Data Communication and Internet Protocol Assignment

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CS3032

1) To differentiate between X.25 and Frame Relay.

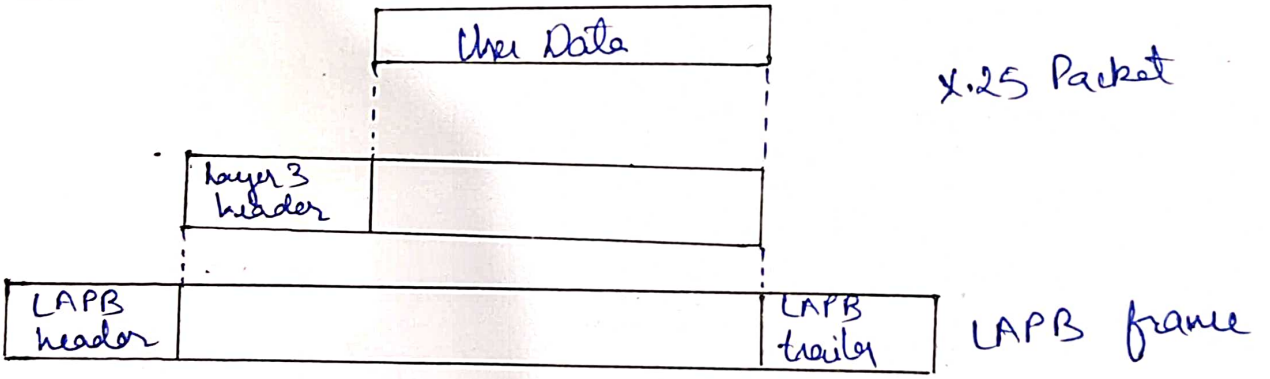
X.25	Frame Relay
a) Protocol layers: Operates at both layer 2 (Data Link layer) using LAPB (Link Access procedure Balanced) and layer 3 (Network layer). It uses both layers for flow and error control.	a) Protocol layers: Operates primarily at layer 2 (Data Link) and eliminates layer 3 functions. It does not include flow and error control at network layer.
b) Flow and Error Control: Uses hop-by-hop flow control and error control. It ensures that data is reliably delivered by handling errors and retransmission at each node.	b) Flow and error Control: Removes hop-by-hop flow and error control. Instead, it relies on the end system or higher-layer protocol (like TCP) to manage errors and flow control.
c) Overhead: Has significant overhead because it maintains virtual circuits with state tables at each hop, requires the exchange of control frames and manage flow and error control at both layer 2 and layer 3	c) Overhead: Reduces overheads by eliminating the need for state tables and control frames at each intermidiate node. It only checks for frame errors and forwards or discards frame accordingly, resulting in faster data transmission

X.25	Frame Relay
Connection Handling: Uses Virtual circuits that carry both user data and call control packets on the same channel, leading to additional processing requirements.	Connection Handling: Seperates call control from user data by using different logical connection. This simplifies the process of connection managment at intermidiate nodes.
Performance: Is designed for older, less reliable networks with lower data rates and more errors, making it slower and less efficient on modern, reliable networks.	Performance: Is optimized for high speed, low error environment (like optical fibre networks). It offers higher throughput and lower latency compared to X.25
Reliability: Provides high reliability by managing data transmission on a link-by-link basis with acknowledgements and retransmissions for error handlings	Reliability: Assumes a more reliable network, thus discarding erroneous frames without retransmissions. This can lead to higher performance but requires higher level protocols to manage any potential data loss.
Use-Case: Is suited for older, error prone networks where reliable delivery of data is critical, even the expense of speed.	Use Case: Is designed for modern networks with reliable transmission mediums, where speed and efficiry are prioritized over robust error handling.
Protocol Complexity: Is more complex due to its need for maintaining virtual circuits, handling flow control and providing error recovery at each hop.	Protocol Complexity: Simplifies the process by reducing the protocol stack and relying on end-to-end control, making it more suitable for high speed data transfer

X.25	Frame Relay
Transmission Control: Uses extensive control fields for data transmission which adds to its complexity and slower performance.	Transmission Control: Omits control fields using a streamlined frame format that allows for faster data transmission with minimal protocol interaction.
Congestion Control: Has built-in mechanism for managing network congestion through its error and flow control systems.	Congestion Control: Relies on higher-layer protocols for congestion management, focusing on speed and efficiency at the expense of detailed congestion control with protocol itself.

Diagram:

User data and X.25 Protocol Control Information



) Frame Relay User - Network Interface: