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**WINTER-15 EXAMINATION**  
**Model Answer**

**Subject Code: 17429**

**Subject Name: Computer Network**

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**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the Figure. The figures drawn by candidate and model answer may vary. The examiner may give Credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed Constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

**1. a) Attempt any SIX of the following:**

**Marks 12**

**i) List advantages of Computer Network.**

*(Any two Advantages - 1 Mark each)*

**Ans:**

- 1) Resource Sharing
- 2) Reducing cost
- 3) High Reliability
- 4) Improved security
- 5) Centralized management.
- 6) E-mail
- 7) Flexible access.



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**ii) Define the following**

- 1) Protocol**
- 2) Peer**

*(Definition - 1 Mark each)*

**Ans:**

**a) Protocol:** - It is set of rules and conventions. Sender and receiver in data communication must agree on common set of rules before they can communicate with each other.

**OR**

Protocol is a system of digital message formats and rules for exchanging those messages in or between computing systems.

**Protocol defines.**

- a) Syntax (what is to be communicated)
- b) Semantics (how is it to be communicated)
- c) Timing (When it should be communicated)

**b) Peer:** Peers are computer systems which are connected to each other via the Internet. Files can be shared directly between systems on the network without the need of a central server. In other words, each computer on a Peer to Peer network becomes a file server as well as a client.

**iii) List types of network topology. Name one device used in star topology.**

*(Network Topology- 1 Mark, Device Used- 1 Mark)*

**Ans:**

Network Topology refers to layout of a network. How different nodes in a network are connected to each other and how they communicate is determined by the network's topology.

**Types of Network Topology**

1. Mesh Topology
2. Bus Topology
3. Star Topology
4. Ring Topology
5. Tree Topology
6. Hybrid Topology

**Device used in STAR Topology:** Switch, Hub



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- iv) **What is hub? Give types of hub.**  
(*Definition of hub - 1Mark, types of hubs- 1Mark*)

**Ans:**

**HUB:** Hub is amplifying & splitting device. Hub contains multiple ports & is a common connection point for connecting all segments of a LAN. When a packet arrives on a port, it is forwarded to rest of ports so that it can be sent to all other nodes in the network.

**Types of Hub:-**

1. Active Hub
2. Passive Hub
3. Intelligent hub

- v) **Define guided media. List the types of guided media.**  
(*Definition - 1Mark, list types of guided media - 1Mark*)

**Ans:**

**Guided Media:** Guided media are wired media, Electrical/Optical signals are passed through a solid medium (different types of cables/wires) as the path traversed by the signals is guided by shape and length of the wire, this type of media is called guided media. In Guided media, the signals are confined within the wire and do not propagate outside of the wire/media.

**Types of Guided Media:**

1. Copper Unshielded Twisted Pair (UTP),
2. Copper Shielded Twisted Pair (STP),
3. Co-axial cables
4. Fiber Optic Cables.

- vi) **Name the layer which is associated with the transmission media.**  
(*Naming the Layer - 2 Marks*)

**Ans:**

**Physical Layer:** Transmission media operate at Layer 1 (Physical Layer) of the OSI model, it encompass the physical entity and describe the types of medium on which voice and data can travel.

**Physical Layer is associated in two ways with transmission medium.**

1. Guided(wired) media  
E.g. Coaxial Cable, Fiber-optic Cable



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2. Unguided (Wireless) Media  
E.g. Radio Frequencies, Microwave, Satellite, and Infrared.

**vii) Define connection oriented protocol.**  
***(Definition -2 Marks)***

**Ans:**

Connection-oriented protocol service is sometimes called a "reliable" network service, because it guarantees that data will arrive in the proper sequence.

Connection-oriented describes a means of transmitting data in which the devices at the end points use a preliminary protocol to establish an end-to-end connection before any data is sent.

**Example:** Transmission Control Protocol (TCP) is a connection-oriented protocol.

**viii) List two DHCP protocols**  
***(Listing any Two Protocols -1 Mark each)***

**Ans:**

1. ARP
2. RARP
3. IP
4. BOOTP

**b) Attempt any TWO of the following:**

**Marks 08**

**(i) State the reason for implementing a network these key resources often shared on a network**

***(Reason -1 Mark, Any 3 key Resources - 1 Mark each)***

**Ans:**

A primary reason for implementing a network is to share resources.

**Resources:** There are many resources to be shared on a network, they are as listed below.

1. Printers
2. Scanners
3. Applications
4. Files
5. Network access to the World Wide Web.



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(ii) Draw with neat labelled sketch of star networks having three computers in two stars and two computers in one star.

(Correct Diagram - 4 Marks)

Ans:

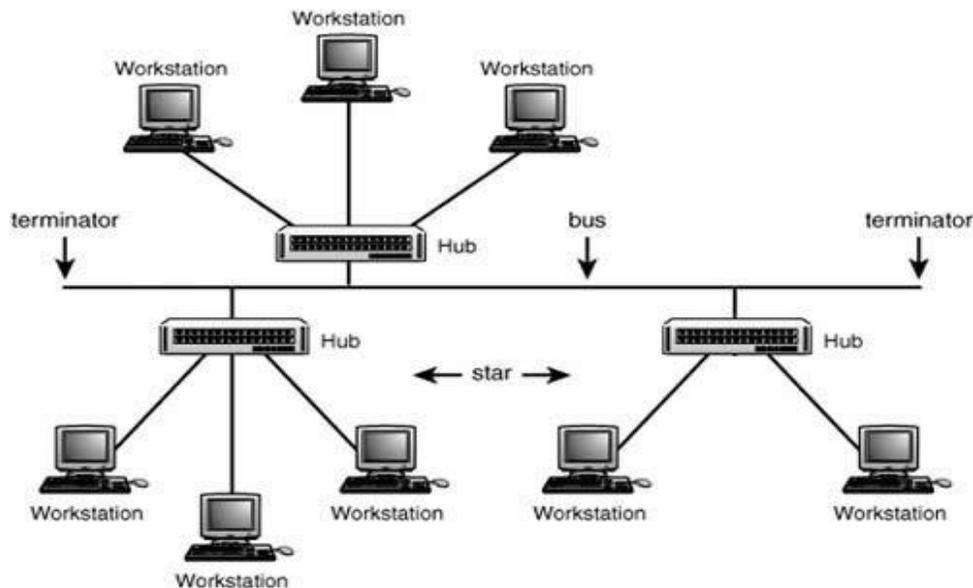


Fig: Star Bus Topology

(iii) Explain the SLIP protocol.

