

Assignment-1 [Computer Network]

Q) Differentiate between : LAN, MAN and WAN.

Answer: The differences between LAN, MAN and WAN are mentioned below:-

LAN

MAN

WAN

- | | | |
|--|---|--|
| 1) LAN stands for Local Area Network. | MAN stands for metropolitan area network. | WAN stands for wide area network. |
| 2) LAN is a group of computers connected together, usually within the same building, town. | MAN is a larger network that spans several buildings location, although together, usually within the same city or in the same building, town. | WAN is not restricted to a geographical area. It might be confined within the bounds of a state or country. |
| 3) The transmission speed of LAN is high. | While the transmission speed of MAN is average. | Whereas the transmission speed of a WAN is low. |
| 4) LAN's ownership is private. | MAN's ownership can be private or public. | While WAN also might not be owned by one organization. |
| 5) The propagation delay is short in a LAN. | There is a moderate propagation delay in a MAN. | Whereas, there is a long propagation delay in a WAN. |
| 6) LAN are perfect for sharing resources like printer, fax within a building but they can't connect distant sites. | MAN covers a city like cable television network, and is often used to connect several LAN's together to form bigger network. | Internet is the largest and well-known example of WAN. And they are used to connect LANs, MANs of other types of networks. |

27 Write short notes on:
Mobile Area Network.

Answer: Mobile Area Network can be defined as a communications network that is spread out over an immense land area around the world, connected wirelessly by transceivers at fixed locations that are known as cell sites or base stations. Mobile network and wireless network perform some similar functions, but they are completely different networks. A mobile area network is commonly described as a physical device that can be taken anywhere. It is composed of a battery to provide power and must have some type of mobile network connectivity in order for the device to operate in order to send and receive data without having to attach the device to a hardware base.

There are four main components that work together to provide service to mobile carriers. They are : public switched telephone network (PSTN), mobile telephone switching office (MTSO) cell site with an antenna system, and mobile subscriber unit (MSU).

Assignment-2

- Q. Differentiate between Baseband and Broadband coaxial cable.

Answer: Both baseband and broadband describe how data is transmitted between two nodes. The differences between baseband and broadband coaxial cable are:-

Broadband coaxial cable

Baseband coaxial cable

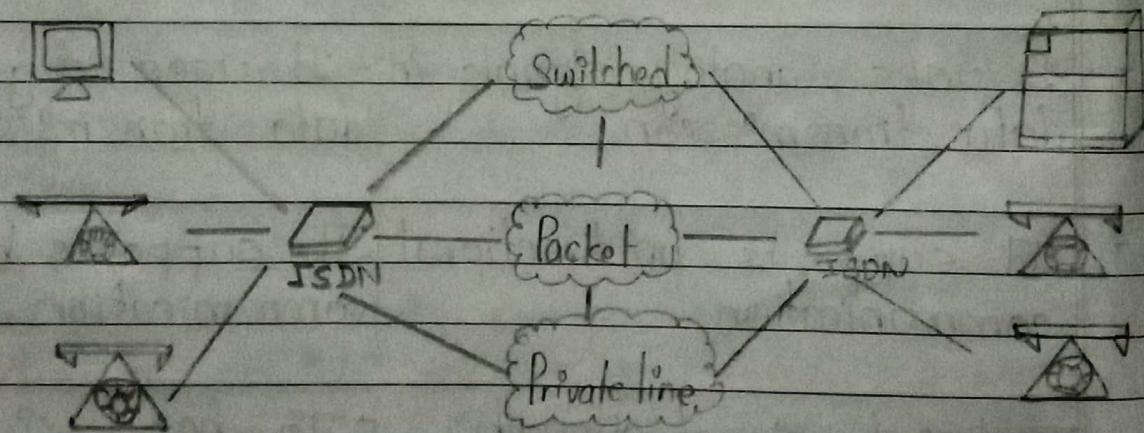
- Broadband coaxial cable transmits multiple data signals simultaneously at the same time.
 - It uses analog signals in data transmission.
 - It supports unidirectional communication.
 - To boost signal strength, it uses amplifiers.
 - It supports FDM based multiplexing.
 - Many WAN links such as DSL and ISDN are broadband technologies.
 - Signal can travel over long distances.
- Baseband coaxial cable transmits a single data signal/stream/channel at a time.
 - It uses digital signals in data transmission.
 - It supports bidirectional communication.
 - To boost signal strength, it uses repeaters.
 - It supports TDM based multiplexing.
 - It is used in Ethernet LAN networks.
 - Signals travel short distance.

Assignment-3

Q. Define ISDN. Write its advantages and disadvantages.

Answer: ISDN, is the abbreviation of Integrated Services Digital Network, which is a set of communications standard for instantaneous digital transmission of data, audio, video and other services related to network, in excess of the conventional circuits of the community switched telephone network. This is a circuit switched telephone network system, which also provides access to Packet Switched networks.

