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Q1
=.No Back N

Retransmits all the frames that sent after the frame which suspect to be damaged or lost.

If error rate is high, it wastes a lot of bandwidth.

Less complicated

Window size is $N - 1$

Sorting is neither required at sender side nor receiver side.

No searching of frame is required on fly side.

NAK numbers refers to the next expected frame number.

It more often used.

Selective Repeat

Retransmits only those frames that are suspected to be lost or damaged.

Comparatively less bandwidth is wasted in retransmitting.

More complex as it requires to apply extra logic and sorting at sender and receiver.

Window size is $\leq (N+1)/2$.

Receiver must be able to sort as it has to maintain the sequence of frames.

Sender must be able to search and select only requested frame.

NAK refers to frame lost.

It is less in practice because of complexity.



Q2 TCP Segment Structure

It consists of data bytes to be sent and a header that is added to data by TCP as-

- The header of TCP segment can range from 20-60 bytes.
- 40 bytes are for options. If there are no options, header is of 20 bytes else it can be upmost 60 bytes.

It works together with IP and provides a reliable transport service between processes using network layer device by IP Protocol.

Let us understand what is TCP first.



TCP Segm

- TCP is a connection oriented protocol. Connection oriented means the communicating devices should establish a connection before transmitting data and should lose connection after transmitting the data.
- TCP is reliable as it guarantees delivery of data to destination router.
- TCP provides error checking mechanisms. It is because it provides flow control and acknowledgement of data.
- TCP is comparatively slower than UDP.
- TCP has 20-60 bytes variable length header.
- TCP is heavy-weight.
- It is used by HTTP, HTTPS, FTP, SMTP and Telnet.

TCP

Now about structure

→ Process - Process Communication

The transfer of data takes place between individual processes executing on end system.

→ Stream Oriented

Data is sent and received as a stream of bytes unlike UDP or IP.

→ Full Duplex Service

Communication can take place in both direction at same time.

→ Connection Oriented Service

It defines 3 phases

- Connection establishment
- Data Transfer
- Connection Termination



→ Reliability

It uses its own error detection, attempts to retransmit lost or corrupted data packets.

→ Mult.plexing

TCP does it at sender and receiver ends respectively as no. of logical connection can be established between port numbers.

Q3

Mobility

- Mobility in networks basically refers to a node.
- Mobile Node changing its point of attachment to network while its communication to network remains uninterrupted.
- Change in MNP (Mobile Node) point of attachment to network is called hand over.
- Mobility of Node is called Host Mobility, and the mobility of subnet is called Network Mobility.
- In addition, there is a personal mobility which refers to ability of user to access services regardless of terminals or networking he/she is using, and focuses on result of user rather than devices.

• And there is again one session mobility which refers to mobility between two terminals and is mainly about tracking communication session between a nodes as they move.

Mobile IP

Mobile IP aka MIP is an "Internet Engineering Task Force" standard communication protocols that designed to allow mobile device users to move from one network to another while maintaining a permanent IP address.

The IP networks routing is based on stationary IP address, similar to our a postal letter is delivered to fixed address or envelope. A device on such network is reachable

through IP routing by its address assigned on network.

Components of mobile IP

- Mobile Node
- Home Agent
- Foreign Agent
 - a. Mobile Node is device such as cell phone, personal digital assistant, or laptop whose software enables network location capabilities
 - b. Home Agent is a router on home network serving as anchor point for communication with mobile node.
 - c. The Foreign Agent is a router that may function as the point of attachment for mobile node when it roams to foreign network.



delivering packets from Home Agent
to Mobile Node.

It has 3 main phases

- Agent records

A mobile Node discovers its Foreign and Home Agents during agent discovery

- Registration

It registers current location with Foreign and Home Agent.

- Tunneling

A reciprocal tunnel is set up by Home agent to care-of address to route packets to Mobile Node as it roams.

Q5

link state routing

- link state routing second family of routing protocols.
- While distance vector routers use a distributed algorithm to compute their routing tables, link state routing uses link-state routers to exchange messages that allows each router to learn the entire network topology.
- Based on this, each router is then able to compute its routing table by using shortest path computation.

Features

- Link State Packet

A small packet that contains routing information



Link state database

A collection of information gathered from link state packet.

Shortest Path First Algo (Dijkstra)

Calculation performs on database results into shortest path.

Routing Table

A list of known paths and information

NOTE Each router shall have the knowledge of its neighbourhood with every other router in internetwork.

There are 3 main things:

1. Knowledge about neighbourhood.
2. Flooding
3. Information sharing



Algorithm

$N = \emptyset AY$

for nodes in V :
if v adjacent to x :
 if $D(v) = C(A, v)$
else:
 $D(v) = \text{infinity}$.

for loop end

find w not in N & $D(w)$ is min

Add w to N

now, $D(v)$ for all v adjacent to w
and not in N :

$$D(v) = \min(D(v), D(w) + c(w, v))$$

loop till all nodes in (N) .

Q6

Explain Multiple Access protocol in detail.

Ans.

Definition:

When a sender and receiver have dedicated link to transmit data packets, the data link control is enough to handle the channel.

Multiple Access Protocols

Random Access Protocol

- ALOHA
- CSMA
- CSMA/CD
- CSMA/CA

Controlled Access

- Reservation
- Polling
- Token passing

Channelization Protocol

- FDMA
- TDMA
- CDMA

A. Random Access Protocol

All stations has equal probability to send data over a channel.

In this one or more stations cannot depend on another station nor any station control another station.

B. Controlled Access Protocol

- It is method of reducing data frame collision on shared channel.
- In this each station interlaces and decides to send a data frame by particularly station approved by all other stations.
- Single station cannot send data frames unless all other stations are not approved.

C. Channelization Protocols

- It is a protocol that allows data with bandwidth in a shared channel to be shared across multiple stations based on their time, distances and codes.
- It can access all stations at some time to send data frame to channel.



Q7 CSM A

CSMA is media access control (MAC) protocol in which a node verifies the absence of other traffic before transmitting on shared transmission medium such as electric bus.

A transmitter attempts to determine whether another transmission is in progress before initiating a transmission.

- If a call is sensed, node waits for transmission phase to end before trying.
- Transmission by one node will generally be heard by all other nodes connected to medium.



CSMA / CD

- CSMA / CD stands for Carrier Sense Multiple Access / Collision Detection.
- It is a network protocol for carrier transmission. It is popular in medium access control layer.
- It senses if the shared channel is busy and broadcasting until the channel is free.
- In CSMA / CD collision is detected by broadcast sensing from other stations.
- Upon collision detection, the transmission is stopped and a jam signal is sent by stations and then station waits for random time context before retransmission.

Algorithm

Waiting time = back-off time

let n = collision number of previous serial no.

Then,

waiting time = $k \# \cdot T_{slot}$

where $k = [0, 2^n - 1]$

Q8 U LANs Using Switch

ULAN is a set of end stations and switch ports that connects them.

You can have different reasons for logical division such as department or project membership.

The only physical requirement is that the end station and port to which it is connected both belong to same ULAN.

The private & edge ULAN facilitates you at protection between ports located on the switch.

This means that protocol port cannot forward traffic to another protocol port on same switch.