(Explanation - 4 Marks)

Ans:

**SLIP**

1. Serial Line Protocol is an encapsulation of the Internet Protocol designed to work over serial ports and modem connections.
2. This packet-framing protocol and defines a sequence of bytes that frame IP packets on a serial line.
3. SLIP is commonly used for point-to-point serial connections running TCP/IP
4. It is designed to transmit signals over a serial connection and has very low overhead.



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5. SLIP is serial line internet protocol
6. SLIP does not perform error detection and correction.
7. SLIP does not provide any authentication.
8. SLIP is not approved internet standard.
9. SLIP supports static IP address assignment

**2. Attempt Any FOUR of the following**

**Marks 16**

- a) If you have two computers to connect to a network located over a long distance over 100 KM, which type of transmission you will used? Justify your answer by describing its features.**

*(Naming Transmission medium - 2 Marks, Features - 2 Marks)*

**Ans:**

You can connect two computers over the Internet (Wide Area Network)

**Features of Internet:**

1. World Wide Web.
2. E-mail.
3. News
4. Telnet
5. File Transfer Protocol (FTP)
6. Internet Relay Chat (IRC)

**The World Wide Web**

**E-mail**

- Electronic mail (e-mail) is the most popular reason people use the Internet.
- To create, send, and receive e-mail messages you need an e-mail program and an account on an Internet mail server with a domain name.
- To use e-mail, a user must have an e-mail address, which you create by adding your user name to the e-mail create by adding your user name to the e-mail server's domain name, as in jsmith@aol.com.

**News:**

- One Internet based service called news, includes tens of thousands of newsgroups.
- Each newsgroup hosts discussions on a specific topic. A newsgroup a some indicated its user's special topic of interest, such as Food cake.
- To participate in a newsgroup, you need a news-reader program that lets you read articles that have been posted on a news server. You can post articles for others to read and respond to.



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### Telnet

- Telnet is a specialized service that lets you use one computer to access the contents of another computer a telnet host.
- A telnet program creates a “Window” into the host so you can access files, issue commands, and exchange data.
- Telnet is widely used by libraries to allow visitors to look up information, find articles and so on.

### File transfer protocol

- File Transfer protocol (FTP) is the internet tool used to copy files from one computer to another.
- Using a special FTP program or a web browser, you can log into an FTP host Computer over the internet and copy files on to your computer.
- FTP is handy for finding and copying software files, articles and other types of data. Universities and software companies use FTP servers to provide visitors with access to data.

### Internet Relay chat (IRC)

- Internet Relay chat (IRC) is a service that allows users to communicate in real time by typing text in a special window.
- Like news, there are hundreds of IRC “channel” each devoted to a subject or user group.
- You can use a special IRC program to participate in chat room discussions but many chat rooms are set up in web sites, enabling visitors to chat directly in their browser window.

### b) Explain horizontal communication and vertical communication.

*(Horizontal Comm. - 2 Marks, Vertical Comm. - 2 Marks)*

**Ans:**

#### Horizontal communications

- The horizontal communication between the different layers is logical; there is no direct communication between them. Information included in each protocol header by the transmitting system is message that will be carried to the same protocol in the destination system.
- For two computers to communicate over a network, the protocols used at each layer of the OSI model in the transmitting system must be duplicated at the receiving system.
- The packet travels up through the protocol stack and each successive header is stripped off by the appropriate protocol and processed.
- When the packet arrives at its destination, the process by which the headers are applied at the source is repeated in reverse.
- The protocol operating at the various layers communicate horizontally with their counterparts in the other system, as shown in below fig.



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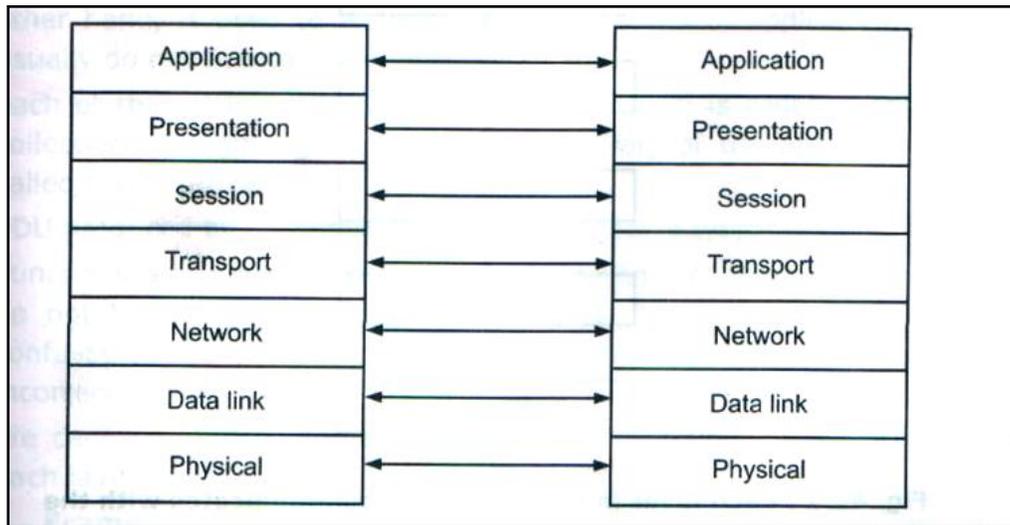