The model of a practical ISDN is as shown below:



Advantages of ISDN

- It facilitates the user with multiple digital channels. These channels can operate concurrently through the same one copper wire pair.
- The connection is faster. Since the services are digital, there is less chance of errors.

- ISDN provides high data rate because of digital scheme which is 56 kbps.
- The bandwidth is higher.
- Audio, data, and video, all of these can be sent over a single ISDN line.

Disadvantages of ISDN

- ISDN lines are very costly than the other typical systems.
- It requires specialized digital devices just like Telephone Company.

Q. Write short notes on the following:-

a) Point to Point Protocol (PPP)

One of the most common protocols for point-to-point access is the Point-to-Point protocol (PPP). Most of the people, who need to connect their home computers to the server of an Internet service provider use PPP. The majority of these users have a traditional modem; they are connected to the Internet through a telephone line, which provides the services of physical layer. But to control and manage the transfer of data, there is a need for point-to-point protocol at the data link layer.

PPP provides several services:-

1. PPP defines the format of the frame to be exchanged between devices.
2. PPP defines how two devices can negotiate the establishment

of the link and exchange of data.

3. PPP defines how network layer data are encapsulated in the data link frame.
4. It defines how two devices can authenticate each other.
5. PPP provides network address configuration. This is particularly useful when a home user needs a temporary network address to connect to the Internet.

b) HDLC (High-level data link control)

HDLC is a bit-oriented protocol for communication over point-to-point and multipoint links. HDLC provides two common transfer modes that can be used in different configurations :-

1. Normal response mode (NRM)

- In NRM, the station configuration is unbalanced
- we have one primary station and multiple secondary stations.
- A primary station can send commands; a secondary station can only respond.

2. Asynchronous balanced mode (ABM)

- In ABM, the configuration is balanced.
- The link is point-to-point and each station can function as a primary and a secondary (acting as peers).
- It is a common mode.

Assignment-4

1. If the 7th bit hamming code word received by a receiver is 1011011. Assuming the even parity, state whether the received codeword is correct or wrong. If wrong, locate and correct the error.

Solution, Here,

7-bit hamming code format is:

1011011

1	0	1	1	0	1	1
D_7	D_6	D_5	P_4	D_3	P_2	P_1

For P_1 , (1,3,5,7)

$$= 1011 \text{ (odd)} \quad \text{So, } P_1 = 1 \text{ (correct)}$$

For P_2 , (2,3,6,7)

$$= 1001 \text{ (even)} \quad \text{So, } P_2 = 0 \text{ (incorrect)}$$

For P_4 , (4,5,6,7)

$$= 1101 \text{ (odd)} \quad \text{So, } P_4 = 1 \text{ (correct)}$$

Hence, error word is:

P_4	P_2	P_1
1	0	1

$$(101)_2 = (5)_{10}$$

Hence, 5th bit in the received codeword is error.

So, correct word is: 1001011 #

Assignment-5

Q.1 Differentiate between IPV4 and IPV6 with their header format.

Answer,

IPV4

IPV6

1. Source and destination addresses are 32 bits. addresses are 128 bits.
2. IPV4 supports small address space. 2. IPV6 supports a very large address space sufficient for each and every people on earth.
3. IPV4 header includes checksum. 3. IPV6 header doesn't include the checksum.
4. Addresses are represented in dotted decimal form. (Eg: 192.168.5.1) 4. Addresses are represented in 16-bit segments, each segment is written in hexadecimal separated by colons (Eg: 2001:0050:020C:0232:0ab4:3456:456b:e560)
5. Header includes options. 5. All optional data is moved to IPV6 extension header.
6. Broadcast address are used to send traffic to all nodes on a subnet. 6. There is no IPV6 broadcast address. Here, multicast addresses are used.

Header format of IPV4

32 bits									
Version (4)	IHL (4)	Type of Service (3)	Total Length (16)						
		Identification (16)	Flags (3)	Fragmentation Offset (13)					
Time to Live (8)	Protocol (8)			Header checksum (16)					
		Source Address (32)							Header
		Destination Address (32)							
Options (variable)				Padding (variable)					1
				data begins here...					

Header format of IPV6

32 bits

Version (4)	Traffic Class (8)	Flow Label (20)		
Payload Length (16)		Next Header (8)	Hop limit (8)	
				40 bytes
	Source IP Address (128)			
	Destination IP Address (128)			
	Transport Layer Data (eg: TCP, UDP)			

Q.2

Explain the transition mechanism from IPv4 to IPv6.

Answer: When we want to send request from IPv4 address to an IPv6 address, it is not possible because IPv4 and IPv6 transition is not compatible. To make compatible transition from IPv4 to IPv6, following mechanisms can be used :-

- i) Dual stack
- ii) Tunneling
- iii) Header Translation.

