Lecture 01 Additional Notes

Circuit switching

Connection Establishment: Before data transmission begins, a circuit-switched network establishes a dedicated communication path, or circuit, between the sender and receiver. This involves setting up physical or logical connections across the network infrastructure.

Exclusive Use: Once the circuit is established, it remains dedicated to the communication session for its entire duration. This means that the bandwidth and resources allocated to the circuit are exclusively used by the sender and receiver, even if there is no data being transmitted.

Data Transfer: With the circuit in place, data can be transmitted between the sender and receiver without the need for address or routing information. The data simply flows through the established circuit.

Connection Release: When the communication session is complete, the circuit is released, freeing up the resources allocated to it. This allows other communication sessions to utilize those resources.

Packet switching

Packetization: Data to be transmitted is divided into smaller packets, each containing a portion of the original data along with header information. The header includes details such as the source and destination addresses, sequencing information, and error-checking data.

Routing: Once packets are created, they are sent into the network. Packet-switched networks use routers and switches to forward packets along the most efficient path toward their destination. Routers make forwarding decisions based on the destination address contained in each packet's header.

Transmission: Packets travel independently across the network, potentially taking different routes and encountering different network conditions along the way. They may be transmitted over various types of network links, including wired and wireless connections.

Reassembly: Upon reaching their destination, packets are reassembled into the original data stream based on sequencing information in their headers. If packets arrive out of order, the receiving device can reorder them before reconstructing the original data.

Packet switching offers several advantages over circuit switching:

Efficiency: Packet switching allows multiple communications to share the same network resources, leading to more efficient use of bandwidth.
Flexibility: Packet-switched networks can adapt dynamically to changing network conditions and traffic patterns.
Scalability: Packet switching scales well as the size and complexity of the network grow.
Resilience: Packet-switched networks are often more resilient to network failures and congestion, as packets can take alternative paths if one route becomes unavailable.