CCA – 102 : Data Communication

Assignment – 2

Q1. What are the different types of networks?

Ans. A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

A computer network can be categorized by their size. A computer network is mainly of four types:

- LAN (Local Area Network)
- PAN (Personal Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)

LAN (Local Area Network) :-

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and Ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.

PAN (Personal Area Network) :-

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- Thomas Zimmerman was the first research scientist to bring the idea of the Personal Area Network.
- Personal Area Network covers an area of 30 feet.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.

MAN (Metropolitan Area Network) :-

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.

- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than LAN.

WAN (Wide Area Network) :-

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.

Q2. Explain the Shielded twisted pair (STP) and Unshielded twisted pair (UTP)?

Ans. STP (Shielded twisted pair) :-

A shielded twisted pair is a type of twisted pair cable that contains an extra wrapping foil or copper braid jacket to protect the cable from defects like cuts, losing bandwidth, noise, and signal to the interference. It is a cable that is usually used underground, and therefore it is costly than UTP. It supports the higher data transmission rates across the long distance. We can also say it is a cable with metal sheath or coating that surround each pair of the insulated conductor to protect the wire from external users and prevent electromagnetic noise from penetrating.

Advantages of the STP :-

1. It has lower noise and attenuation than UTP.
2. It is shielded with a plastic cover that protects the STP cable from a harsh environment and increases the data transmission rate.
3. It reduces the chances of crosstalk and protects from external interference.
4. A modular connection helps to terminate the connection of the STP cable.

Disadvantages of the STP :-

1. It is the most expensive wire from UTP cables.
2. It requires more maintenance to reduce the loss of data signals.
3. There is no segment improvement in length despite its thick and heavier connection.
4. It is used only as a grounded wire.

UTP (Unshielded Twisted Pair) :-

UTP is an unshielded twisted pair cable used in computer and telecommunications mediums. Its frequency range is suitable for transmitting both data and voice via a UTP cable. Therefore, it is widely used in the telephone, computers, etc. It is a pair of insulated

copper wires twisted together to reduce noise generated by external interference. It is a wire with no additional shielding, like aluminium foil, to protect its data from the exterior.

Advantages of the UTP :-

1. It is a less costly and less expensive unshielded wire from another network medium.
2. It is designed to reduce crosstalk, RFI, and EMI.
3. Its size is small, and hence the installation of the UTP is easier.
4. It is mostly useful for short-distance network connections like home and small organizations.
5. It is the most commonly used networking cable in the market. It is considered as faster copper-based data transmission cable.
6. It is suitable for transmitting both data and voice via UTP cable.

Disadvantages of the UTP :-

1. It can only be used in length segment up to 100 meters.
2. It has limited bandwidth for transmitting the data.
3. It does not provide a secure connection for data transmitting over the network.

Q3. What is difference between baseband and broadband transmission?

Ans. Baseband is a digital signal is transmitted on the medium using one of the signal codes like NRZ, RZ Manchester biphase-M code etc. is called baseband transmission.

Broadband system use modulation techniques to reduce the effect of noise in the environment. Broadband transmission employs multiple channel unidirectional transmission using combination of phase and amplitude modulation.

These are following differences between Baseband and Broadband transmission:-

Baseband transmission: 1. In baseband transmission, the type of signaling used is digital.

2. Baseband transmission is bidirectional in nature.

3. Signals can only travel over short distances.

4. It works well with bus topology.

5. In baseband transmission, Manchester and Differential Manchester encoding are used.

6. Baseband transmission have 50 ohm impedance.

7. Baseband transmission is easy to install and maintain.

8. This transmission is cheaper to design.

Broadband transmission: 1. In broadband transmission, the type of signaling used is analog.

2. Broadband transmission is unidirectional in nature.

3. Signals can be travelled over long distances without being attenuated.

4. It is used with a bus as well as tree topology.

5. Only PSK encoding is used.

6. Broadband transmission have 70 ohm impedance.

7. Broadband transmission is difficult to install and maintain.

8. This transmission is expensive to design.

Q4. What is the difference between a hub, modem, router and a switch?

Ans. Difference between a hub, modem, router and a switch:

Hub: A Hub is just a connector and connects the wires coming from different sides. There is no signal processing or regeneration. It is an electronic device that operates on only physical layers of the OSI model.

Modem: A modem transforms translates digital data from your computer into analog signals that can be transferred over cables, and it can also translate incoming analog signals into digital data that your computer can comprehend.

Router: Routers are the multiport devices and more sophisticated as compare to repeaters and bridges. It contains a routing table that enables it to make decision about the route i.e. to determine which of several possible paths between the sources and destination is the best for a particular transmission.

Switch: Switch is a point to point communication device. Switch operators at the data link layer of OSI model. It uses switching table to find out the correct destination.