- Dual stack Routers

A router can be installed with both IPv4 and IPv6 addresses configured on its interfaces pointing to the network of relevant IP scheme.

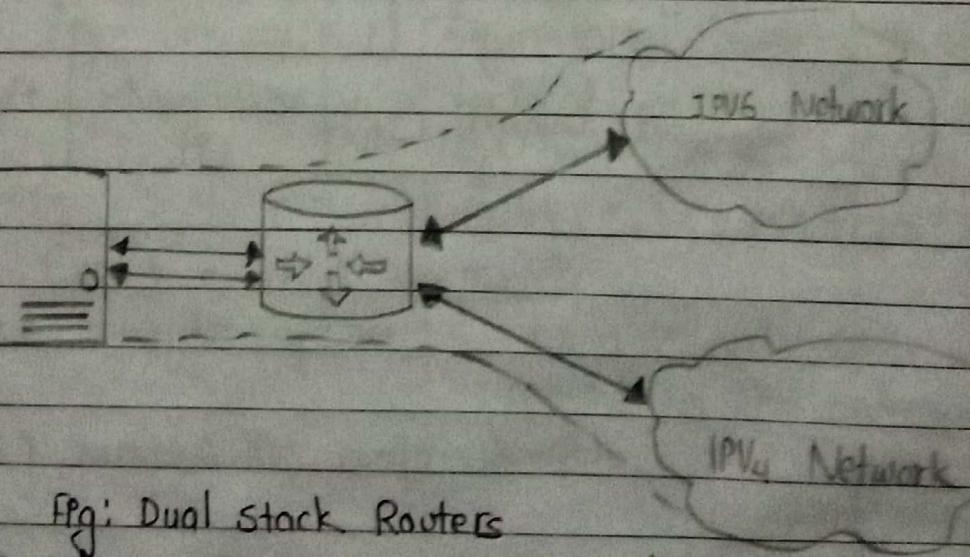


Fig: Dual stack Router

In the above figure, a server having IPv4 as well as IPv6 address configured for it can now speak with all the hosts on both the IPv4 as well as the IPv6 networks with the help of a Dual Stack Router. The Dual stack Router can communicate

with both the networks. It provides a medium for the hosts to access a server without changing their respective IP versions.

- Tunneling

In tunneling, different IP versions exist on intermediate path or transit networks, tunneling provides a better solution where user's data can pass through a non-supported IP version.

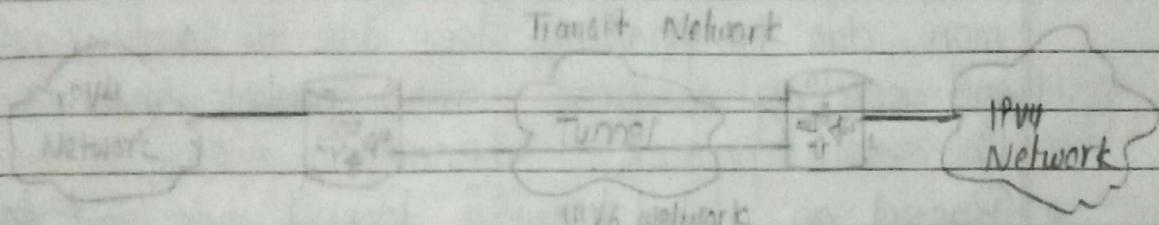
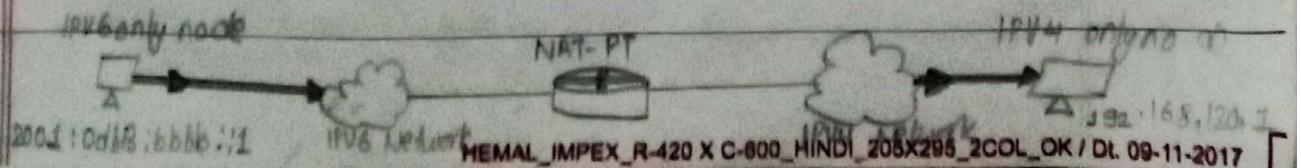


Fig. Tunnel

From the figure, we can depict how to communicate via tunnel between two remote IPv4 networks where the transit network is an IPv6. Vice versa it is also possible where the transit network is an IPv6 and the remote sites that intend to communicate are on IPv4.

- Header Translation

In this mechanism, it changes the header format from IPv4 to IPv6 format and vice versa. This scheme translates the packet from both the addresses. By using the translation, IPv6 only hosts can communicate with IPv4 only hosts. Translation method are of two types i.e. stateless and stateful. The stateless translation, the packets are not interrelated to each other while the stateful translation is interrelated to each other.



Assignment - 6

- Q. Differentiate between link state and distance vector routing algorithm.

