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(1).

→ Upper 4 Layers of TCP models are—

1. Application Layer.

PDU → Data

Protocols → SMTP, FTP, HTTP, DNS, SNMP, TELNET.

Functionality: It directly interacts with the user. It translates, encryptes and compresses data if necessary. it enables data exchange over networks. Handles tasks like, file transfer, authentication, email delivery etc.

2. Transport Layer:

PDU → Segment, Datagram.

Protocols → SCTP, TCP, UDP.

Functionality: Transport layer ensures reliable data transfer between hosts. It can be both connectionless or connection oriented. It also ensures reliable delivery or best delivery. Other functionalities of this layer are, flow control, connection control and Error control.

3. Internet Layer

PDU → Packet.

Protocol → IP

functionality: The internet layer ensures the addressing and routing of data packets. By adding IP address it ensures the correct destination. Encapsulates the transport layer. For easy and secure transmission it divides the data stream into segments also does the reassembly.

4. Host to Network Layer (Physical & DataLink):

PDU → Frame

Protocols → Does not define any specific protocol. Supports all standard protocols.

Functionality: It deals with transmission of frames over the Local network. Other tasks it handles are physical addressing, flow, error and access control. It encapsulates IP packets into frames. Handles errors and retransmission.

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→ Here a computer is sending a frame to another computer using a bus topology LAN. Frame is the PDU of Data Link Layer. In this step a header is added to the frame to define the sender/reciver which is physical addressing. Now, here comes what happens when their physical destination addressing is corrupted in Bus topology LAN. Data Link Layer has a functionality Error control which is basically adding reliability to the physical layer. It is done by adding a trailer to the end of the frame in order to detect and retransmit damaged frames. Now, in bus topology if the physical address is damaged the intended receiver will not get the fram. but it will still be broadcasted to all devices of the bus. No device will receive the frame as it don't matches with their address because of corruption and. Bus topology has no direct or buit-in mechanism to understand ultimately the sender that the process frame was not delivered.

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In order to understand the error bus topology has to depand on error control mechanism which data Link Layer provides as discussed here earlier. It is like in a spcific time if the sender doesn't receive the acknowledgement from the receiver it will understand that the attempt was unsuccessful and will retransmit again.

(3)

→ As the question says Tom an Jerry have option of two protocols, one makes sure the delivery of data maybe in slower rate and another ensures fast fast delivery and less prioritizes reliability. These 2 protocols are TCP and UDP.

UDP is a fast protocol. UDP stands for "User Datagram protocol". UDP is connectionless and doesnot provides guranteed delivery or error control mechanisms.

→ Pros:

1. It ensures faster data transfers.
2. Due to simplicity, UDP have less delay in the transmission compared to TCP.
3. It don't includes extra packets for re-transmission or acknowledgment which allows it less bandwith consumption.

→ Cons:

1. UDP don't provide any built-in error detection or recovery mechanisms.
2. Data transfer is unreliable. Packets can be lost.
3. It don't provides ordering or reliability so they have to implement their own mechanisms.

TCP or Transmission control protocol is a reliable protocol for data delivery since it ensures acknowledgement, retransmission and error detection.

Pros:

1. TCP ensures reliability that all data sent from the sender is received by the receiver.
2. By including checksums and sequence numbers it handles error detection and handling.
3. It ensures that the order sender sent the message receiver receives exactly same order.

cons:

1. TCP is a slower protocol due to all it's mechanism
2. As it ensures many mechanisms like retransmissio data delivery acknowledgment it uses higher bandwith.

Now, which one will be best for Tom and Jerry depends on their requirement. If they want to choose reliability they need to use TCP. But if they want fast delivery they need to choose UDP.

(4)

→ According to the Question in a crucial level of game me and my friend have to work together and decides to save the game at regular intervals so that none of us lose the g progress in the game. Even if one of us lose can continue from the last saved point. This procedure resembles the "session" Layer of OSI model.

To be more specific, session Layer have specific responsibilities Like - dialog control and Syncronization. In the dialog section two system enters into a dialog. through a connection of either half-duplex or full-duplex mode exactly like me and my friend need to work together. Again in the syncronization step the system adds check points to the stream of data to secure the transmission process. It works like this ~~a section of~~ data will be send to reciver but if a section gets lost it can simply check the checkpoint from which point the data

is lost. After identifying the point sender can again send that specific section of data. So, no need to send the entire data again. This is similar in case of me and my friend about saving at certain point so that if one loses can start from the previous saved point no need to start over again. So, the explained procedure resembles the Session Layer of OSI Model.

(5)

(a) → Application Layer.

(b) → Transport Layer and Data Link Layer.

(c) → Physical Layer.