Fig: **Horizontal communications**

### **Vertical Communications**

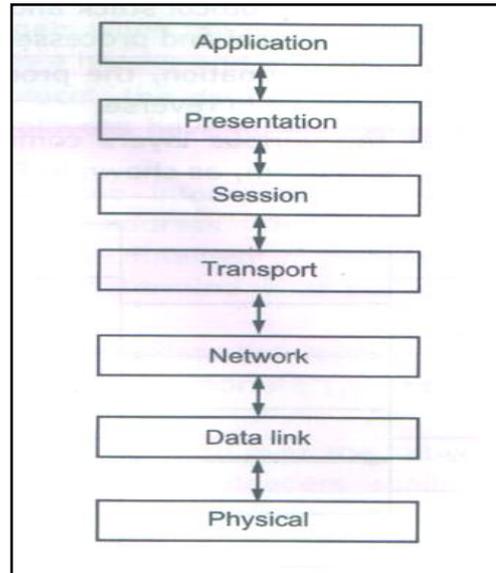
- In addition to communicating horizontally with the same protocol in the other system, the header information also enables each layer to communicate with the layer above and below it.
- The headers applied by the different protocols implemented the specific functions carried out by those protocols.
- For Example: When a system receives a packets and passes it up through the protocol stack, the data link layer protocol header includes afield that identifies which network-layer protocol the system should use to process the packet.
- Network –layer protocol header in tern specifies one of the transport-layer protocols and the transport-layer protocol identifies the application for which the data is ultimately destined.
- Vertical communication makes it possible for a computer to support multiple protocols at each of the layers simultaneously.



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- c) You are said to establish a small network with minimum cost at least ten computer and also necessary to use the centralized database. Which type of network and topology you will prefer in this situation? Justify your answer.

*(Identification of type of network – 1 Mark, its justification – 1 Mark, Identification of Topology – 1Mark, its justification -1 Mark)*

**Ans:**

Type of Network- Client-Server Network.

Justification- For the mention situation client Server network is preferred because centralized database can be maintained at server.

Type of Topology- Bus Topology.

Justification -For the mention situation Bus Topology is preferred because cost is less due to short cable length, no need of HUB, simple wiring layout. Bus topology can support 10 computers and additional nodes can be easily added to existing bus network



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**d) Explain RARP and BOOTP.**

*(Explanation - 2 Marks For Each Protocol)*

**Ans:**

**RARP:** The **Reverse Address Resolution Protocol (RARP)** is an obsolete computer networking protocol used by a client computer to request its Internet Protocol (IPv4) address from a computer network, when all it has available is its Link Layer or hardware address, such as a MAC address. The client broadcasts the request, and does not need prior knowledge of the network topology or the identities of servers capable of fulfilling its request.

RARP is described in Internet Engineering Task Force (IETF) publication RFC 903. RARP requires one or more server hosts to maintain a database of mappings of Link Layer addresses to their respective protocol addresses. Media Access Control (MAC) addresses needed to be individually configured on the servers by an administrator. RARP was limited to serving only IP addresses. Reverse ARP differs from the Inverse Address Resolution Protocol (InARP) described in RFC 2390, which is designed to obtain the IP address associated with a local Frame Relay data link connection identifier. InARP is not used in Ethernet.

**BOOTP:** The Bootstrap Protocol (BOOTP) is a computer networking protocol used in Internet Protocol networks to automatically assign an IP address to network devices from a configuration server. The BOOTP was originally defined in RFC 951. When a computer that is connected to a network is powered up and boots its operating system, the system software broadcasts BOOTP messages onto the network to request an IP address assignment. A BOOTP configuration server assigns an IP address based on the request from a pool of addresses configured by an administrator.

BOOTP is implemented using the User Datagram Protocol (UDP) as transport protocol, port number 67 is used by the server to receive client requests and port number 68 is used by the client to receive server responses. BOOTP operates only on IPv4 networks.

**e) What is MAC address? How it is located?**

*(MAC address - 2 Marks, Locating of MAC - 2 Mark)*

**Ans:**

MAC (Media access control address)

MAC address is a unique id associated with the network adapter (NIC) and it uniquely identifies an adapter on a LAN or internet.

Media Access Control (MAC) address is a binary number used to uniquely identify computer network adapters. These numbers (sometimes called "hardware addresses" or



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"physical addresses") are embedded into the network hardware during the manufacturing process, or stored in firmware, and designed to not be modified.

MAC addresses are 12-digit (6 bytes or 48 bits) hexadecimal numbers. By convention, they are usually written in one of the following three formats:

- a. MM:MM:MM:SS:SS:SS
- b. MM-MM-MM-SS-SS-SS
- c. MMM.MMM.SSS.SSS

The leftmost 6 digits (24 bits) called a "prefix" is associated with the adapter manufacturer

Locating a MAC Address in Windows XP, Vista, NT 2000, 2003,7, 8, 10.

1. Click the Start button, select Run.
2. Type CMD and click OK.
3. In Command prompt, Type ipconfig/all and press Enter. ...
4. MAC address (Physical Address) will be displayed in the Ethernet Adapter Local Area Connection section.

**f) Describe any four physical characteristics of fiber optic cable.**

*(Any Four physical characteristics - 1 Mark each)*

**Ans:**

1. Core - Thin glass center of the fiber where the light travels.
2. Cladding - Outer optical material surrounding the core that reflects the light back into the core.
3. Buffer coating - Plastic coating that protects the fiber from damage and moisture. Hundreds or thousands of these optical fibers are arranged in bundles in optical cables. The bundles are protected by the cable's outer covering, called a jacket.
4. Strengthening fibers: These components help protect the core against crushing forces and exercise tension during installation.
5. Cable jacket: This is the outer layer of any cable. Most fiber optic cables have an orange jacket, although some types can have black or yellow jackets

**Optical fibers come in two types:**

Single-mode fibers - Used to transmit one signal per fiber (used in telephones and cable TV)

Multi-mode fibers - Used to transmit many signals per fiber (used in computer networks, local area networks)

Some optical fibers can be made from plastic. These fibers have a large core (0.04 inches or 1 mm diameter) and transmit visible red light from LEDs.



