



School of Computing Skills
Session: 2020-21 (Summer Semester)
B. Voc. Program, 1st Semester,
End-Sem. Examination

SET-A

Course Code: ITN1101

Set A

Time: 2 Hours

Course Name: Introduction to Computers

Max. Marks: 50

Instructions: Answer all the questions.

Section – A

10X01 = 10 Marks

- Q1. A byte consists of
A) One bit
B) Four bits
C) Eight bits
D) Sixteen bits
- Q2. The term gigabyte refers to
A) 1024 bytes
B) 1024 kilobytes
C) 1024 megabytes
D) 1024 gigabyte
- Q3. What are the three decisions making operations performed by the ALU of a computer?
A) Greater than
B) Less than
C) Equal to
D) All of the above
- Q4. An integrated circuit is
A) A complicated circuit
B) An integrating device
C) Much costlier than a single transistor
D) Fabricated on a tiny silicon chip
- Q5. A computer consists of
A) A central processing unit
B) A memory
C) Input and output unit
D) All of the above
- Q6. BCD is
A) Binary Coded Decimal
B) Bit Coded Decimal
C) Binary Coded Digit
D) Bit Coded Digit



- Q7. Which is used for manufacturing chips?
A) Bus
B) Control unit
C) Semiconductors
D) A and b only
- Q8. One millisecond is
A) 1 second
B) 10th of a seconds
C) 1000th of a seconds
D) 10000th of a seconds
- Q9. The largest two digit hexadecimal number is _____
A) (FE)₁₆
B) (FD)₁₆
C) (FF)₁₆
D) (EF)₁₆
- Q10. Which of the following is not a binary number?
a) 1111
b) 101
c) 11E
d) 000

Section – B

04X04 = 16 Marks

- Q11. What is the binary equivalent of the decimal number 368?
- Q12. Write down the decimal equivalent of hex number 1A53
- Q13. Explain what is a combinational circuit?
- Q14. Write down advantages of lcs.

Section – C

04X06 = 24 Marks

- Q15. List some of the applications of computers?
- Q16. What are the functions of the output unit in Computers. List out few Output devices?
- Q17. What do you mean by computer generation? Explain different types of computer generations.
- Q18. List the logic families. Which is the digital logic family which has minimum power dissipation?



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Answer key

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Section – B

04X04 = 16 Marks

Q11. What is the binary equivalent of the decimal number 368?

Ans : 101110000 is the binary equivalent of 368.

Q12. Write down the decimal equivalent of hex number 1A53

Ans : 6739

Q13. Explain what is a combinational circuit?

Ans: In a combinational circuit depends upon present input(s) only i.e. not dependant on the previous input(s). The combinational circuit has no memory dement. It consists of logic gates only.

Q14. Write down advantages of ICs.

Ans : (i) Extremely small in size, (ii) Low power consumption, (iii) Reliability, (iv) Reduced cost, (v) Very small weight and (vi) Easy replacement.

Section – C



Q15. List some of the applications of computers?

Ans. · Word Processing

- Internet
- Desktop publishing
- Digital video or audio composition
- Mathematical Calculations
- Robotics
- Weather analysis

Q16. What are the functions of the output unit in Computers. List out few Output devices?

Ans: In computers, a unit which delivers information from the computer to an external device or from internal storage to external storage.

- Speakers.
- Printer.
- Headphone.
- Monitor (or) Visual Display Unit (VDU).
- Plotter.

Q17. What do you mean by computer generation? Explain different types of computer generations.

Ans: An international conference in 1962 classified computers into 5 distinct generations – 3 of which are already passed by and we are in fourth generation now. The fifth generation computers are undergoing research and a few computers of this generation are developed that meets some of the expected feature of fifth generation.

Each generation of computers is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful, and more efficient and reliable devices.

First Generation - First generation computers were gigantic in size, used vacuum tubes as their main switching device and magnetic drum for memory. Vacuum tubes consumed a lot of electricity and produced much heat requiring cooling facilities for room. The operation was expensive as these tubes burnt off frequently.

Second Generation - By 1948, the invention of the transistor greatly changed the computer's development. Coupled with early advances in magnetic-core memory, transistors led to second generation computers that were smaller, faster, more reliable and more energy-efficient than their predecessors.



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Third Generation - The computers using IC Chips - small scale integration circuits (SSI) and medium scale integration circuits (MSI) are under this class. The invention of IC Chips made it possible to greatly reduce the size of computers with improvement in operation speed (nanoseconds) and reliability. The most noticeable achievement of third generation is the development of operating systems. The operating systems allowed the machines to run many different applications.

Fourth Generation - Fourth generation for the computers is the era of blooming in multiple dimensions rather than invention of electronic components. Fourth generation computers use ICs as in third generation, but this time Large Scale ICs (LSI), and Very Large Scale ICs (VLSI) are used. As millions of electronic components got integrated in a tiny chip, the computers became very small with increased speed, reliability and reduction in cost. The size of computer reduced to mini computers and microcomputers. Today, we have laptops, palm tops and pocket PCs. Probably the most important development in this generation is microprocessor.

Fifth Generation - Fifth generation computers are future computers. In 1982 Japan started a project named Fifth Generation Computer Systems Project (FGCS) initiated to create a "fifth generation computer" which was supposed to perform much calculation using massive parallel processing. Fifth generation computers are anticipated new type of computer based on emerging microelectronic technologies with high computing speeds and parallel processing.

Q18. List the logic families. Which is the digital logic family which has minimum power dissipation?

Ans: TTL, CMOS, ECL etc are the logic families. The CMOS logic family has the minimum power requirement being unipolar.



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End-Sem. Examination

Course Code: ITN1101

Time: 2 Hours

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Max. Marks: 50

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A) (FE)16
B) (FD)16
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a) 1111
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04X04 = 16 Marks

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589-B

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B. Voc. Program, 1st Semester,

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Registration No.:

Set – A

School of Computing Skills
Session: 2020-21 (Summer Semester)
B. Voc. Program, 1st Semester,
End-Sem. Examination

Course Code: ITN1104

Time: 2 Hours

Course Name: Basics of Networking

Max. Marks: 50

Section – A

10X01 = 10 Marks

10 objective type questions, each question carries 01 mark.

1. How long is an IPv6 address?
a) 32 bits
b) 64 bits
c) 128 bits
d) 128 bytes
2. Which protocol is used to send a destination network unknown message back to originating hosts?
a) TCP
b) ARP
c) BootP
d) ICMP
3. A set of rules that governs data communication
a) Protocols
b) Standards
c) RFCs
d) None of the mentioned
4. The _____ layer is responsible for moving frames from one hop (node) to the next.
a) Data link
b) Physical
c) Network
d) None of the above
5. In a _____ connection, more than two devices can share a single link.
a) Primary
b) Secondary
c) Multipoint
d) Point-to-point
6. A _____ is a data communication system spanning states, countries, or the whole world.
a) MAN
b) WAN
c) LAN
d) None of the above
7. What is a Firewall in Computer Network?
a) The physical boundary of Network
b) An operating System of Computer Network
c) A system designed to prevent unauthorized access
d) A web browsing Software
8. Which of the following includes the benefit of the Networking?
a) File Sharing
b) Easier access to Resources
c) Easier Backups
d) All of the Above
9. Which one of the following is the most common internet protocol?
a) HTML
b) NetBEUI
c) TCP/IP
d) IPX/SPX
10. Which one of the following is not a network topology?
a) Star
b) Ring
c) Bus
d) Peer to Peer



Section – B

04X04 = 16 Marks

04 short answer type questions, each question carries 04 marks.

