

Assignment 1

R19B5006

1. What is unicast, Multicast and Broadcast Communication?

→ unicast communication: unicast is the term used to describe communication where a piece of information is sent from one point to another point. In this case there is just one sender and one receiver.

Eg: http, smtp, ftp and telnet

→ Multicast Communication: Multicast is the term used to describe communication where a piece of information is sent from one or more points to a set of other points. In this case there may be one or more senders and the information is distributed to a set of receivers.

2. Write a note on process-to-process communication?

→ Transmission Control Protocol / Transport Layer protocol provides process-to-process communication i.e. the transfer of data takes place between individual processes executing on an end system. This is done using port numbers or port addresses. Port numbers are 16-bit long that help identify which process is sending & receiving data on a host.

3. What is encapsulation and decapsulation?

→ Encapsulation: It is the process of adding headers and trailers around some data.

Decapsulation - It is the process of removing headers and trailers around some data.

4. What is proxy Server? Why we need proxy Server?

→ A proxy Server is a server application or appliance that acts as a intermediary from requests from clients seeking resources from servers that provides those resources. A proxy server thus functions on behalf of the client when requesting service, potentially masking the true origin of request to the resource server.

- we need proxy Server :
- To control Internet usage
- privacy benefits
- Improved security
- Get access to blocked resource.

5. What is the purpose of OSI Model? In detail discuss the functionality of each layer.

→ OSI (Open System Interconnect)

Model is a standard description of how messages should be transmitted between any two communicating parties in a network.

In this model divides the communicating to functions into 7 layers. They are :-

1. Application Layer :- It provides user interface and support for services such as email file transfer database sharing specific responsibilities of are;

- NVT (Network Virtual terminal)
 - It consists of a telnet protocol which a local computer to Logon to a remote computer.
 - Accessing transferring & managing the files.
 - Mail Services
 - Directory Services.
2. Presentation Layer :- It is the 'translator' of the network specific responsibilities of presentation layer are :
- Translation : Changing the format of message that is used by the sender into mutually acceptable for transmission then at the destination changing that format into understood by the receiver.
 - Encryption :- Encryption & decryption of data for security purpose.
 - Compression :- Compressing & decompressing data to make transmission more efficient.
 - Security :- Validating password and Login Codes.
3. Session Layer :- The session layer is that network dialog controller specific responsibilities of session layer are :
- Session management : Dividing a session into session by the introduction of checkpoints and separating long messages into shorter units called dialog units.

- Synchronization: Deciding in what order to pass the dialog units & making sure that the previous request has been fulfilled before the next one is sent.
 - Dialog control: Deciding who sends the data and when
 - Graceful close: Ensuring that the exchanging of data has been completed appropriately before the session closes.
4. Transport Layer: The transport layer is responsible for source to destination of delivery of the entire message. Specific responsibilities of transport layer are:
- End to end delivery of messages:
 - Segmentation and Reassembly: Dividing a message into segments and marking each segment with the sequence number are used to reassemble the messages correctly at the destination.
 - Service point addressing: Guaranteeing delivery of a message to the appropriate program running on the destination computer.
5. Network Layer: Network layer is responsible for end to end delivery of individual packets. This layer provides two related services.
- Switching & Forwarding refers to temporary connection between physical links.
 - Routing: Selecting the best path for sending a packet.
- Specific responsibilities of network layer are:-

- source to destination: delivery of packet.
 - Logical Addressing: Inclusion of the source and destination address in the head of each packet.
 - Address transformation: Interpreting logical address to find their physical equivalence.
 - Multiplexing: Using a single physical link to carry data between many devices at the same time.
6. Data Link Layer: Data link layer is responsible for moving frames from one node to another. Specific responsibilities of data link layer are :-
- framing: It divides stream of bits received from the n/w layer into manageable data units called frames.
 - physical addressing: It adds header & trailer that contains addressing and other control information to the beginning and end of the frame.
 - flow control: If the rate at which the data are absorbed by the receiver is less than the rate at which data are produced in the sender the data link layer imposes a flow control mechanism to avoid overwhelming the receiver.
 - Error control: It adds a mechanism to detect & to inform retransmit the damaged frames.
 - Synchronization: It adds a mechanism to detect & to inform the receiver that a frame is arriving.

7. Physical Layers: The physical Layer co-ordinates the functions required to transmit a bit stream over a physical medium.

- It is concerned with changing of bit stream into electromechanical signals and their transmission on to and across a medium.

6. Discuss TCP/IP protocol. Suite in detail. TCP/IP Standard for Transmission control protocol / Internet protocol.

- TCP/IP is a set of standardized rules that allows computers need to communicate on a network such as Internet.

- Two computers need to know, ahead of time, how they are expected to communicate.

- These protocols describe the movement of data between the source and destination of internet. They also offer simple naming and addressing.

- Different layers of TCP/IP protocol

- Layer 1: Host to network layer:

- * protocol is used to connect to the host.

