Topic 5: Transport and Application Layer

5.1 Transportation of Data

a) The transport layer is:

• responsible for logical communications between applications running on different hosts.

• The link between the application layer and the lower layers that are responsible for network transmission.

b) Transport Layer Protocols (TCP)

The transport layer includes the TCP and UDP protocols.

c) User Datagram Protocol (UDP)

• UDP is a connectionless protocol.

• UDP is known as a best-effort delivery protocol

d) The Right Transport Layer Protocol for the Right Application

• UDP is also used by request-and-reply applications
• TCP is used as the transport protocol.

5.2 TCP Overview

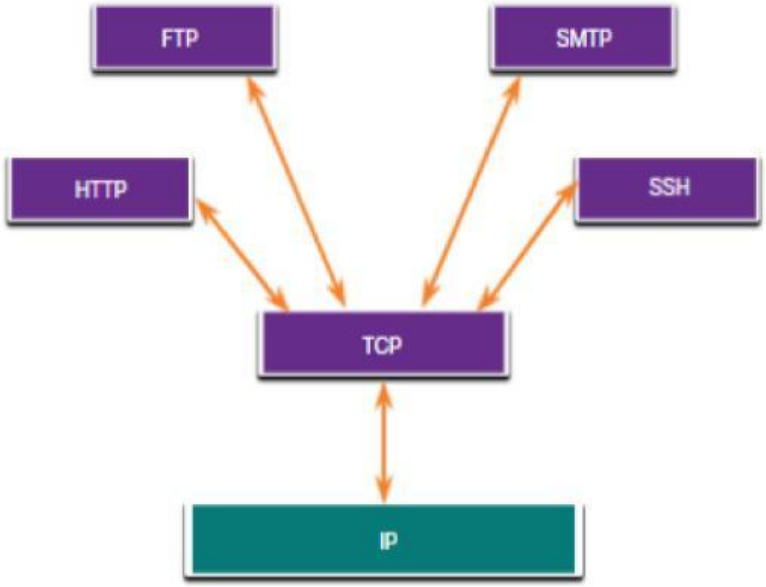
a) TCP Features

Features	Description
Provides Same-Order Delivery	Because networks may provide multiple routes that can have different transmission rates, data can arrive in the wrong order.
Establishes a Session	TCP is a connection-oriented protocol that negotiates and establishes a permanent connection (or session)
Ensures Reliable Delivery	TCP ensures that each segment that is sent by the source arrives at the destination.
Supports Flow Control	It can request that the sending application reduce the rate of data flow.

b) TCP Header Fields

TCP Header Field	Description
Source Port	A 16-bit field used to identify the source application by port number.
Destination Port	A 16-bit field used to identify the destination application by port number.
Acknowledgment Number	A 32-bit field used to indicate that data has been received and the next byte expected from the source.
Sequence Number	A 32-bit field used for data reassembly purposes
Header Length	A 4-bit field known as "data offset" that indicates the length of the TCP segment header.
Reserved	A 6-bit field that is reserved for future use.
Window size	A 16-bit field used to indicate the number of bytes that can be accepted at one time.
Control bits	A 6-bit field used that includes bit codes, or flags, which indicate the purpose and function of the TCP segment.
Urgent	A 16-bit field used to indicate if the contained data is urgent.
Checksum	A 16-bit field used for error checking of the segment header and data.

c) Applications that use TCP



5.3 UDP Overview

a) UDP Header Fields

UDP Header Field	Description
Destination Port	A 16-bit field used to identify the destination application by port number.
Checksum	A 16-bit field used for error checking of the datagram header and data
Source Port	A 16-bit field used to identify the source application by port number.
Length	A 16-bit field that indicates the length of the UDP datagram header.

b) Applications that use UDP