1. What is data communication? Explain different types of data communication components.
2. Explain different types of computer network architectures.
3. What is the difference between TCP and UDP protocols?
4. What is the Internet Control Message Protocol (ICMP)? How does it work?

Section – C

04X06 = 24 Marks

04 long type questions, each question carries 06 marks.

1. Explain different types of network topologies used in computer networking.
2. Explain the following: -
 - a) LAN
 - b) MAN
 - c) WAN
3. What is the IEEE 802 standard? Why IEEE 802 standards are important in computer networking?
4. What are the advantages of wireless network? And how to deploy a wireless network?



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Answer key

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Ans. c) 128 bits

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Ans. d) ICMP

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- a) Protocols
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- c) RFCs
- d) None of the mentioned

Ans. a) Protocols

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- d) None of the above

Ans. a) data link

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- a) Primary
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- d) Point-to-point

Ans. c) Multipoint

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Ans. b) WAN

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Ans. d) Peer to Peer

Section – B

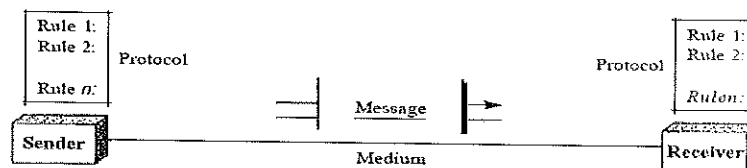
04X04 = 16 Marks

04 short answer type questions, each question carries 04 marks.

1. What is data communication? Explain different types of data communication components.

Ans. Data communications refers to the transmission of data between two or more computers and a computer network or data network is a telecommunications network that allows computers to exchange data. The physical connection between networked computing devices is established using either cable media or wireless media. When we communicate, we are sharing information. This sharing can be local or remote. Between individuals, local communication usually occurs face to face, while remote communication takes place over distance.

A data communications system has five components.



1. **Message.** The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.
2. **Sender.** The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.
3. **Receiver.** The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.
4. **Transmission medium.** The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves
5. **Protocol.** A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

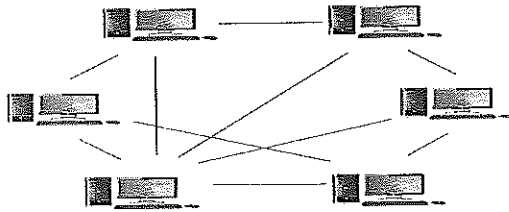
2. Explain different types of computer network architectures.

Ans. Computer Network Architectures

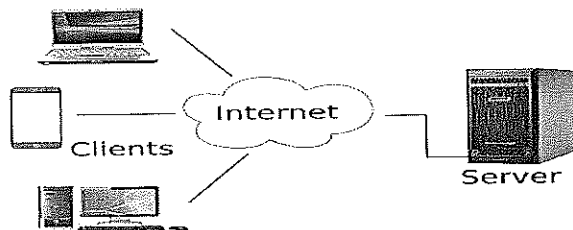
A Computer Architecture is a design in which all computers in a computer network are organized. An architecture defines how the computers should get connected to get the maximum advantages of a computer network such as better response time, security, scalability etc. The two most popular computer architectures are

1. P2P (Peer to Peer): In peer to peer architecture all the computers in a computer network are connected with every computer in the network. Peer-to-peer computing or networking is a distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes. Peers make a portion of their resources, such as processing power, disk storage or network bandwidth, directly available to other network participants,

without the need for central coordination by servers or stable hosts Peers are both suppliers and consumers of resources, in contrast to the traditional client-server model in which the consumption and supply of resources is divided.



2. Client-Server architecture: In Client Server architecture a central computer acts as a hub and serves all the requests from client computers. In this architecture, many clients (remote processors) request and receive service from a centralized server (host computer). Client computers provide an interface to allow a computer user to request services of the server and to display the results the server returns. Servers wait for requests to arrive from clients and then respond to them. Ideally, a server provides a standardized transparent interface to clients so that clients need not be aware of the specifics of the system (i.e., the hardware and software) that is providing the service. Clients are often situated at workstations or on personal computers, while servers are located elsewhere on the network, usually on more powerful machines. This computing model is especially effective when clients and the server each have distinct tasks that they routinely perform.



3. What is the difference between TCP and UDP protocols?

Ans. Both TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are the most widely used Internet protocols among which TCP is connection oriented – once a connection is established, data can be sent bidirectional. UDP is a simpler, connectionless Internet protocol. Multiple messages are sent as packets in chunks using UDP. Now on the basis of features of attributes we can distinguish between TCP and UDP. Following are the important differences between TCP and UDP.

| S. No. | Key point | TCP | UDP |
|--------|------------|--|---|
| 1. | Definition | It is a communications protocol, using which the data is transmitted between systems over the network. In this, the data is transmitted into the form of packets. It includes error-checking, guarantees the delivery and preserves the order of the data packets. | It is same as the TCP protocol except this doesn't guarantee the error-checking and data recovery. If you use this protocol, the data will be sent continuously, irrespective of the issues in the receiving end. |
| 2. | Design | TCP is a connection oriented protocol. | UDP is a connection less protocol. |



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| | | | |
|----|-------------------|--|---|
| 3. | Reliable | As TCP provides error checking support and also guarantees delivery of data to the destination router this make it more reliable as compared to UDP. | While on other hand UDP does provided only basic error checking support using checksum so the delivery of data to the destination cannot be guaranteed in UDP as compared to that in case of TCP. |
| 4. | Data transmission | In TCP the data is transmitted in a particular sequence which means that packets arrive in-order at the receiver. | On other hand there is no sequencing of data in UDP in order to implement ordering it has to be managed by the application layer. |
| 5. | Performance | TCP is slower and less efficient in performance as compared to UDP. Also TCP is heavy-weight as compared to UDP. | On other hand UDP is faster and more efficient than TCP. |
| 6. | Retransmission | As TCP provides error checking support and also guarantees delivery of data to the destination router this make it more reliable as compared to UDP. | While on other hand UDP does provided only basic error checking support using checksum so the delivery of data to the destination cannot be guaranteed in UDP as compared to that in case of TCP. |

4. What is the Internet Control Message Protocol (ICMP)? How does it work?

Ans. Internet Control Message Protocol (ICMP)