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3. Attempt any **FOUR** of the following:

**Marks 16**

a) Differentiate LAN and WAN by considering following points:

- i. Physical area
- ii. Installation cost
- iii. Bandwidth
- iv. Transmission media

*(1Mark for each Parameter)*

**Ans:**

<b>Characteristics</b>	<b>LAN</b>	<b>WAN</b>
Physical area	Network within a single building or campus of up to a few kilometers in size. 10 ... 1 Km campus.	Network spans a large geographical area after a country or continent 100 km ... 1000km country
Installation cost	Less	High
Bandwidth	Bandwidth is low.	Bandwidth is high.
Transmission Media	Coaxial cable.	PSTN or Satellite links.



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**b) State two advantages of ring topology. Describe token. State whether ring topology is broadcast or point to point network.**

*(Any two Advantages - 2 Marks, definition of token - 1 Mark; ring topology is broadcast or point to point - 1 Mark)*

**Ans:**

**Advantages of Ring Topology:**

1. The adding or removing of network nodes is easy, as the process requires changing only two connections.
2. The data being transmitted between two nodes passes through all the intermediate nodes. A central server is not required for the management of this topology
3. Here, since the system provides point to point flow of data i.e. the data is moving in one direction from one computer to another i.e. active topology, hence no collision occurs in the system.
4. Cable faults are easily identified.
5. Dual loop rings can be easily effective.
6. Packet or data delivery is guaranteed.
7. Every computer is having equal priority.

**Token:** Token is a special three byte frame that travels around the ring network. It can flow clockwise or anticlockwise.

Ring topology is a point to point network.

**c) What are the different IP address classes? Explain any one in brief.**

*(Enlisting IP classes -1 Mark & Any one class Explanation - 3Marks)*

**Ans:**

Different IP classes are:

- i) Class A
  - ii) Class B
  - iii) Class C
  - iv) Class D
  - v) Class E
- i) Class A

*Class A* addresses are assigned to networks with a very large number of hosts. The high-order bit in a class A address is always set to zero. The next seven bits complete the network ID. The remaining 24 bits (the last three octets) represent the host ID. This allows for 126

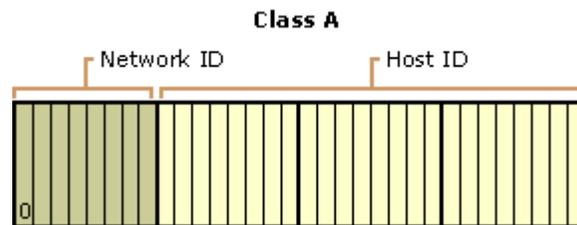


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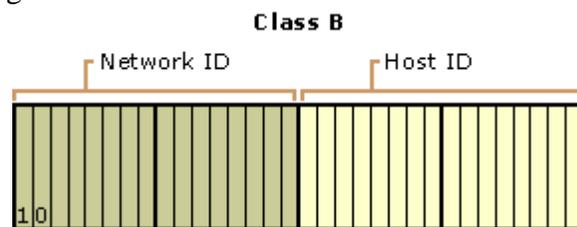
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networks and 16,777,214 hosts per network. Figure illustrates the structure of class A addresses.



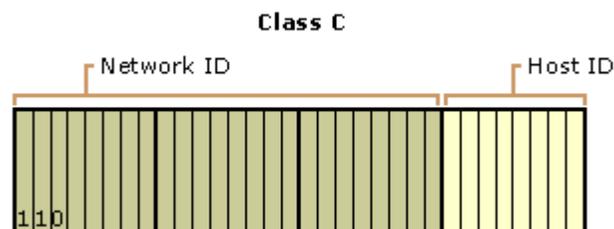
ii) Class B

*Class B* addresses are assigned to medium-sized to large-sized networks. The two high-order bits in a class B address are always set to binary 1 0. The next 14 bits complete the network ID. The remaining 16 bits represent the host ID. This allows for 16,384 networks and 65,534 hosts per network. Figure illustrates the structure of class B addresses.



iii) Class C

*Class C* addresses are used for small networks. The three high-order bits in a class C address are always set to binary 1 1 0. The next 21 bits complete the network ID. The remaining 8 bits (last octet) represent the host ID. This allows for 2,097,152 networks and 254 hosts per network. Figure illustrates the structure of class C addresses.



iv) Class D

*Class D* addresses are reserved for IP multicast addresses. The four high-order bits in a class D address are always set to binary 1 1 1 0. The remaining bits are for the address that



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interested hosts recognize. Microsoft supports class D addresses for applications to multicast data to multicast-capable hosts on an internetwork.

v) Class E

*Class E* is an experimental address that is reserved for future use. The high-order bits in a class E address are set to 1111.

**d) Explain the following terms with respect to presentation layer:**

**(i) Data encryption**

**(ii) Data compression**

*(Data Encryption Explanation - 2 Marks & Data Compression Explanations - 2Marks.)*

**Ans:**

(i) Data Encryption

- For ensuring the security and privacy of the information that is being communicated, a process is called data encryption.
- Data encryption is carried out at the sending signal. In this the sender transforms the original information to another form and sends the transformed information.
- Data encryption ensures the security of the data as it travels down the protocol stack.
- For example, one of the most popular encryption schemes that is usually associated with the presentation layer is the Secure Sockets Layer (SSL) protocol. Not all encryption is done at layer however; some encryption is often done at lower layers in the protocol stack, in technologies such as IPSec.

(ii) Data Compression

- The data compression technique is used for reducing the number of bits required to send information.
- Compression improve the throughput of data
- Data compression is essential for transmission of multimedia such as text, audio, video..