Q5. When you move the NIC cards from one PC to another PC, does the MAC address gets transferred as well?

Ans. Yes, that's because MAC address are hardwired into the NIC circuitry, not the PC. This also means that a PC can have a different MAC address when the NIC card was replace by another one.

Q6. When troubleshooting computer network problems, what common hardware – related problems can occur?

Ans. A large percentage of a network is made up of hardware. Problems in these area can range from malfunctioning hard drives, broken NICs and even hardware startups. Incorrectly hardware configuration is also one of those culprits to look into.

Q7. In a network that contains two servers and twenty workstations, where is the best place to install an Anti-virus program?

Ans. An anti-virus program must be installed on all servers and workstations to ensure protection. That's because individual users can access any workstation and introduce a computer virus when plugging in their removable hard drives or flash drives.

Q8. Define Static IP and Dynamic IP? Discuss the difference between IPV4 and IPV6.

Ans. An IP address is an Internet protocol address, or a device's identifying number. IP addresses are associated with a network or the devices on a network, letting devices communicate in and out of the network. Since IP addresses reveal the device's region and ZIP code, hackers can use them to track users' physical location.

Static IP addresses: A static IP address is an IP address that doesn't change. Our static IP addresses usually stay that same unless our network architecture changes or our devices are out of commission. Static IP addresses are typically used for servers or other important networking equipment. They're popular within business settings because they ensure that the devices connected to them keep a consistent address. They also work well for remote access solutions.

A static IP address is assigned to a device by an ISP. Typically, static IP addresses add to the cost of your internet service.

Dynamic IP addresses: A dynamic IP address is an IP address that can regularly change. An ISP will buy a large number of dynamic IP addresses and assign them to their customer's devices. Dynamic IP addresses are often reassigning. Reassigning IP addresses helps internet providers save money and ensure a higher level of security. It also means that they don't need to take the time to reestablish any network connections if we go on a vacation or move to a new location.

Dynamic IP addresses are more common for consumer equipment and personal use. A dynamic IP address is assigned to a device by our ISP's Dynamic Host Configuration Protocol servers. The DHCP server typically uses network routers to assign addresses to devices.

Difference between IPV4 and IPV6:

Feature	IPV4	IPV6
Size of the address	32 bits	128 bits
Addressing method	IPV4 is a numeric address. It uses a dotted notation to separate the binary octets.	IPV6 is an alphanumeric address. It uses a colon to separate the binary bits.
Number of classes	There are five classes, A to E.	It allows a limitless number of IP addresses.
Type of addresses	Unicast, multicast, broadcast	Unicast, multicast, anycast
Number of header fields	12	8
Length of header filed	20	40
Checksum fields	Has checksum fields	Has no checksum fields
Packet size	The minimum packet size for an IPV4 is 576 bytes.	The minimum packet size for an IPV6 is 1208 bytes.
Mapping	IPV4 uses the address resolution protocol (ARP) to map an IP address to the media access control (MAC) address.	IPV6 uses the neighbor discovery protocol (NDP) to map the IP to MAC address.

Dynamic host configuration server (DHCS)	Clients request the DHCSs' for IP addresses before connecting to the network.	Clients have permanent addresses. There is no need for DHCSs.
Simple network management protocol (SNMP)	IPV4 uses SNMP for system management.	IPV6 does not use SNMP.
Compatibility with mobile devices	IPV4 uses a dot-decimal notation, which is not appropriate for mobile networks.	IPV6 uses hexadecimal colon-separated notation, which is more appropriate for mobile networks.
Local subnet group management	IPV4 uses the internet group management protocol (GMP).	IPV6 uses multicast listener discovery (MLD).
Interoperability and mobility	It limits network topologies, therefore, hindering interoperability and mobility.	It has interoperability and mobility capabilities embedded in network devices.
Subnet mask	The designated network uses the subnet mask from the host portion.	It does not use subnet masks.
Routing information protocol (RIP)	IPV4 supports RIP	IPV6 does not support RIP
Address features	IPV4 uses the network address translation (NAT) that allows a single address to mask multiple non-routable address.	IPV6 uses direct addressing due to its vast address space.
Security	Security depends on the applications.	IPV6 has an internet protocol security (IPsec) built into the protocol to provide automatic security.
Optional fields	Has optional fields	It has no optional fields. It offers extension headers.

Q9. Discuss TCP/IP model in detail.

Ans. TCP/IP model is a four-layered suite of communication protocols. It was developed by the DOD (Department of Defence) in the 1960s. It is named after the two main protocols that are used in the model, namely, TCP and IP. TCP stands for Transmission Control Protocol and IP stands for Internet Protocol.

The four layers in the TCP/IP protocol suite are_:

- Host-to-Network Layer- It is the lowest layer that is concerned with the physical transmission of data. TCP/IP does not specifically define any protocol here but suppo0rts all the standard protocols.