- The Internet Control Message Protocol (ICMP) is a network layer protocol used by network devices to diagnose network communication issues. ICMP is mainly used to determine whether or not data is reaching its intended destination in a timely manner.
- Commonly, the ICMP protocol is used on network devices, such as routers. ICMP is crucial for error reporting and testing, but it can also be used in distributed denial-of-service (DDoS) attacks.
- The primary purpose of ICMP is for error reporting. When two devices connect over the Internet, the ICMP generates errors to share with the sending device in the event that any of the data did not get to its intended destination. For example, if a packet of data is too large for a router, the router will drop the packet and send an ICMP message back to the original source for the data.
- A secondary use of ICMP protocol is to perform network diagnostics; the commonly used terminal utilities traceroute and ping both operate using ICMP.
- The traceroute utility is used to display the routing path between two Internet devices. The routing path is the actual physical path of connected routers that a request must pass through before it reaches its destination. The journey between one router and another is known as a 'hop,' and a traceroute also reports the time required for each hop along the way. This can be useful for determining sources of network delay.
- The ping utility is a simplified version of traceroute. A ping will test the speed of the connection between two devices and report exactly how long it takes a packet of data to reach its destination and come back to the sender's device. Although ping does not provide data about routing or hops, it is still a very useful metric for gauging the latency between two devices.
- The ICMP echo-request and echo-reply messages are commonly used for the purpose of performing a ping.
- Unfortunately network attacks can exploit this process, creating means of disruption such as the ICMP flood attack and the ping of death attack.

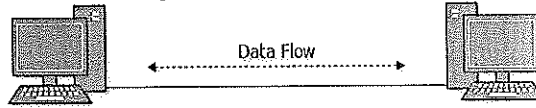
04 long type questions, each question carries 06 marks.

1. Explain different types of network topologies used in computer networking.

Ans. Network Topology is the schematic description of a network arrangement, connecting various nodes (sender and receiver) through lines of connection. Following are the network topologies.

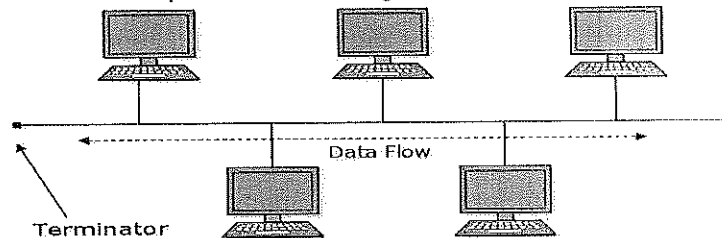
Point-to-Point

Point-to-point networks contains exactly two hosts such as computer, switches or routers, servers connected back to back using a single piece of cable.



Bus Topology

In case of Bus topology, all devices share single communication line or cable. Bus topology may have problem while multiple hosts sending data at the same time.

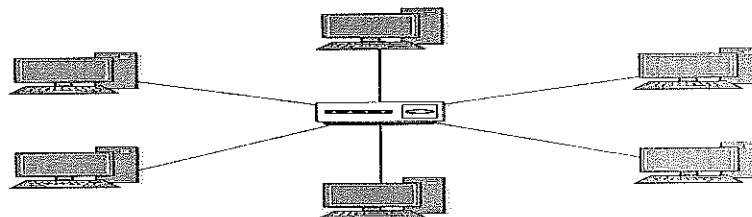


Features of Bus Topology

1. It transmits data only in one direction.
2. Every device is connected to a single cable

Star Topology

All hosts in Star topology are connected to a central device, known as hub device, using a point-to-point connection. That is, there exists a point to point connection between hosts and hub.

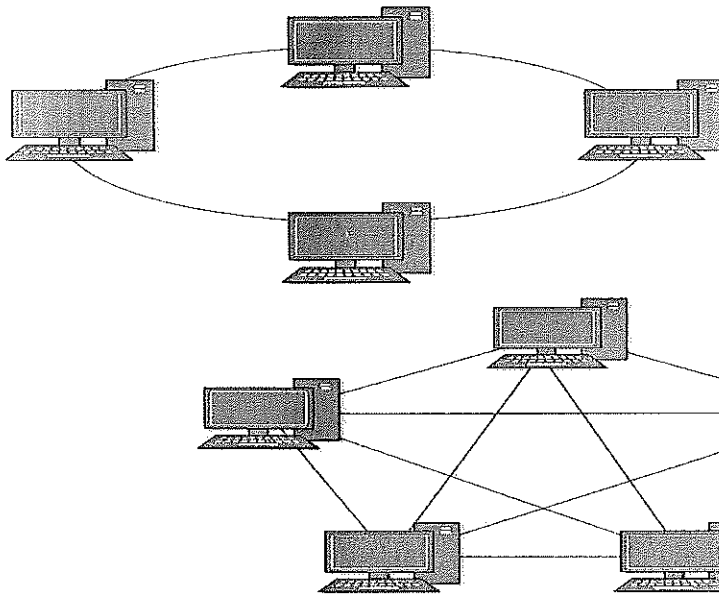


Features of Star Topology

1. Every node has its own dedicated connection to the hub.
2. Hub acts as a repeater for data flow.
3. Can be used with twisted pair, Optical Fiber or coaxial cable.

Ring Topology

In ring topology, each host machine connects to exactly two other machines, creating a circular network structure. When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts. To connect one more host in the existing structure, the administrator may need only one more extra cable.



Mesh Topology

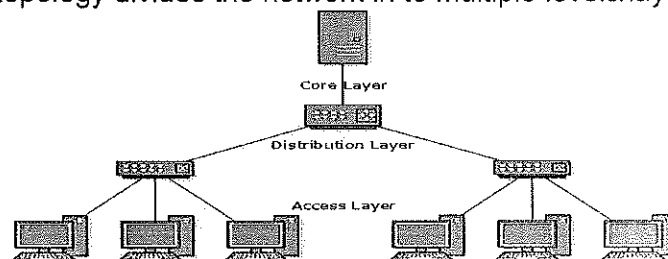
In this type of topology, a host is connected to one or multiple hosts. This topology has hosts in point-to-point connection with every other host or may also have hosts which are in point-to-point connection to few hosts only.

Mesh technology comes into two types:

- **Full Mesh:** All hosts have a point-to-point connection to every other host in the network.
- **Partially Mesh:** Not all hosts have point-to-point connection to every other host. Hosts connect to each other in some arbitrary fashion.

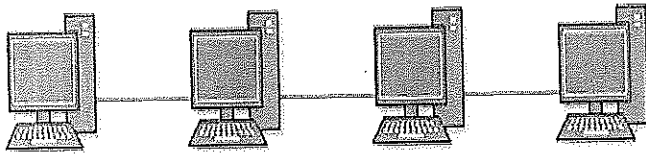
Tree Topology

Also known as Hierarchical Topology, this is the most common form of network topology in use presently. This topology imitates as extended Star topology and inherits properties of bus topology. This topology divides the network in to multiple levels/layers of network.