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- e) **Compare ARP and RARP**  
*(Any four points - 4 Marks)*

**Ans:**

ARP	RARP
ARP converts an Internet Protocol address to its physical network address (MAC).	RARP converts Ethernet MAC address to IP address.
ARP broadcast an IP address in an effort to discover its equivalent hardware address.	RARP broadcast the System's hardware address.
Local host maintain the ARP Table.	A RARP server maintain the RARP table.
RFC 826 describes ARP	RFC 903 describes RARP

- f) **State the criteria for selecting transmission media.**  
*(1/2 Marks for any eight factors)*

**Ans:**

Criteria to be considered:

1. Type of medium.
2. No of conductors/connectors.
3. Flexibility.
4. Durability.
5. Bandwidth.
6. Reliability of connection
7. Required speed
8. Distance
9. Ease of installation and maintenance access
10. Technical expertise required to install and utilize
11. Resistance to internal EMI, cross talk of parallel wires
12. Resistance to external EMI outside the cable.
13. Attenuation characteristics
14. Cost



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- 4. Attempt any FOUR of the following: Marks 16**  
**a) Compare cable and wireless transmission.**  
*(Any four points - 4Marks.)*

**Ans:**

Cable(Wired media)	Wireless Media
Also called as bounded or wired media	Also called as unbounded or wireless media
Point to point connection i.e. signal travelling is directed	Used for radio broadcasting in all directions i.e. signal travelling is undirected
Transport signal in electric current or light/beam	Transport signal in the form of electromagnetic waves
Unidirectional, not broadcast	Broadcast
Installation is costly and time consuming	Installation needs less time and money
Wired media leads to discrete network topologies	Wireless media leads to continuous network topologies
Attenuation depends exponentially on the distance	Attenuation is proportional to square of the distance
Example: Twisted pair cable, coaxial cable, optical fiber cable	Example: Radio and Infrared Signals.

- b) In a small agency, there are five PCs in the network. Cost is an issue and the company would prefer not to dedicate an individuals time to maintain a network. However the agency is also concerned about keeping its data safe and the users are not sophisticated computer users. In what ways is a peer to peer network appropriate for the company? In what ways it is inappropriate?**  
*(Reasons for appropriate - 2 Marks & Reasons for Inappropriate - 2 Marks)*

**Ans:**

A peer to peer to peer network appropriate due to following reasons:



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- i) P2P is more reliable as central dependency is eliminated. Failure of one peer doesn't affect the functioning of other peers.
- ii) There is no need for full-time System Administrator. Every user is the administrator of his machine. User can control their shared resources.
- iii) The over-all cost of building and maintaining this type of network is comparatively very less.
- iv) It does not run efficient if you have many computers, it is best to used two to eight computers..

A peer to peer to peer network appropriate due to following reasons:

- i) Security in this system is very less viruses, spywares, Trojans, etc malwares can easily transmitted over this P-2-P architecture.
- ii) In this network, the whole system is decentralized thus it is difficult to administer. That is one person cannot determine the whole accessibility setting of whole network.

- c) **Explain satellite communication with the help of neat diagram.**  
*(Diagram - 2 Marks & Explanation - 2 Marks)*

**Ans:**

**SATELLITE COMMUNICATION:**

In satellite communication, signal transferring between the sender and receiver is done with the help of satellite. In this process, the signal which is basically a beam of modulated microwaves is sent towards the satellite called UPLINK (6 Ghz). Then the satellite amplifies the signal and sent it back to the receiver's antenna present on the earth's surface called as DOWNLINK (4Ghz), as shown in the diagram given

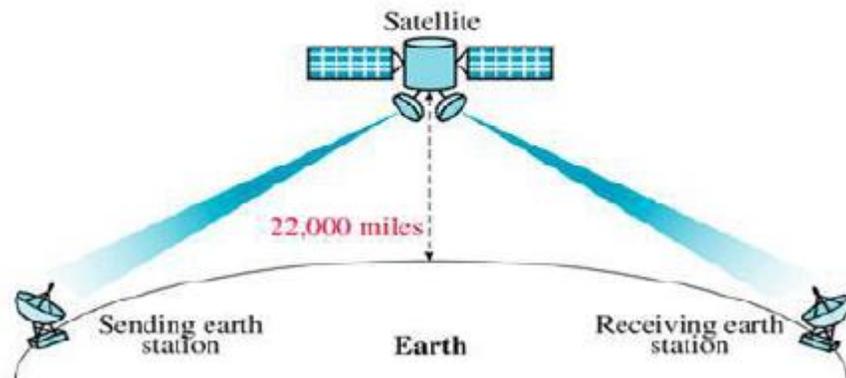


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Satellite Communication

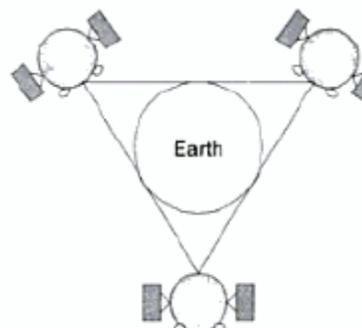


As the entire signal transferring is happening in space. Thus this type of communication is known as space communication. The satellite does the functions of an antenna and the repeater together. If the earth along with its ground stations is revolving and the satellite is stationary, the sending and receiving earth stations and the satellite can be out of sync over time.

Therefore Geosynchronous satellites are used which move at same RPM as that of the earth in the same direction.

So the relative position of the ground station with respect to the satellite never changes.

However 3 satellites are needed to cover earth's surface entirely.





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Frequency band used in satellite communication:

Band	Downlink	Uplink
C	3.7 to 4.2 Ghz	5.925 to 6.425Ghz
Ku	11.7 to 12.2 Ghz	14 to 14.5 Ghz
Ka	17.7 to 21 Ghz	27.5 to 31 Ghz

**d) Describe the term subnet masking.**

*(Subnet masking Explanation -2 Marks & Example - 2 Marks)*

**Ans:**

An IP address has two components, the network address and the host address. A subnet mask separates the IP address into the network and host addresses. In Internet Protocol (IP) networking, devices on a subnet share contiguous ranges of IP address numbers. A mask (known as the *subnet mask* or network mask) defines the boundaries of an IP subnet. The correspondence between subnet masks and IP address ranges follows defined mathematical formulas. IT professionals use *subnet calculators* to map between masks and addresses.

