CSE3151

COMPUTER NETWORKS

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NETWORK LAYER

Medium Access Sublayer: Pure and slotted ALOHA, Persistent and Non persistent CSMA, CSMA with collision detection and collision free protocols, IEEE standard 802.3 and Ethernet.

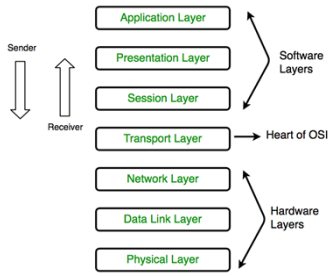
Data Link Layer: Types of errors, framing, error detection & correction methods; Flow control, Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC.

Network Layer: Internet address, classful address, subnetting, static vs. dynamic routing, shortest path algorithm, flooding, distance vector routing, link state routing, ARP, RARP, IP, ICMP.

Transport Layer: UDP, TCP, Connection management, Addressing, Establishing and Releasing Connection, Congestion control algorithm, Flow control and Buffering, Multiplexing.

Presentation Layer: Data Compression techniques, Frequency Dependent Coding, Context Dependent Encoding.

TRANSPORT LAYER



TRANSPORT LAYER

- **Various responsibilities of a Transport Layer –**
  - Process to process delivery
  - End-to-end Connection between hosts
  - Multiplexing and Demultiplexing
  - Congestion Control
  - Data integrity and Error correction
  - Flow control

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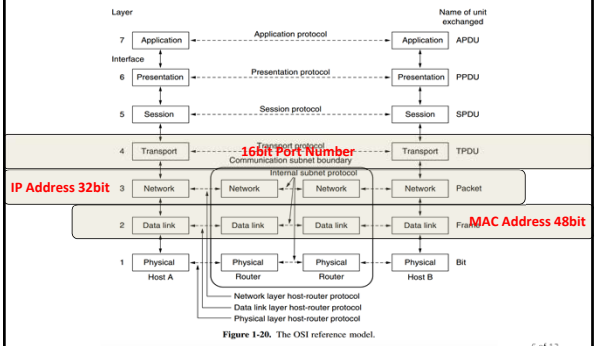
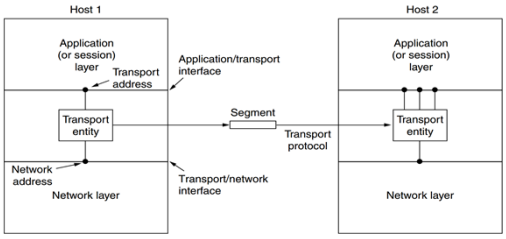


Figure 1-20. The OSI reference model.

TRANSPORT LAYER



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TRANSPORT LAYER

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TRANSPORT LAYER

- Two types of connection:
  - Connection oriented
  - Connectionless
- TCP –Transmission Control Protocol
- UDP – User Datagram Protocol

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TRANSPORT LAYER

- **Transmission Control Protocol (TCP)**
  - Transmission Control Protocol (TCP) is a connection oriented protocol, which means the devices should open a connection before transmitting data and should close the connection gracefully after transmitting the data.
  - … assure reliable delivery of data to the destination.
  - … protocol provides extensive error checking mechanisms such as flow control and acknowledgment of data.
  - Sequencing of data is a feature of Transmission Control Protocol (TCP).
  - Delivery of data is guaranteed if you are using Transmission Control Protocol (TCP).
  - Transmission Control Protocol (TCP) is comparatively slow because of these extensive error checking mechanism.
  - Multiplexing and Demultiplexing is possible in Transmission Control Protocol (TCP) using TCP port numbers.
  - Retransmission of lost packets is possible in Transmission Control Protocol (TCP)

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TRANSPORT LAYER

- **User Datagram Protocol (UDP)**
  - User Datagram Protocol (UDP) is Datagram oriented protocol with no overhead for opening a connection (using three-way handshake), maintaining a connection, and closing (terminating) a connection.
  - User Datagram Protocol (UDP) is efficient for broadcast/multicast type of network transmission.
  - User Datagram Protocol (UDP) has only the basic error checking mechanism using checksums.
  - There is no sequencing of data in User Datagram Protocol (UDP).
  - The delivery of data cannot be guaranteed in User Datagram Protocol (UDP).
  - User Datagram Protocol (UDP) is faster, simpler and more efficient than TCP. However, User Datagram Protocol (UDP) it is less robust then TCP.
  - Multiplexing and Demultiplexing is possible in User Datagram Protocol (UDP) using UDP port numbers.
  - There is no retransmission of lost packets in User Datagram Protocol (UDP).

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TRANSPORT LAYER

Situations when UDP is preferred over TCP

- SNMP (Simple Network Management Protocol)
- DNS (Domain Name System)
- Internet Radio
- LAN requests
- Router updates exchanges etc.

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TRANSPORT LAYER

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TRANSPORT LAYER

- Multiplexing allows simultaneous use of different applications over a network which are running on a host.

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TRANSPORT LAYER

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TRANSPORT LAYER

- Congestion is a situation in which too many sources over a network attempt to send data and the router buffers start overflowing due to which loss of packets occur. As a result retransmission of packets from the sources increase the congestion further

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TRANSPORT LAYER

- Transport layer checks for errors in the messages coming from application layer by using error detection codes, computing checksums, it checks whether the received data is not corrupted and uses the ACK and NACK services to inform the sender if the data is arrived or not and checks for the integrity of data.
- …fast sender and slow receiver

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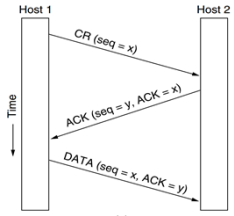
TCP Connection Establishing

- THREE WAY HANDSHAKE



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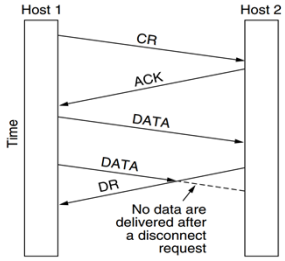
TCP CONNECTION RELEASE



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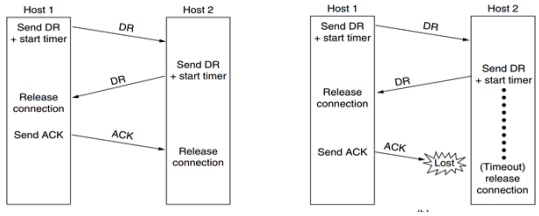
TCP CONNECTION RELEASE



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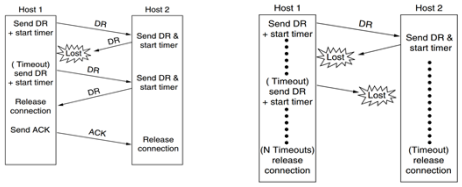

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