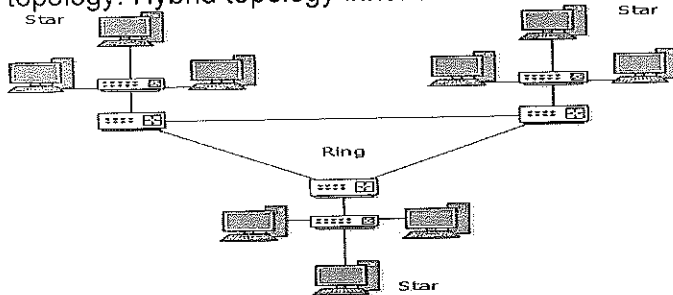
Daisy Chain

This topology connects all the hosts in a linear fashion. Similar to Ring topology, all hosts are connected to two hosts only, except the end hosts. Means, if the end hosts in daisy chain are connected then it represents Ring topology.



Hybrid Topology

A network structure whose design contains more than one topology is said to be hybrid topology. Hybrid topology inherits merits and demerits of all the incorporating topologies.

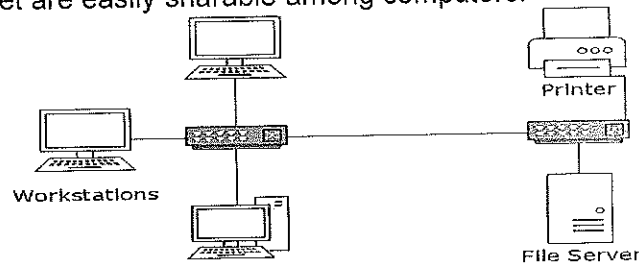


2. Explain the following: -

- a) LAN
- b) MAN
- c) WAN

Ans. LAN-Local Area Network

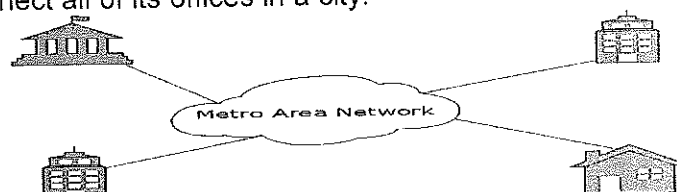
A computer network spanned inside a building and operated under single administrative system is generally termed as Local Area Network (LAN). Usually, LAN covers an organization' offices, schools, colleges or universities. Number of systems connected in LAN may vary from as least as two to as much as 16 million. LAN provides a useful way of sharing the resources between end users. The resources such as printers, file servers, scanners, and internet are easily sharable among computers.



LANs are composed of inexpensive networking and routing equipment. It may contain local servers serving file storage and other locally shared applications. It mostly operates on private IP addresses and does not involve heavy routing. LAN works under its own local domain and controlled centrally.

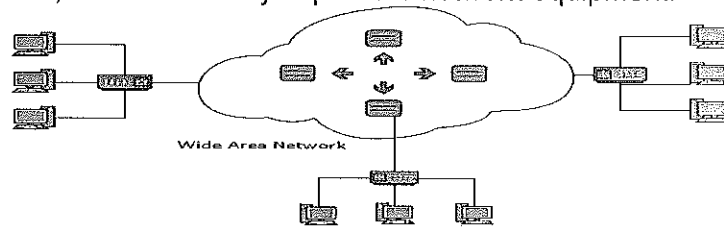
MAN-Metropolitan Area Network

The Metropolitan Area Network (MAN) generally expands throughout a city such as cable TV network. It can be in the form of Ethernet, Token-ring, ATM, or Fiber Distributed Data Interface (FDDI). Metro Ethernet is a service which is provided by ISPs. This service enables its users to expand their Local Area Networks. For example, MAN can help an organization to connect all of its offices in a city.



WAN-Wide Area Network

The Wide Area Network (WAN) covers a wide area which may span across provinces and even a whole country. Generally, telecommunication networks are Wide Area Network. These networks provide connectivity to MANs and LANs. Since they are equipped with very high speed backbone, WANs use very expensive network equipment.



WAN may use advanced technologies such as Asynchronous Transfer Mode (ATM), Frame Relay, and Synchronous Optical Network (SONET). WAN may be managed by multiple administration.

3. What is the IEEE 802 standard? Why IEEE 802 standards are important in computer networking?

Ans. IEEE 802 networking standards

- IEEE 802 is a collection of networking standards that cover the physical and data-link layer specifications for technologies such as Ethernet and wireless.
- These specifications apply to local area networks (LAN) and metropolitan area networks (MAN).
- IEEE 802 also aids in ensuring multi-vendor interoperability by promoting standards for vendors to follow.
- Essentially, the IEEE 802 standards help make sure internet services and technologies follow a set of recommended practices so network devices can all work together smoothly.
- IEEE 802 is divided into 22 parts that cover the physical and data-link aspects of networking. The family of standards is developed and maintained by the IEEE 802 LAN/MAN Standards Committee, also called the LMSC. IEEE stands for Institute of Electrical and Electronics Engineers.
- The set of standards started in 1979 with a "local network for computer interconnection" standard, which was approved a year later. The LMSC has made more than 70 standards for IEEE 802.
- Some commonly used standards include those for Ethernet, bridging and virtual bridged LANs, wireless LAN, wireless PAN, MAN and radio access networks as well as media independent handover services.
- The better-known specifications include 802.3 Ethernet, 802.11 Wi-Fi and 802.15 Bluetooth/ZigBee. However, some of these standards have been labeled as disbanded or hibernating and are either superseded by newer standards or are being reworked.
- IEEE 802 specifications also split the data link layer into two different layers:
 - LLC layer
 - MAC layer

Why IEEE 802 standards are important

- LMSC was formed in 1980 in order to standardize network protocols and provide a path to make compatible devices across numerous industries.
- Without these standards, equipment suppliers could manufacture network hardware that would only connect to certain computers. It would be much more difficult to connect to systems not using the same set of networking equipment.



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- Standardizing protocols help ensure that multiple types of devices can connect to multiple network types. It also helps make sure network management isn't the challenge it could be if it wasn't in place.
- IEEE 802 will also coordinate with other international standards, such as ISO, to help maintain international standards.
- In addition, the "802" in IEEE 802 does not stand for anything with high significance. 802 was just the next numbered project.

4. What are the advantages of wireless network? And how to deploy a wireless network?

Ans. Advantages of Wireless Network

- **Convenience:** Access your network resources from any location within your wireless network's coverage area or from any Wi-Fi hotspot.
- **Mobility:** You're not tied to your desk, as you are with a wired connection. You and your employees can go online in conference room meetings, for example.
- **Productivity:** Wireless access to the Internet and to your company's key applications and resources helps your staff get the job done and encourages collaboration.
- **Easy setup:** You don't have to string cables, so installation can be quick and cost effective.
- **Expandability:** You can easily expand wireless networks with existing equipment, whereas a wired network might require additional wiring.
- **Security:** Advances in wireless networks provide robust security protections.
- **Reduced cost:** Because wireless networks eliminate or reduce wiring expenses, they can cost less to operate than wired networks.