A Subnet mask is a 32-bit number that masks an IP address, and divides the IP address into network address and host address. Subnet Mask is made by setting network bits to all "1"s and setting host bits to all "0"s. Within a given network, two host addresses are reserved for special purpose, and cannot be assigned to hosts. The "0" address is assigned a network address and "255" is assigned to a broadcast address, and they cannot be assigned to hosts.

Subnet masking for 2 subnet: To calculate the number of subnets or nodes, use the formula  $(2^n - 2)$  where n = number of bits in either field, and  $2^n$  represents 2 raised to the nth power. Multiplying the number of subnets by the number of nodes available per subnet gives you the total number of nodes available for your class and subnet mask. Also, note that although subnet masks with non-contiguous mask bits are allowed, they are not recommended.

Example: 10001100.10110011.11011100.11001000 140.179.220.200 IP Address  
 11111111.11111111.11000000.00000000 255.255.192.000 Subnet Mask

-----  
 10001100.10110011.11000000.00000000 140.179.192.000 Subnet Address Hence

Subnet number	Address
1	140.179.64.0
2	140.179.128.0



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e) Which of the following TCP/IP transport layers is faster? Justify your answer:

- i. TCP
- ii. IP
- iii. UDP

*(Explanation of TCP - 2Marks, IP - 1Mark, UDP - 1Mark)*

**Ans:**

**TCP**

- TCP is transmission control protocol.
- It is connection oriented protocol because connection must be establish prior to transmission of data.
- TCP is reliable protocol because data is delivered with acknowledgement.
- TCP perform Auto Retransmission if the data is lost.
- TCP use flow control.
- TCP has low speed of transmission.
- Features of TCP are: connection oriented, point to point communication, support duplex mode.

**IP:**

- IP is internet Protocol.
- It is unreliable protocol because it does not provide any error control and flow control.
- Packets in IP are called "Datagram"
- Datagram is variable length packet with two parts –header and data.
- Features of IP are encapsulation, addressing, routing, fragmentation, protocol identification.

**UDP:**

- UDP is user datagram protocol.
- It is connectionless protocol because data is sent without establishing a connection between sender and receiver before sending the data.
- UDP is unreliable because data is delivered without acknowledgement.
- UDP does not perform Auto retransmission.
- UDP does not use flow control.
- UDP has high transmission speed.



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f) **What do you mean by remote access?**

*(Explanation of Remote access - 2 Marks, Advantages - 1 Mark, Disadvantages - 1Mark)*

**Ans:**

Remote access is the ability to get access to a computer or a network from a remote distance. In corporations, people at branch offices, telecommuters, and people who are travelling may need access to the corporation's network. Home users get access to the Internet through remote access to an Internet service provider. Dial-up connection through desktop, notebook, or handheld computer modem over regular telephone lines is a common method of remote access. Remote access is also possible using a dedicated line between a computer or a remote local area network and the "central" or main corporate local area network. A dedicated line is more expensive and less flexible but offers faster data rates. Integrated Services Digital Network is a common method of remote access from branch offices since it combines dial-up with faster data rates.

**Advantages:**

1. It enables user access to centralized application, stored private or shared files on LAN.
2. User can access their files and emails from remote location.

**Disadvantages:**

1. Require more security
2. More hardware or complex hardware required.

5. **Attempt any FOUR of the following:**

**Marks 16**

a) **For following situations, state which type of network architecture is appropriate?**

- (i) **Number of users 50**
  - (ii) **Data and resources need to be restricted.**
  - (iii) **No network administrator required.**
  - (iv) **All users with equal priority**
- (1 Marks for each type)*

**Ans:**

**i) Number of users 50**

→ Client-Server Network

**ii) Data and resources need to be restricted**

→ Client-Server Network



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iii) No network administrator required

→ Peer to peer Network

iv) All users with equal priority

→ Peer to peer Network

b) Explain twisted pair cable with neat sketch.

(Diagram - 2Marks Explanation - 2Marks)

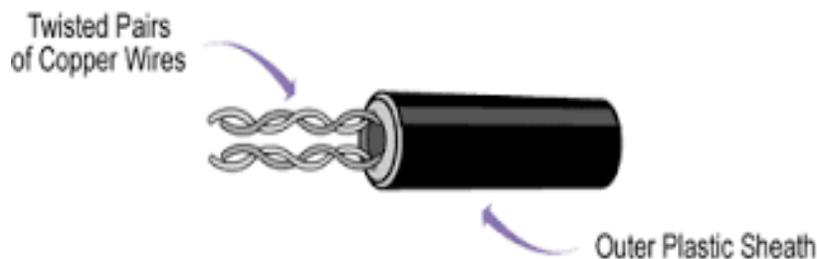
Ans:

A type of cable that consists of two independently insulated wires twisted around one another. The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction. While twisted-pair cable is used by older telephone networks and is the least expensive type of local-area network (LAN) cable, most networks contain some twisted-pair cabling at some point along the network.

Types :

i) Unshielded Twisted Pair Cable (UTP)

Unshielded twisted pair is the most common kind of copper telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires.





