing

c) Error Control

d) Flow Control

e) Access control

3) Network layer: It works for transmission of data from one host to the other located in different network, Functionalities are

i) Routing

ii) Logical Addressing

4) Transport layer: It provides services to the applications layer and takes services from the network layer, Functionalities are

i) Segmentation & Reassembly

ii) Service Port Addressing

5) Session layer: It is responsible for

i) Session establishment, maintenance & Termination

ii) Synchronization

iii) Dialog Controller

6) Presentation layer: the data from the application layer is extracted here and manipulated as per required format to transmit over the network, functionalities are

- i) Translation
- ii) Encryption / Decryption
- iii) Compression

7) Application layer: This layer serves as a window for the application services to access the network and for displaying the received info to the user, functionalities are

- i) Network Virtual Terminal
- ii) Mail Services
- iii) Directory Services

Q5) Compare the client server & P to P network architectures

Sol) → Client Server Architecture

- i) In this architecture, there is a server and many clients distributed over the network.
- ii) The server is always on while a client can be randomly run.
- iii) Usually there is no communication between two clients.
- iv) The server has fixed IP address.
- v) A server is able to communicate with many clients.
- vi) The applications such as FTP, WEB, e-mail etc use C-S architecture.

→ P to P network architecture

- i) There is no dedicated server.
- ii) Pairs of hosts are called peers.
- iii) Peers communicate directly with each other.
- iv) Many of today's most popular & traffic-intensive applications are based on P2P architecture.
- v) Examples include file sharing (Bit Torrent), Internet telephone (Skype) etc.

Q6) Explain stepwise non-persistent HTTP protocol

Sol) Step 1a: HTTP client initiates TCP connection to HTTP server at ^{School} www.google.com on port 80

Step 1b: HTTP server at host ^{School} www.google.com waiting for TCP connection at port 80 "accepts" connection, notifying client

Step 2: HTTP client sends HTTP request message (containing URL) into TCP connection socket. Message indicates that client wants object

Step 3: HTTP server receives request message, forms response msg. containing requested object, and send message into socket.

Step 5: HTTP client receives response containing html file, displays html. Parsing html file, finds 10 referenced jpeg objects

Step 4: HTTP server closes TCP connection.

Step 6: Step 1-5 repeated for each of 10 jpeg objects.

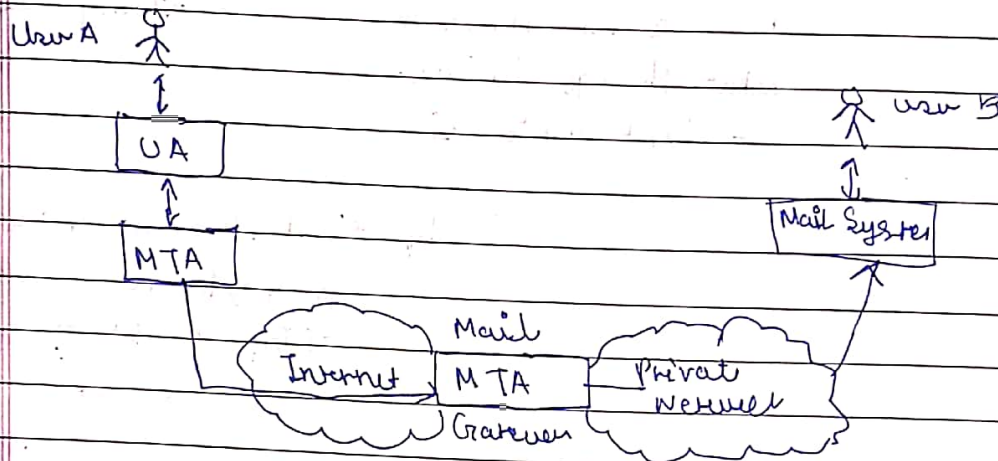
Q7) Demonstrate the interaction that happens in SMTP between A & B for sending and receiving the emails

Sol) → First, we will break SMTP client & SMTP server into two components such as user agent (UA) and mail transfer agent (MTA). The user agent (UA) prepares the message, creates the envelop and then puts message in the envelop.