How to deploy a wireless network?

To create your wireless network, you can choose between three types of deployment: centralized deployment, converged deployment, and cloud-based deployment. Need help figuring out which deployment is best for your business? Talk to an expert.

1. Centralized Deployment

The most common type of wireless network system, centralized deployments are traditionally used in campuses where buildings and networks are in close proximity. This deployment consolidates the wireless network, which makes upgrades easier and facilitates advanced wireless functionality. Controllers are based on-premises and are installed in a centralized location.

2. Converged Deployment

For small campuses or branch offices, converged deployments offer consistency in wireless and wired connections. This deployment converges wired and wireless on one network device—an access switch—and performs the dual role of both switch and wireless controller.

3. Cloud-Based Deployment

This system uses the cloud to manage network devices deployed on places at different locations. The solution requires Cisco Meraki cloud-managed devices, which provide full visibility of the network through their dashboards.





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- c) Hypertext transfer protocol
- d) Hypertext transfer program

Section – B

04X04 = 16 Marks

04 short answer type questions, each question carries 04 marks.

1. What is the difference between IPv4 and IPv6 addresses?
2. What is the use of Address Resolution Protocol (ARP) in computer networking?
3. Explain the following: -
 - a) PAN
 - b) LAN
 - c) Internetwork
4. What is the wireless network? Write down the difference between wired and wireless networks.

Section – C

04X06 = 24 Marks

04 long type questions, each question carries 06 marks.

1. Explain about the different types of transmission Mediums in computer networks.
2. Discuss various advantages and disadvantages of each network topology.
3. What is the OSI model? Explain its different layers.
4. Explain the following:
 - a) Router
 - b) Bridge
 - c) Access Point



School of Computing Skills
Session: 2020-21 (Summer Semester)

B. Voc. Program, 1st Semester,

End-Sem. Examination

Course Code: ITN1104

Course Name: Basics of Networking

Time: 2 Hours

Max. Marks: 50

Answer key

Section – A

10X01 = 10 Marks

10 objective type questions, each question carries 01 mark.

1. Communication between a computer and a keyboard involves _____ transmission.
- a) Automatic
 - b) Half-duplex
 - c) Simplex
 - d) Full-duplex

Ans. c) Simplex

2. Which class of IP address has the most host addresses available by default?

- a) A and B
- b) A
- c) B
- d) C

Ans. b) A

3. A _____ is a data communication system within a building, plant, or campus, or between nearby buildings.

- a) MAN
- b) WAN
- c) LAN
- d) None of the above

Ans. c) LAN

4. Which protocol does Ping use?

- a) TCP
- b) ICMP
- c) BootP
- d) ARP

Ans. b) ICMP

5. The process-to-process delivery of the entire message is the responsibility of the _____ layer.

- a) Transport
- b) Network
- c) Application
- d) Physical

Ans. a) Transport

6. A _____ connection provides a dedicated link between two devices.

- a) Primary
- b) Secondary
- c) Multipoint
- d) Point-to-point

Ans. d) Point-to-point

7. What is the size of the IP version 4?

- a) 22 bytes
- b) 32 bits
- c) 32 bytes
- d) 64 bits

Ans. b) 32 bits

8. Which of the following is not the Networking Devices?

- a) Gateways
- b) Firewalls
- c) Linux
- d) Routers

Ans. c) Linux

9. What kind of transmission medium is most appropriate to carry data in a computer network that is exposed to electrical interferences?

- a) Unshielded twisted pair
- b) Microwave
- c) Coaxial cable
- d) Optical fiber

Ans. d) Optical fiber



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10. The term HTTP stands for?
- Hyper terminal tracing program
 - Hypertext tracing protocol
 - Hypertext transfer protocol
 - Hypertext transfer program

Ans. c) Hypertext transfer protocol

Section – B

04X04 = 16 Marks

04 short answer type questions, each question carries 04 marks.

1. What is the difference between IPv4 and IPv6 addresses?

Ans. Differences Between IPv4 and IPv6 Addresses

| Basis for differences | IPv4 | IPv6 |
|------------------------------------|---|--|
| Size of IP address | IPv4 is a 32-Bit IP Address. | IPv6 is 128 Bit IP Address. |
| Addressing method | IPv4 is a numeric address, and its binary bits are separated by a dot (.) | IPv6 is an alphanumeric address whose binary bits are separated by a colon (:). It also contains hexadecimal. |
| Example | 12.244.233.165 | 2001:0db8:0000:0000:ff00:0042:7879 |
| Number of classes | IPv4 offers five different classes of IP Address. Class A to E. | IPv6 allows storing an unlimited number of IP Address. |
| Fragmentation | Fragmentation is done by sending and forwarding routes. | Fragmentation is done by the sender. |
| Routing Information Protocol (RIP) | RIP is a routing protocol supported by the routed daemon. | RIP does not support IPv6. It uses static routes. |
| Network Configuration | Networks need to be configured either manually or with DHCP. IPv4 had several overlays to handle Internet growth, which require more maintenance efforts. | IPv6 support auto-configuration capabilities. |
| Security | Security is dependent on applications - IPv4 was not designed with security in mind. | IP Sec(Internet Protocol Security) is built into the IPv6 protocol, usable with a proper key infrastructure. |
| Packet size | Packet size 576 bytes required, fragmentation optional | 1208 bytes required without fragmentation |
| Address configuration | Manual or via DHCP | Stateless address auto configuration using Internet Control Message Protocol version 6 (ICMPv6) or DHCPv6 |
| Dynamic configuration Server | Clients have approach DHCS (Dynamic Host Configuration server) whenever they want to connect to a network. | A Client does not have to approach any such server as they are given permanent addresses. |
| Compatibility with mobile devices | IPv4 address uses the dot-decimal notation. That's why it is not suitable for mobile networks. | IPv6 address is represented in hexadecimal, colon- separated notation. IPv6 is better suited to mobile networks. |

2. What is the use of Address Resolution Protocol (ARP) in computer networking?

Ans. Address Resolution Protocol (ARP)

- Address Resolution Protocol (ARP) is one of the major protocol of the TCP/IP protocol suite. The purpose of Address Resolution Protocol (ARP) is to resolve an IPv4 address (32 bit Logical Address) to the corresponding physical address (48 bit MAC Address).
- Network Applications at the Application Layer use IPv4 Address to communicate with another device. But at the Datalink layer, the addressing is MAC address (48 bit Physical Address), and this address is burned into the network card permanently.
- You can view your network card's hardware address by typing the command "ipconfig /all" at the command prompt (without double quotes using Windows Operating Systems).