- Internet Layer- It defines the protocols for logical transmission of data over the network. The main protocol in this layer is Internet Protocol and it is supported by the protocols ICMP, IGMP, RARP, ARP.
- Transport Layer- It is responsible for error-free end-to-end delivery of data. The protocols defined here are Transmission Control Protocol and User Datagram Protocol.
- Application Layer- This is the topmost layer and defines the interface of host programs with the transport layer services. This layer includes all high-level protocols like Telnet, DNS, HTTP, FTP, SMTP etc.

Q10. What is a Web Browser? Give some example of browsers.

Ans. A web browser is a computer software application that enables a person to locate retrieve, and display content such as webpages, images, video, as well as other files on the World Wide Web (www).

Browsers work because every web page, image and video on the web has its own unique Uniform Resource Locator (URL), allowing the browser to identify the resource and retrieve it from the web server.

Example of browsers:

- Google Chrome
- Mozilla Firefox
- Microsoft Internet Explorer and Edge
- Apple Safari
- Opera

Q11. What is a search engine? Give example.

Ans. Also known as web search engine and an internet search engine, a search engine is a computer program that collects and organizes content from all over the internet.

The user enters a query composed of keywords or phrases, and the search engine responds by providing a list of results that best match the user's query. The results can take the form of links to websites, images, videos, or other online data.

Example of search engine:

- Google
- Bing
- Yahoo!
- Ask.com
- AOL.com
- Internet Archive

Q12. What is the Internet & WWW? What are the uses of internet in our daily life?

Ans. Internet: The internet is a globally connected network system facilitating world wide communication and access to data resources through a huge collection of personal, public, business, academic and government networks. It's governed by agencies just like Internet Assigned Numbers Authority (or IANA) that establish universal protocols.

WWW: World Wide Web, byname Web, is leading information retrieval service of web (the world wide computer network). Online gives users access to a huge array of documents that are connected to every other by means of hypertext or hypermedia links – i.e., hyperlinks, electronic connections that link related pieces of data so as to permit a user quick access to them. Hypertext allows the user to pick a word or phrase from text and thereby access other documents that contain additional information concerning that word or phrase.

There are various uses of the internet in different fields, which is given below:-

- Online Booking
- Cashless Transactions
- Web Browsing
- Job Search
- Social Networking
- Communication
- File Transfer
- Education
- Bill Payment
- Finance & Accounting

Q13. What is an Internet Service Provider? Give some example of ISP in India.

Ans. Internet Service Provider: The term Internet service provider refers to a company that provides access to the internet to both personal and business customers to surf the web, shop online, conduct business, and connect with family and friends – all for a fee. ISPs may also provide other services including email services, domain registration, web hosting, and browser packages. An ISP may also be referred to as an information service provider, a storage service provider, an Internet service provider, or any combination of these three based on the services the company offers.

Internet Service Provider in India:-

- BSNL Broadband
- Amazon Networking Device
- Tata Communication
- You Broadband
- Reliance Communications
- Bharti Airtel

- Idea Cellular
- Siti Cable
- Videocon
- Airtel India

Q14. Discuss the difference between MAC address, IP address and Port address.

Ans. Difference between MAC address, IP address and Port address.

	MAC address	IP address	Port address
Meaning	The term MAC address is an acronym for Media Access control address.	The IP address refers to the Internet Protocol Address. These basically identify a host present in a network.	We use Port number for identifying any process/service present on your system.
Bits	It is hexadecimal address of six bytes.	IP address can be either IPv4 or IPv6. IPv4 can be at most 32 bits and IPv6 can be at most 128 bits.	Port number can be at most 16 bits.
Protocol	You can retrieve a device attached to the MAC address using the ARP protocol.	The address refers to the IP Protocol of Layer 3.	This address refers to that of the protocol of Layer 4.
Provider	The Manufacture of NIC Cards provides a device with its MAC address.	A network administrator or system admin provides a user with their IP address.	The kernel of the OS (Operating system) provides an application with its port number.
Use	The primary use of MAC address is to ensure the physical address of a given device/computer.	This type of address identifies a computer/host device on the computer network.	These number act as the logical interfaces utilized by the communication protocols.

OSI Model	It works on the data links layer of the OSI model.	It's associated with the network layer of the OSI model.	It's associated with the transport layer of the OSI model.

Q15. How do we view my internet browser's history?

Ans. Google Chrome on Desktop:-

Step1: Open Google Chrome. It's a red, yellow, green, and blue circular icon.

Step2: Click. This option is in the top – right corner of the window.

Step3: Select History. You'll see this option near the top of the drop – down menu. Selecting it will prompt a pop – out menu.

Step4: Click History. It's at the top of the pop – out menu. Doing so will take you to your search history.

Step5: Review your browsing history. You can scroll down through your browsing history to see items from earlier in your history.