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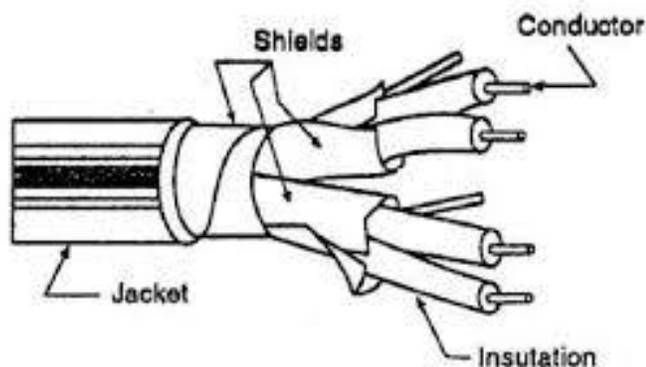
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ii) **Shielded Twisted Pair Cable (STP)**

*STP* is a type of copper telephone wiring in which each of the two copper wires that are twisted together are coated with an insulating coating that functions as a ground for the wires. The extra covering in shielded twisted pair wiring protects the transmission line from electromagnetic interference leaking into or out of the cable. STP cabling often is used in Ethernet networks, especially fast data rate Ethernets.



*Shielded Twisted Pair (STP) configuration*

Advantages of Twisted pair cable

1. It can be used to carry both analog and digital data.



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2. It is relatively easy to implement and terminate.
3. It is the least expensive media of transmission for short distances.
4. If portion of a twisted pair cable is damaged it does not affect the entire network.

- c) **State any two advantages of bus topology .Explain whether adding more computers in bus topology affects performance of network.**  
*(Any Two Advantage – 2 Marks Explanations – 2 Marks)*

**Ans:**

The bus topology has the following advantages:

1. Low cost
2. Easy control.
3. It is easy to set-up and extend bus network.
4. Cable length required for this topology is the least compared to other networks.
5. Linear Bus network is mostly used in small networks. Good for LAN.

In bus topologies, all computers are connected to a single cable or "trunk or backbone", by a transceiver either directly or by using a short drop cable. All ends of the cable must be terminated, that is plugged into a device such as a computer or terminator. Most bus topologies use coax cables. The number of computers on a bus network will affect network performance, since only one computer at a time can send data, the more computers you have on the network the more computers there will be waiting send data.

- d) **What is meant by file sharing and printer sharing? How this can be achieved?**  
*(Explanation - 2Marks Each)*

**Ans:**

**File sharing:**

File sharing is the primary feature of network. Due to use of networks, the sharing of files becomes easier. File sharing requires a shared directory or disk drive to which many users can access over the network. When many users are accessing the same file on the network, more than one person can make changes to a file at the same time. They might both making conflicting changes simultaneously.



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**Printer sharing:**

Printer sharing can share costly & higher quality printers. Printer sharing can be done in several different ways on network. The most common way is to use printer queues on server. The printer queue holds print job until any currently running print jobs are finished & then automatically send the waiting jobs to the printer i.e. printer connected to server. Another way to share printer on a network is that each workstations accesses the printer directly.

- e) **Explain the term SMTP.**  
*(Explanation - 4 Marks)*

**Ans :**

- ➔ It is Simple Mail transfer Protocol.
- ➔ It is connection oriented text based protocol in which sender communicates with receiver using a command and supplying data over reliable TCP connection.
- ➔ SMTP is standard application layer protocol for delivery of email over TCP/IP network.
- ➔ SMTP establish a TCP connection between Sender And port number 25 of receiver.
  
- ➔ It is limited in its ability to queue messages at the receiving end, it is usually used with one of two other protocols, POP3 or IMAP, that let the user save messages in a server mailbox and download them periodically from the server

- f) **Compare IPv4 and IPv6.**  
*(Any 4 Points - 1Mark each)*

**Ans:**

<b>IPv4</b>	<b>IPv6</b>
Source and destination addresses are 32 bits (4 bytes)in length.	Source and destination addresses are 128 bits(16 bytes) in length.
Uses broadcast addresses to send traffic to all nodes on a subnet.	There are no IPv6 broadcast addresses. Instead, multicast scoped addresses are used.



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Fragmentation is supported at Originating hosts and intermediate routers.	Fragmentation is not supported at routers. It is only supported at the originating host.
IP header includes a checksum.	IP header does not include a checksum.
IP header includes options.	All optional data is moved to IPv6 extension headers.

**6. Attempt any TWO of the following:**

**16**

**a) Compare UDP with TCP protocols with respect to:**

- (i) Complexity**
- (ii) Connection**
- (iii) Reliability**
- (iv) Function**
- (v) Which layer they exist**
- (vi) Flow controlling**
- (vii) Overhead**
- (viii) Which is powerful?**

*(Each Parameter - 1Mark each)*

**Ans:**

	UDP	TCP
Complexity	UDP is less complex	TCP is more complex
Connection	UDP is connection less protocol	TCP is connection oriented protocol
Reliability	It provides unreliable delivery of messages	It provides reliable delivery of messages
Function	By using this protocol one program can send a load of packets to another and that would be the end of the	As a message makes its way across the internet from one computer to another. This is connection based.



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	relationship.	
Which layer they exist	Transport layer	Transport layer
Flow controlling	UCP has no flow control	TCP has flow control
Overhead	Overhead is very low	Overhead is low
Which is powerful	UDP is less powerful	TCP is more powerful.

- b) Describe gateways. State the situations under which gateways are necessary in the network.**

*(Explanations – 2 Marks, Diagram – 2 Marks, situation explanation - 4 Marks)*

**Ans:**

A gateway is a node (router) in a computer network, a key stopping point for data on its way to or from other networks. Using gateways, we are able to communicate and send data back and forth. The Internet wouldn't be any use to us without gateways (as well as a lot of other hardware and software).

In a workplace, the gateway is the computer that routes traffic from a workstation to the outside network that is serving up the Web pages. For basic Internet connections at home, the gateway is the Internet Service Provider that gives you access to the entire Internet.