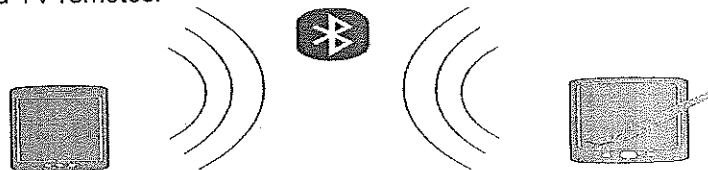
- In other words, there are two types of addresses used for IPv4 communication:
 - The address used at layer 3 (Network layer) is IPv4 address (32 bit Logical Addresses).
 - The address used at layer 2 (Datalink layer) is MAC address (48 bit Physical Address).
- When a computer encapsulates an IPv4 datagram, it needs
 - Source IPv4 address,
 - Destination IPv4 address,
 - Source MAC address and
 - Destination MAC address
- Source IPv4 address, destination IPv4 address, source MAC address are already available, because source IPv4 address and destination IPv4 addresses are available locally and the destination IPv4 address is where we are trying to communicate.
- At the layer 2 (Datalink layer) of the sending computer, if the computer want to encapsulate an IPv4 datagram inside an Ethernet frame, it needs destination MAC address. Address Resolution Protocol (ARP) is used to resolve layer 2 MAC Address of the receiver (destination MAC address).
- The purpose of Address Resolution Protocol (ARP) is to find out the MAC address of a device in your Local Area Network (LAN), for the corresponding IPv4 address, which network application is trying to communicate.

3. Explain the following: -

- a) PAN
- b) LAN
- c) Internetwork

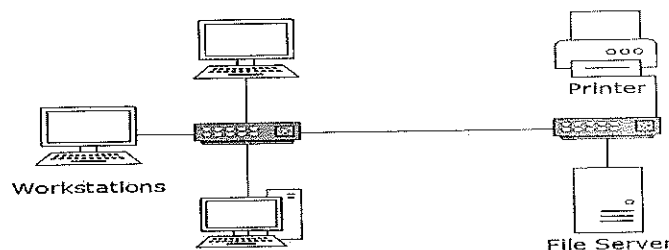
Ans. PAN-Personal Area Network

A Personal Area Network (PAN) is smallest network which is very personal to a user. This may include Bluetooth enabled devices or infra-red enabled devices. PAN has connectivity range up to 10 meters. PAN may include wireless computer keyboard and mouse, Bluetooth enabled headphones, wireless printers and TV remotes.



LAN-Local Area Network

A computer network spanned inside a building and operated under single administrative system is generally termed as Local Area Network (LAN). Usually, LAN covers an organization' offices, schools, colleges or universities. Number of systems connected in LAN may vary from as least as two to as much as 16 million. LAN provides a useful way of sharing the resources between end users. The resources such as printers, file servers, scanners, and internet are easily sharable among computers.



LANs are composed of inexpensive networking and routing equipment. It may contain local servers serving file storage and other locally shared applications. It mostly operates on private IP addresses and does not involve heavy routing. LAN works under its own local domain and controlled centrally.

Internetwork: A network of networks is called an internetwork, or simply the internet. It is the largest network in existence on this planet. The internet hugely connects all WANs and it can have connection to LANs and Home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4. Because of shortage of address spaces, it is gradually migrating from IPv4 to IPv6.

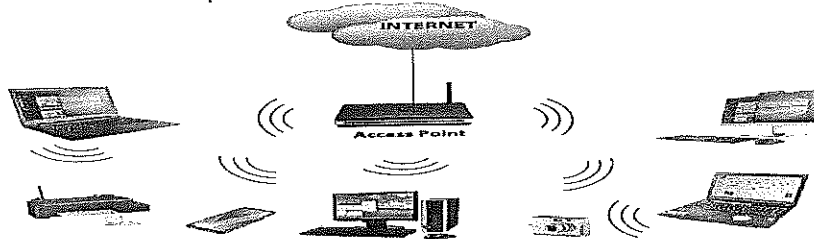
Internet enables its users to share and access enormous amount of information worldwide. It uses WWW, FTP, email services, audio and video streaming etc. At huge level, internet works on Client-Server model. Internet uses very high speed backbone of fiber optics. To inter-connect various continents, fibers are laid under sea known to us as submarine communication cable. Internet is widely deployed on World Wide Web services using HTML linked pages and is accessible by client software known as Web Browsers. When a user requests a page using some web browser located

on some Web Server anywhere in the world, the Web Server responds with the proper HTML page. The communication delay is very low.

4. What is the wireless network? Write down the difference between wired and wireless networks.

Ans. Wireless Network

- Wireless network or computer network uses wireless data connections between the nodes of the network. Wireless networks fetch important changes to data networking and make an integrated network authenticity.
- A wireless network provides a network without the use of wires because by using it you can connect your computer to the network using radio waves and can move your computer anywhere.
- A wireless network is extremely portable because of its digital modulation, adaptive modulation, information compression, and access multiplexing.



➤ Air is the medium for the wireless network and it offers you the best privacy, personal computer security than before.

The main purpose of using wireless network is its flexibility, roaming, low cost, and high standard.

Difference between Wired and Wireless Network

| PARAMETER | WIRED | WIRELESS |
|---|---|--|
| Communication Medium | Copper, Fiber etc. | Air |
| Standard | IEEE 802.3 | 802.11 family |
| Mobility and Roaming | Limited | Higher |
| Security | High | Lower than Wired. Also easy to hack |
| Speed / Bandwidth | High Speed upto 1 Gbps | Lower speed than Wired Network. |
| Access to Network | Physical Access Required | Proximity Required |
| Delay | Low | High |
| Reliability | High | Lower than Wired |
| Flexibility to change | Less flexible to changes | More flexible configuration |
| Working principle | CSMA/CD, operates by detecting the occurrence of a collision. | CSMA/CA, hence reduces possibility of collision by avoiding collision from happening |
| Interference and Fluctuations vulnerability | Very Less | High |
| Installation activity | Cumbersome and manpower intensive | Less labor intensive and easy |
| Installation Time | Takes longer time to perform | Very less deployment time |
| Dedicated / Shared Connection | Dedicated | Shared |
| Installation Cost | High | Low |

| PARAMETER | WIRED | WIRELESS |
|----------------------------|---|--|
| Maintenance (Upgrade) cost | High | Low |
| Related equipment | Router, Switch , Hub | Wireless Router, Access Point |
| Benefits | <ul style="list-style-type: none"> ✓ Greater Speed ✓ Higher noise immunity ✓ Highly reliable ✓ Greater Security | <ul style="list-style-type: none"> ✓ No Hassles of Cable ✓ Best for mobile devices ✓ Greater mobility ✓ Easy installation and management |

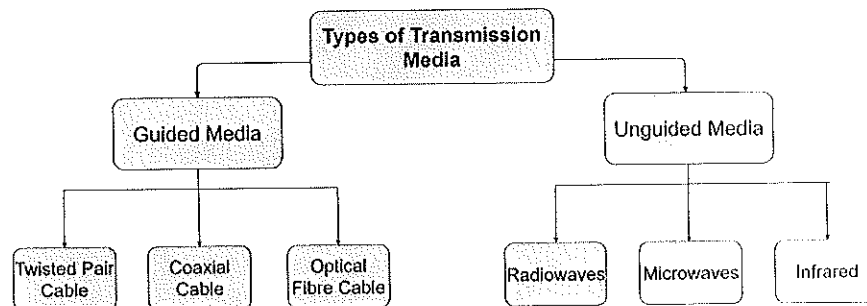
Section – C

04X06 = 24 Marks

04 long type questions, each question carries 06 marks.