So that the packets can be sent over it.

- Various forms to host and network to network.

→ Layer 2 ÷ Internet Layer

- Selection of a packet switching network which

is based on a connections less internet layer.

- It is the layer which holds the whole architecture together.
- It helps the packet to travel independently to the destination.
- Order in which packets are received is differently from that way they are sent.

* IP is used in this layer.

* The various functions performed by the layer are:

- > Delivering - IP packets
- > performing Routing
- > Avoiding Congestion.

→ Layer 3 : Transport Layer :

* It decides if data transmission would be on parallel path or single path.

* functions such as multiplexing, segmenting or splitting on the data is done by transport layer.

* Transport layer adds header information to the data.

* Transport layer breaks the message into small units so that they are handled more efficiently by the network layer.

* It defines two end-to-end protocols: TCP and UDP

→ Layer 4 : Application Layer :

The TCP/IP specification described a lot of applications. Some of them were TELNET, FTP, SMTP, DNS etc..

→ TELNET is a two-way communication protocol which allows connecting to a remote machine and run application on it.

- > FTP is a protocol, that allows file transfer amongst computer user connected over a network. It is reliable, simple and efficient.
- > SMTP is a protocol which is used to transport electronic mail between a source and destination, directed via a route.
7. List the network support layer and user support layers of OSI model.
- * The network support layers are:
- physical layer
 - data link layer
 - network layer
- * The user support layers are:
- session layer
 - presentation layer
 - application layer
- * Transport layer supports both network support layers and user support layers.
8. Briefly discuss about the two types of addresses in TCP/IP.
- Types of address of TCP/IP are:
- * physical address: The physical address is the address of a node as defined by its LAN or WAN.
 - * The size and format of these addresses vary depending on the network.
 - * physical address can be either unicast, multicast or broadcast.
- Eg: Most local area network use 48-bit written

12 hexadecimal digit every byte is separated by a colon, as shown below: 07:01:02:01:2C:4B

* Logical address: Logical address is used by networking software to allow packets to be independent of the physical connecting on the network.

- Local addresses can be either unicast, multicast or broadcast. There are limitation on broadcast.

* Port Addresses: There are many application running on the computer each application run with a port number (logically) on the computer.

- port numbers are most commonly used with TCP/IP connections.

9. Explain in detail/about physical arrangements of devices in a networks.

→ Network topology refers to how various nodes, devices and connections on your network are physical or logical arranged.

Physical network topology is the actual connections (wires, cables, etc) of how the network is arranged.

Types of Topology :-

→ Bus topology :- All the network devices are connected to signal long cable called bus/backbone

Advantages :-

- Easy to use and install
- Easy to add extra workstation.
- Requires less cabling.

- failure of one nodes does not affect the rest of network.
- Less expensive.

Disadvantages :-

- problem with the central cable - the entire network stops working.
- Lot of workstation - data can travel slowly
- Network busy - Data Collision.
- Low security.
- fault identification is difficult
- failure of cable will shutdown the entire network.

→ Star topology :- All the devices are connected to central device switch or Router.

Advantages :-

- Easy to use and install
- Easy to reconfigure.
- failure of one node does not affect the rest of the network.
- fault identification is easy.

Disadvantages :

- If the hub fails the entire network fails
- Require large amount of cable
- It is expensive.

→ Ring topology :- All the devices are connected to one another in the shape of a closed ring.

- Data is transmitted around the ring in one direction only from device until it reaches its destination.
- sending and receiving of data takes place with help of token.

Advantages

- Easy to use and install
- Easy to configure
- All the nodes on the network have equal access to the network
- fault identification is easy

Disadvantages

- Signal is passed only in one direction
- A break in the ring can disable the entire network
- Adding or removing the node distribution the entire network.

→ Mesh topology: Each device is connected to every other device on the network through a dedicated point to point link

Advantages

- It is robust and reliable
- Easy to reconfigure
- Data is transferred very fast
- Estimates traffic problem due to dedicated link.

Disadvantages

- Installation and re-configuration is very difficult.
- It is very expensive.
- Cable required is very high
- Large numbers of input or output ports are required for each node.

- Hybrid topology - It is the combination of two or more topologies

Advantages

- Super reliable and fault tolerant
- High flexible and Scalable
- Robust

Disadvantages

- Expensive
- Extremely complex structure to create and manage.

10. Write a brief note on connecting devices

→ - Acts as Middleware between network or computers by binding the network media together.

- Some of the common connecting devices are: Router, Bridges, Hubs, Repeaters, Gateways, switches.

- Types of Connecting devices:

- Repeaters: A physical layer device that acts on bits not on frames or packets

• Repeater regenerates the signal, and can extend the physical length.

• Doesn't connect two LANs, connects two segments of the same LAN

- Bridge: Bridge operates in both the physical and data link layers.

- It regenerates the signal

- It checks the physical decisions.