Answer

The difference between link state and distance vector routing algorithm are as follows:

Link state Routing	Distance vector Routing
1. Bandwidth required is more due to flooding and sending of large link state packets.	1. Bandwidth required is less due to local sharing small packets and no flooding.
2. Based on global knowledge i.e. it have knowledge about entire network.	2. Based on local knowledge since it updates table based on information from neighbors
3. It makes use of Dijkstra's algorithm.	3. It makes use of Bellman Ford algorithm
4. Traffic is more.	4. Traffic is less.
5. It converges faster.	5. It converges slowly.
6. No count to infinity problem.	6. Count to infinity problem.
7. No persistent loops, only transient loops.	7. Persistent looping problem i.e. loop will be there forever.
8. Practical implementation is OSPF and ISIS.	8. Practical implementation is RIP and IGRP.

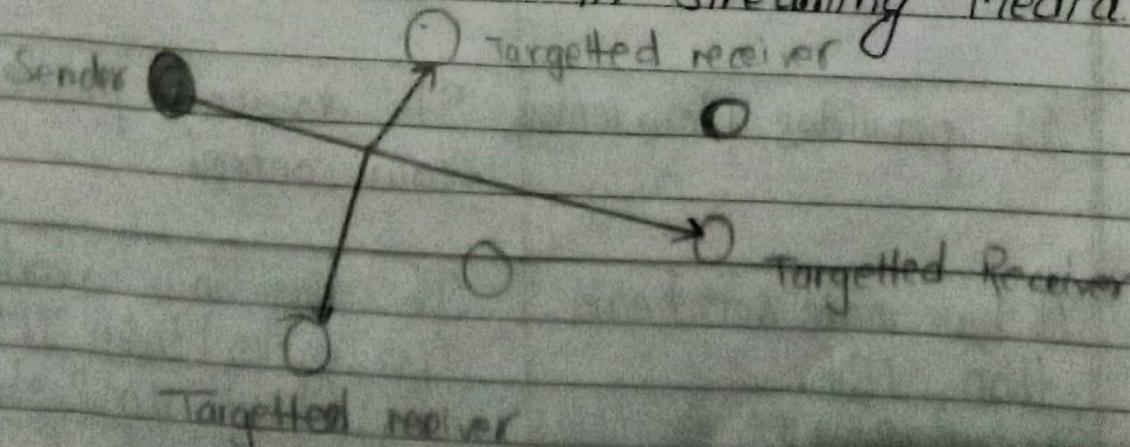
Assignment - 7

Q.1 Explain multicast routing.

Answer. Multicast routing is a method of group communication where the sender sends data to multiple receivers or nodes present in the network simultaneously. Multicasting is a type of one-to-many and many-to-many communication as it allows sender or senders to send data packets to multiple receivers at once across LANs or WANs. This process helps in improving the data frame of the network.

Multicasting works similar to broadcasting, but in multicasting, the information is sent to the targeted or specific members of the network. This task can be accomplished by transmitting individual copies to each user or node present in the network, but sending individual copies to each user is inefficient and might increase the network latency. To overcome these shortcomings, multicasting allows a single transmission that can be split up among the multiple users, consequently, this reduces the bandwidth of the signal. Multicasting is used in many areas like ;

- i) internet protocol
- ii) Streaming Media



Q.2 Difference between TCP and UDP.

Answer. The differences between TCP and UDP are as follows:

TCP

TCP stands for Transmission Control Protocol. UDP stands for User Datagram Protocol.

It is connection-oriented. It is connectionless and fast and reliable (virtual unreliable protocol) which does not check message delivery.

It divides outgoing messages into segments. It sends "datagrams."

It reassembles messages at the destination. Incoming messages.

It resends anything if not received.

It does not acknowledge if message is not received.

It provides flow control.

It does not provide flow control.

It has more overhead than UDP.

Eg: HTTP, NFS, etc.

It has low overhead (i.e. faster) than TCP.

Eg: DNS, VOIP, etc.

Assignment - 8

Q. Explain piggybacking and its usefulness.

Answer: Piggybacking is a technique used to improve the efficiency of the bidirectional protocols. When a frame is carrying data from A to B, it can also carry control information about arrived (or lost) frames from B; when a frame is carrying data from B to A, it can also carry control information about the arrived (or lost) frames from A. The major advantage of piggybacking is better use of available channel bandwidth. In piggybacking, acknowledgement is carried along with the data on the same channel. Following are the benefits of Piggybacking :-

- It offers efficient use of available channel bandwidth. It saves bandwidth to greater extent. ~~In fact~~ In figure below, both the channels between A and B can be used for data acknowledgement.
- The transmitter (let A) need not have to wait for ACK separately as it receives previous packet's ACK along with next data packet from the other end (let B). This improves latency of data transfer between A and B.