1. Explain about the different types of transmission Mediums in computer networks.

Ans. In data communication terminology, a transmission medium is a physical path between the transmitter and the receiver i.e. it is the channel through which data is sent from one place to another. Transmission Media is broadly classified into the following types:



1. Guided Media:

It is also referred to as Wired or Bounded transmission media. Signals being transmitted are directed and confined in a narrow pathway by using physical links.

Features:

- High Speed
- Secure
- Used for comparatively shorter distances

There are 3 major types of Guided Media:

(i) Twisted Pair Cable –

It consists of two separately insulated conductor wires wound about each other. Generally, several such pairs are bundled together in a protective sheath. They are the most widely used Transmission Media. Twisted Pair is of two types:

1. Unshielded Twisted Pair (UTP): This type of cable has the ability to block interference and does not depend on a physical shield for this purpose. It is used for telephonic applications.
2. Shielded Twisted Pair (STP): This type of cable consists of a special jacket to block external interference. It is used in fast-data-rate Ethernet and in voice and data channels of telephone lines.

(ii) Coaxial Cable –

It has an outer plastic covering containing two parallel conductors each having a separate insulated protection cover. Coaxial cable transmits information in two modes: Baseband mode (dedicated cable bandwidth) and Broadband mode (cable bandwidth is split into separate ranges). Cable TVs and analog television networks widely use Coaxial cables.

(iii) Optical Fiber Cable –

It uses the concept of reflection of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for transmission of large volumes of data. The cable can be unidirectional or bidirectional. The WDM (Wavelength Division Multiplexer) supports two modes, namely unidirectional and bidirectional mode.

2. Unguided Media:



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It is also referred to as Wireless or Unbounded transmission media. No physical medium is required for the transmission of electromagnetic signals.

There are 3 major types of Unguided Media:

(i) Radio waves –

These are easy to generate and can penetrate through buildings. The sending and receiving antennas need not be aligned. Frequency Range: 3KHz – 1GHz. AM and FM radios and cordless phones use Radio waves for transmission.

(ii) Microwaves –

It is a line of sight transmission i.e. the sending and receiving antennas need to be properly aligned with each other. The distance covered by the signal is directly proportional to the height of the antenna. Frequency Range: 1GHz – 300GHz. These are majorly used for mobile phone communication and television distribution.

(iii) Infrared –

Infrared waves are used for very short distance communication. They cannot penetrate through obstacles. This prevents interference between systems. Frequency Range: 300GHz – 400THz. It is used in TV remotes, wireless mouse, keyboard, printer, etc.

2. Discuss various advantages and disadvantages of each network topology.

Ans. Network Topology is the schematic description of a network arrangement, connecting various nodes (sender and receiver) through lines of connection. There are some advantages and disadvantages of network topologies

Point-to-Point

Point-to-point networks contains exactly two hosts such as computer, switches or routers, servers connected back to back using a single piece of cable. Often, the receiving end of one host is connected to sending end of the other and vice-versa. If the hosts are connected point-to-point logically, then may have multiple intermediate devices. But the end hosts are unaware of underlying network and see each other as if they are connected directly.

Bus Topology

In Bus topology, all devices share single communication line or cable.

Advantages of bus topology:

- If N devices are connected to each other in bus topology, then the number of cables required to connect them is 1, which is known as backbone cable and N drop lines are required.
- Cost of the cable is less as compared to other topology, but it is used to build small networks.
- It is easy to understand and easy to expand joining two cables together.

Disadvantages of bus topology:

- If the common cable fails, then the whole system will crash down.
- If the network traffic is heavy, it increases collisions in the network.

Star Topology

In Star topology, devices connected using a point-to-point connection.

Advantages of star topology:

- If N devices are connected to each other in star topology, then the number of cables required to connect them is N. So, it is easy to set up.
- Fast performance with few nodes and low network traffic.
- Hub can be upgraded easily.
- Easy to troubleshoot.
- Only that node is affected which has failed, rest of the nodes can work smoothly.

Disadvantages of star topology:

- Cost of installation is high.
- Performance is based on the single concentrator i.e. hub.
- If the hub fails, then the whole network is stopped because all the nodes depend on the hub.

Ring Topology

In ring topology, each host machine connects to exactly two other machines, creating a circular network structure.

Advantages of ring topology:

- The possibility of collision is minimum in this type of topology.
- Cheap to install and expand.
- Transmitting network is not affected by high traffic or by adding more nodes, as only the nodes having tokens can transmit data.
- Cheap to install and expand

Disadvantages of ring topology:

- Troubleshooting is difficult in this topology.
- Addition of stations in between or removal of stations can disturb the whole topology.
- Failure of one computer disturbs the whole network.

Mesh Topology



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In this type of topology, a host is connected to one or multiple hosts.

Advantages of mesh topology:

- Fault is diagnosed easily. Data is reliable because data is transferred among the devices through dedicated channels or links.
- Provides security and privacy.
- Each connection can carry its own data load.

Disadvantages of mesh topology:

- Cost of cables are high as bulk wiring is required, hence suitable for less number of devices.
- Cost of maintenance is high.
- Installation and configuration is difficult

Tree Topology

Also known as Hierarchical Topology, this is the most common form of network topology in use presently.

Advantages of tree topology:

- It allows more devices to be attached to a single central hub thus it increases the distance that is travel by the signal to come to the devices.
- It allows the network to get isolate and also prioritize from different computers.
- Extension of bus and star topologies.

Disadvantages of tree topology:

- If the central hub gets fails, the entire system fails.
- The cost is high because of cabling.
- If more nodes are added maintenance is difficult.

Daisy Chain

This topology connects all the hosts in a linear fashion. Each link in daisy chain topology represents single point of failure. Every link failure splits the network into two segments. Every intermediate host works as relay for its immediate hosts.

Hybrid Topology

A network structure whose design contains more than one topology is said to be hybrid topology.

