21BDS0340

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Computer Networks

Digital Assignment - 1

OSI - Open systems Interconnection

TCP/IP - Transmission Control Protocol/Internet Protocol

The OSI model was developed by the ISO standards organisation. This model is to provide a structure and format. The OSI model consists of 7 layers that are used for communication between computers

The TCP/IP is a different computer communication protocol and standard. This model only uses the bottom/lower comparable OSI layers.

OSI layers:

Physical - Lowest layer

Deals with transmission of data over an electrical/optical medium

Data Link Layer - Responsible for frame transfer

Network - Responsible for logical addressing of packets

Transport - Responsible for connection establishment

Session - Responsible for synchronisation and data transfer sessions

Presentation - Responsible for data representation and encryption

Application - Topmost layer

Responsible for providing the user access to network services

The TCP/IP protocols have equivalent structures for the physical to transport layer. The other layers are all together as the application layer.

For data transfer of M from A → B

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1. A prepares the message M to be sent, adding request content like headers.
2. The message is passed to the presentation, which encrypts the message
3. The session layer creates a session between A and B
4. The transport layer chooses the correct transmission protocol

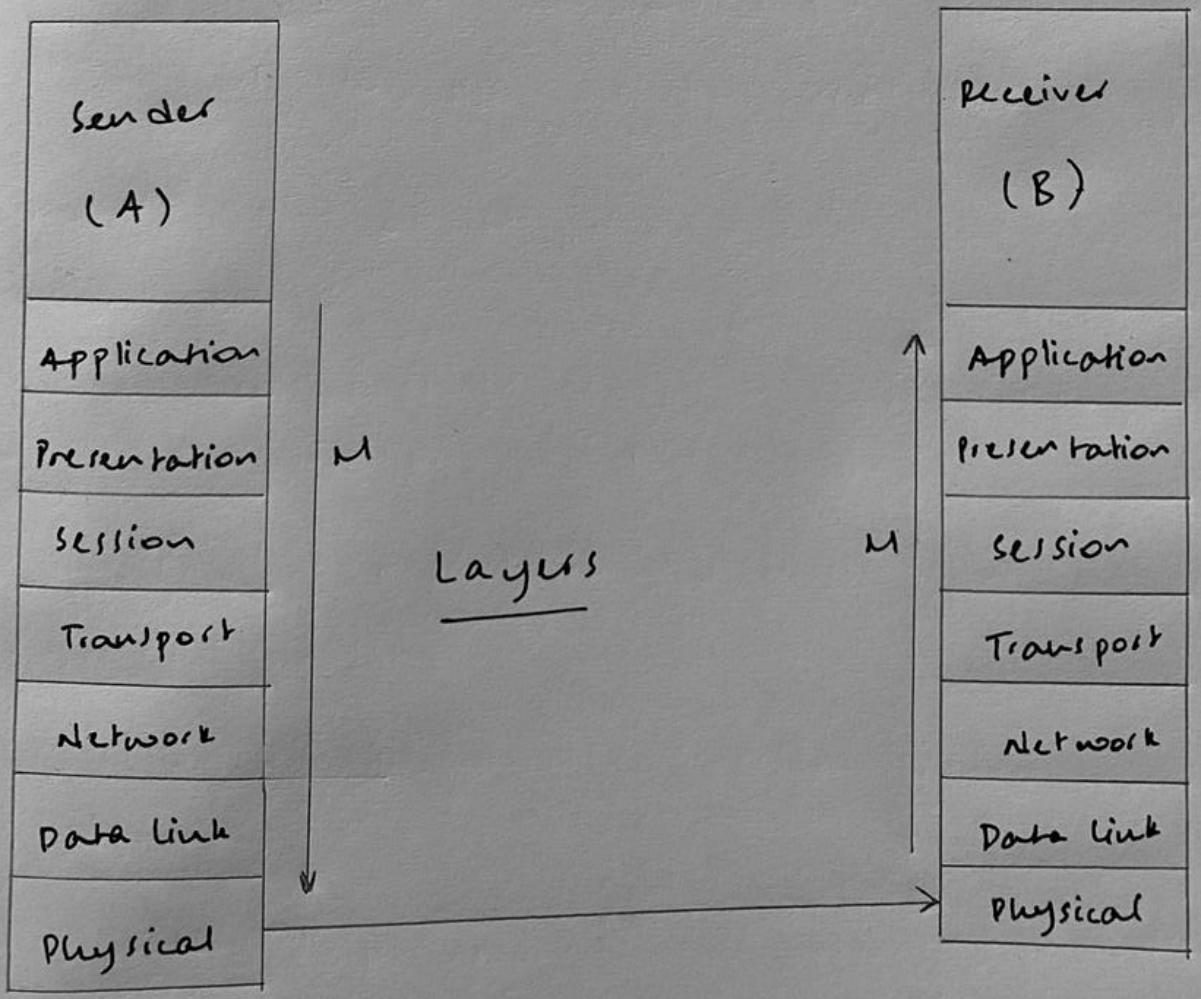
5. The network layer adds headers to indicate which computers are the source and destination

6. The packets are passed to the data link layer, which adds more headers like the MAC addresses

7. The packets are sent through the physical layer and are received by the destination.

8. The destination machine removes/checks headers then ~~encrypts~~ decrypts the message and then serves it as a response, repeating the steps 1-7 but to A.

The TCP/IP model will do the steps 1-3 together as one layer, then executes 4 onwards.



Question 2

Packet switching and virtual circuit switching are two complete opposite ways of implementing networking between two computers.

Packet switching involves the sender breaking all the requested data into smaller pieces and sends them seperately.

Virtual networks use a connection line to dedicate for a data transfer, sending all the data at once.

Both these methods have their pros, cons and uses.

Packet switching is very good at sending data seemingly asynchronously. In reality, multiple packets can be sent on one connection to give the illusion of multiple transfers together. It will usually be slower.

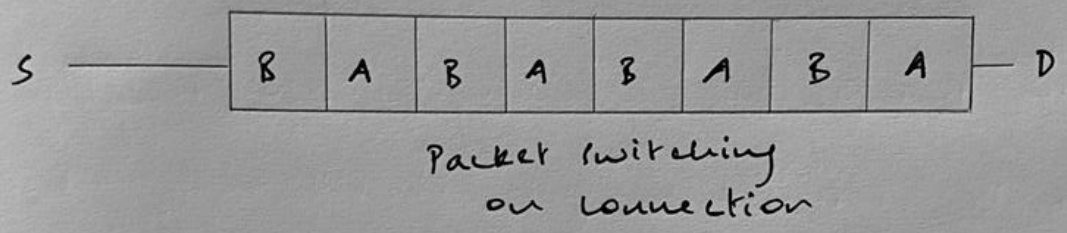
Virtual circuit switching allows for very fast transfers. Since a dedicated line is reserved for a connection, data transfer, no other computers sharing the same line can affect the network.

Packet switching is the method used in almost all computers nowadays.

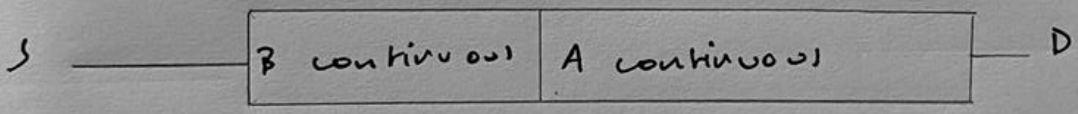
virtual circuit switching is used in applications like cell phone calling; to dedicate a line to each connection.

Example:

Sending A and B from source S to destination D:



Packet switching on connection



Virtual circuit switching connection