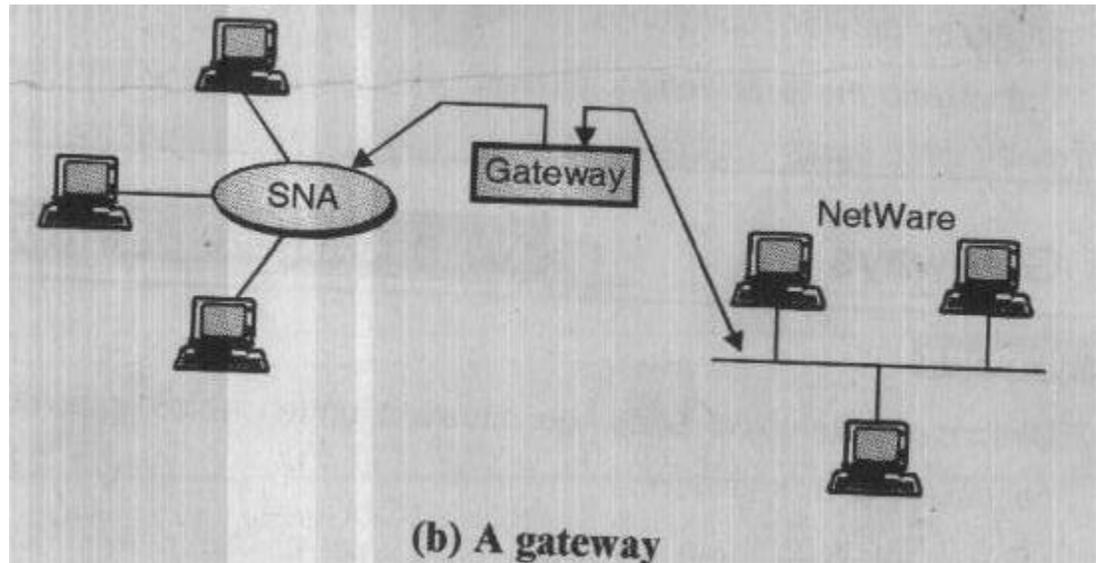
Gateway operates at all 7 layers of the OSI model. It is a device, which connects two different dissimilar networks which have same function of communication. Situation where gateways are necessary for different network like Ethernet, Token Ring, and FDDI etc. It can communicate if they are using same protocol for communication like TCP/IP and if they are using different protocol from a gateway can also forward packet across different n/ws that may also use different protocol.



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Eg: if n/w A is a Token Ring network using TCP/IP & network B is a Novell Network, a gateway can relay frames between two.

This means that a gateway is not only used for similar protocol, but also used between different protocols. In certain situations the only changes required are to the frame header. In other cases, the gateway must take care of different frame sizes, data rates, format, acknowledgement schemes, and priority schemes etc.



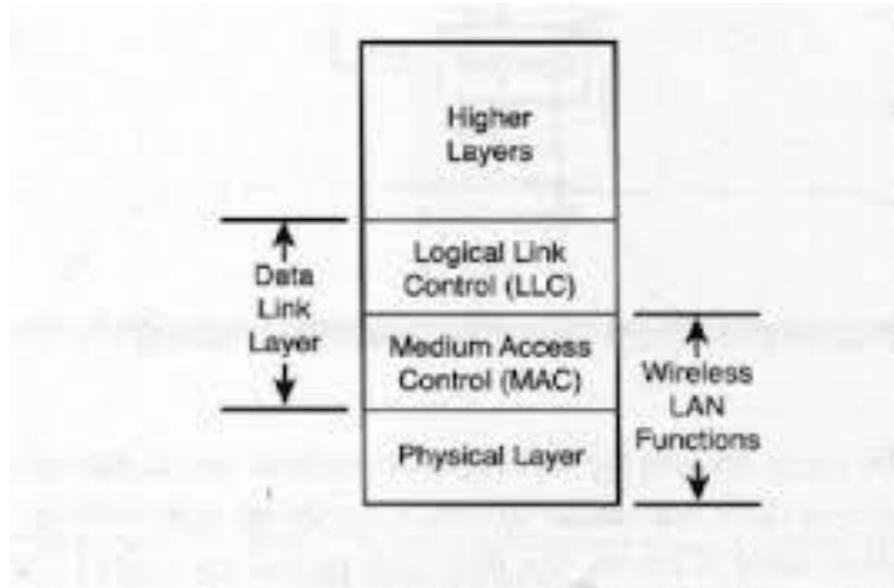
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- c) Draw the adjacent layers in DLL in OSI reference model and describe the major functions and responsibilities of DLL. Describe two sublayers of DLL.  
(Diagram – 2 Marks, Function and responsibility – 2 Marks, Each Sub layer – 2 Marks each)

Ans:





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**Data link layer** is responsible for transmitting group of bits between the adjacent nodes. The group of bits is called as frame. The network layer passes a data unit to the data link layer. Header and trailer is added to the data unit by data link layer. This data unit is passed to the physical layer. Data link layer is responsible for moving frames from one node to the next.

**Functions of data link layer are:**

- Link establishment and termination: establishes and terminates the logical link between two nodes.
- Frame traffic control: tells the transmitting node to "back-off" when no frame buffers are available.
- Frame sequencing: transmits/receives frames sequentially.
- Frame acknowledgment: provides/expects frame acknowledgments. Detects and recovers from errors that occur in the physical layer by retransmitting non-acknowledged frames and handling duplicate frame receipt.
- Frame delimiting: creates and recognizes frame boundaries.
- Frame error checking: checks received frames for integrity.
- Media access management: determines when the node "has the right" to use the physical medium.

**Sublayers of Data Link layer:**

**1) Logical link control sub layer**

It performs functions in the upper portion of the Data Link layer, such as flow control and management of connection errors.

LLC supports the following three types of connections for transmitting data:

- 1) Unacknowledged connectionless service: does not perform reliability checks or maintain a connection, very fast, most commonly used
- 2) Connection oriented service: once the connection is established, blocks of data can be transferred between nodes until one of the node terminates the connection.
- 3) Acknowledged connectionless service provides a mechanism through which individual frames can be acknowledged.

**2) Media Access Control**

This sub layer contains methods that logical topologies can use to regulate the timing of data signals and eliminate collisions. The Media Access Control sub layer also determines where one frame of data ends and the next one starts – frame synchronization. There are four means of frame synchronization: time based, character counting, byte stuffing and bit stuffing.