Advantages of Hybrid Topology

1. Reliable as Error detecting and troubleshooting is easy.
2. Scalable as size can be increased easily.

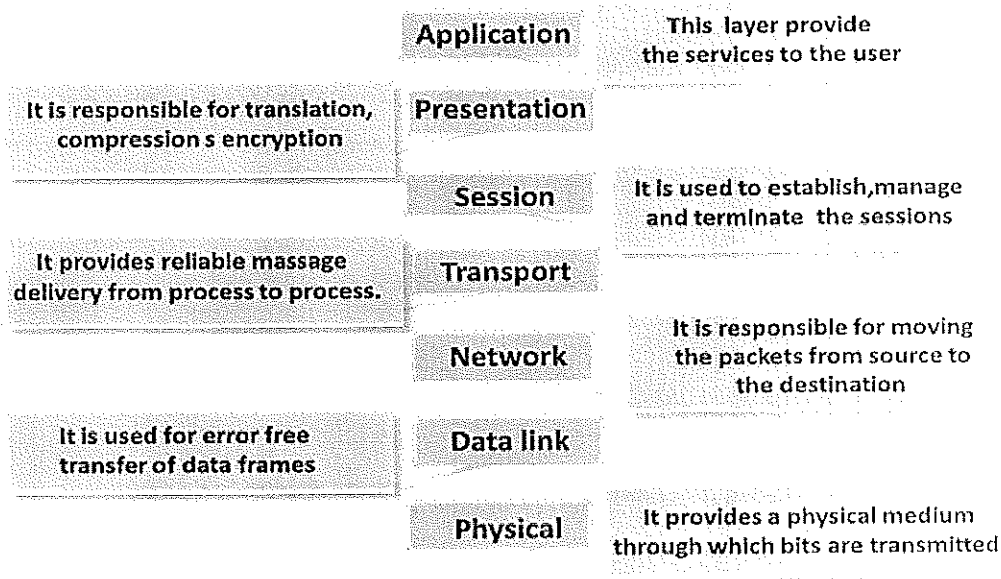
Disadvantages of Hybrid Topology

1. Complex in design.
2. Costly.

3. What is the OSI model? Explain its different layers.

Ans. Open System Interconnection (OSI) model

- OSI is a reference model that describes how information from a software application in one computer moves through a physical medium to the software application in another computer.
- OSI consists of seven layers, and each layer performs a particular network function.
- OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered as an architectural model for the inter-computer communications.
- OSI model divides the whole task into seven smaller and manageable tasks. Each layer is assigned a particular task.
- Each layer is self-contained, so that task assigned to each layer can be performed independently.



- The main functionality of the physical layer is to transmit the individual bits from one node to another node.
- Data link layer is responsible for the error-free transfer of data frames.
- Network layer is a layer 3 that manages device addressing, tracks the location of devices on the network.
- The Transport layer is a Layer 4 ensures that messages are transmitted in the order in which they are sent and there is no duplication of data.
- The Session layer is used to establish, maintain and synchronizes the interaction between communicating devices.
- A Presentation layer is mainly concerned with the syntax and semantics of the information exchanged between the two systems.
- An application layer serves as a window for users and application processes to access network service.

4. Explain the following:

- Router
- Bridge
- Access Point

Ans.

a) Router:

- Routers help transmit packets to their destinations by charting a path through the sea of interconnected networking devices using different network topologies.
- Routers are intelligent devices, and they store information about the networks they're connected to.
- Most routers can be configured to operate as packet-filtering firewalls and use access control lists (ACLs).
- Routers, in conjunction with a channel service unit/data service unit (CSU/DSU), are also used to translate from LAN framing to WAN framing. This is needed because LANs and WANs use different network protocols. Such routers are known as border routers. They serve as the outside connection of a LAN to a WAN, and they operate at the border of your network.
- Router are also used to divide internal networks into two or more subnetworks.
- Routers can also be connected internally to other routers, creating zones that operate independently.
- Routers establish communication by maintaining tables about destinations and local connections.
- A router contains information about the systems connected to it and where to send requests if the destination isn't known.
- Routers usually communicate routing and other information using one of three standard protocols: Routing Information Protocol (RIP), Border Gateway Protocol (BGP) or Open Shortest Path First (OSPF).
- Routers are your first line of defense, and they must be configured to pass only traffic that is authorized by network administrators.



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- The routes themselves can be configured as static or dynamic. If they are static, they can only be configured manually and stay that way until changed. If they are dynamic, they learn of other routers around them and use information about those routers to build their routing tables.

b) Bridge:

- Bridges are used to connect two or more hosts or network segments together. The basic role of bridges in network architecture is storing and forwarding frames between the different segments that the bridge connects.
- They use hardware Media Access Control (MAC) addresses for transferring frames. By looking at the MAC address of the devices connected to each segment, bridges can forward the data or block it from crossing. Bridges can also be used to connect two physical LANs into a larger logical LAN.
- Bridges work only at the Physical and Data Link layers of the OSI model. Bridges are used to divide larger networks into smaller sections by sitting between two physical network segments and managing the flow of data between the two.
- Bridges are like hubs in many respects, including the fact that they connect LAN components with identical protocols. However, bridges filter incoming data packets, known as frames, for addresses before they are forwarded.
- As it filters the data packets, the bridge makes no modifications to the format or content of the incoming data.
- The bridge filters and forwards frames on the network with the help of a dynamic bridge table. The bridge table, which is initially empty, maintains the LAN addresses for each computer in the LAN and the addresses of each bridge interface that connects the LAN to other LANs. Bridges, like hubs, can be either simple or multiple port.
- Bridges have mostly fallen out of favor in recent years and have been replaced by switches, which offer more functionality. In fact, switches are sometimes referred to as "multiport bridges" because of how they operate.

c) Access Point

- While an access point (AP) can technically involve either a wired or wireless connection, it commonly means a wireless device.
- An AP works at the second OSI layer, the Data Link layer, and it can operate either as a bridge connecting a standard wired network to wireless devices or as a router passing data transmissions from one access point to another.
- Wireless access points (WAPs) consist of a transmitter and receiver (transceiver) device used to create a wireless LAN (WLAN).
- Access points typically are separate network devices with a built-in antenna, transmitter and adapter.
- APs use the wireless infrastructure network mode to provide a connection point between WLANs and a wired Ethernet LAN. They also have several ports, giving you a way to expand the network to support additional clients.
- Depending on the size of the network, one or more APs might be required to provide full coverage.
- Additional APs are used to allow access to more wireless clients and to expand the range of the wireless network.
- Each AP is limited by its transmission range — the distance a client can be from an AP and still obtain a usable signal and data process speed. The actual distance depends on the wireless standard, the obstructions and environmental conditions between the client and the AP. Higher end APs have high-powered antennas, enabling them to extend how far the wireless signal can travel.
- APs might also provide many ports that can be used to increase the network's size, firewall capabilities and Dynamic Host Configuration Protocol (DHCP) service. Therefore, we get APs that are a switch, DHCP server, router and firewall.
- To connect to a wireless AP, you need a service set identifier (SSID) name. 802.11 wireless networks use the SSID to identify all systems belonging to the same network, and client stations must be configured with the SSID to be authenticated to the AP.
- The AP might broadcast the SSID, allowing all wireless clients in the area to see the AP's SSID. However, for security reasons, APs can be configured not to broadcast the SSID, which means that an administrator needs to give client systems the SSID instead of allowing it to be discovered automatically.