Solved

The mail transfer agent (MTA) transfers this mail across Internet

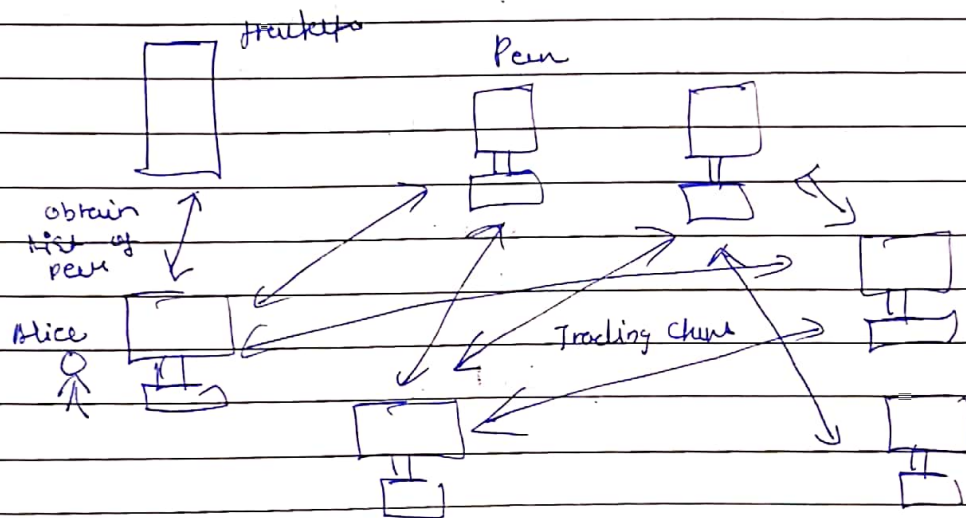
- SMTP allows more complex system by adding a relaying system. Instead of just having one MTA at sending side and one at receiving side, more MTA's can be added, acting either as a client or server to relay the email.
- This relaying system without TCP/IP protocol can also be used to send the emails to users, and this is achieved by the use of the mail gateway. The mail gateway is a relay MTA that can be used to receive an email.



Q 8) Apply working of P-to-P architecture for file distribution application Bit Torrent

- The Collection of all peers participating in the distribution of a particular file is called a torrent.
- Peers download equal-size chunks of the file from one another, i.e. chunk size = 256 KBytes
- The peer ~~has~~ also uploads chunks to other peers.
- Once peer has acquired the entire file, the peer may leave the torrent or remain in the torrent.
- Each torrent has an infrastructure node called tracker
- i) When a peer joins a torrent, the peer registers itself with the ~~tracker~~ tracker and periodically informs the tracker that it is in the torrent
- ii) When a new peer joins the torrent, the tracker

- randomly selects subset of peers from the set of participating peers and
- ~~Then the new peer~~ sends the IP addresses of these peers to the new peer
- iii) Then the new peer tries to establish concurrent TCP connections with all peers on the list
- iv) Periodically, the new peer will ask each of neighboring peers for set of chunks



9) Explain the working of FTP along with sample responses and codes.

→ ~~Working~~ Working :-

- i) When session starts, the client initiates a Control-Connection with the server on port 21
- ii) The client sends user-identity and password over the control-connection
- iii) Then, the server initiates data-connection to the client on port 20.
- iv) FTP sends exactly one file over the data-connection and then closes the data-connection
- v) Usually, the Control-Connection remains open throughout the duration of the user-session
- vi) But, a new data-connection is created for each file transferred with a session

Ex: 331 Username OK, password required

125 Data Connection already open; transfer starting

425 Can't open data-connection

452 Error writing file.

10) Explain working of FTP along with Sample Reqs

11) 10) E What is Internet Protocol Stack? Explain Services provided by each layer

Sol: Internet Protocol Stack is the first layer that introduces the virtual network abstraction that is the basic principle of the Internet Model.

Application
Transport
Network
Link
Physical

→ Application: It supports network applications like

Ex: FTP, SMTP, HTTP

→ Transport: It provides process to process data transfer or communication. like E: TCP, UDP

→ Network: Routing of datagrams from source to destination
Ex: IP, routing protocols

→ Link: Data transfer between neighbouring network elements
Ex: Ethernet, WiFi, PPP

→ Physical: They are sometimes omitted, It represents different types of physical media that can be used for communication

Q 12) Describe the following

i) Packet loss

ii) Delay

iii) Throughput

Sol i) Packet loss:- When accessing ~~any network~~ the internet or any network, small units of data called packets are sent and received. When one or more of these packets fail to reach its intended destination, this is called PL.

ii) Delay :- It is a design and performance characteristic of Communications Networks, It specifies the latency for a bit of data to travel ~~across~~ across the network from one Communication endpoint to another.

iii) Throughput :- It is the rate at which bits are transferred between sender / receiver.

⇒ Instantaneous:- rate at given point in time

⇒ average:- rate over longer period of time.

13) Difference between TCP & UDP Services

See → Transmission Control Protocol

User datagram Protocol

1) TCP is reliable as it ~~guarantees~~ guarantees the delivery of data to the destination router

1) The delivery of data to the destination cannot be guaranteed in UDP

2) Acknowledgment segment is Present

2) No Acknowledgment Segment

3) TCP is comparatively slower than UDP

3) UDP is faster, Simple and more efficient than TCP

4) Retransmission of lost packets is possible in TCP ~~but not in UDP.~~

4) There is no retransmission of lost packets in the UDP

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5) TCP is heavy-weight

5) UDP is light-weight

6) TCP doesn't Support Broadcasting

6) ~~It~~ UDP Supports Broadcasting

7) Uses handshake such as SYN, ACK & SYN-ACK

7) It is a Connectionless protocol i.e. No Handshake