CCA-102: Data Communication

ASSIGNMENT

Q.1.What are the different types of networks?

Answer:

The different type of network is: -

1) LAN:

- ✓ Local Area Network is a group of computers connected to each other in small area such as building.
- ✓ LAN is used for connecting two or more personal twisted computers through a communication medium such as pair, c0axial, 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.

2) PAN:

- 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 computer devices that are used to develop the personal area network are the laptop, mobile phone, media player and play stations.

3) MAN:

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- In MAN, various LAN 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 Local Area Network (LAN).

4) WAN:

- 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 then LAN.

- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fiber 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 flied of Business, government, and education.

Q.2. Explain the Shielded twisted pair (STP) and Unshielded twisted pair(UTP)

Answer:

Shielded Twisted Pair (STP): -

Shielded Twisted Pair (STP) is a special kind of copper telephone and local area network (LAN) wiring used in some business installations. It adds an outer covering or shield that functions as a ground to ordinary twisted pair wiring.

Twisted pair is the ordinary copper wire that connects many computer networks to the telephone company. To reduce cross-talk or electromagnetic induction between pairs of wires, to insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires. Unlike unshielded twisted pair (UTP), shielded twisted pair also encloses these wires in a shield and groups them to further reduce electromagnetic and radio frequency interference. STP cables are more expensive and harder to install that UTP wiring.

Shielded twisted pairs come in a variety of cables categories. The most popular in use today are Cat5e, Cat6, Cat6a, Cat7. In electrically noisy business environment, shielded twisted pair uses RS-499, RJ-45, RS-232, and RJ-11 connectors to maximize the reduction of interference.

Unshielded Twisted Pair: -

Unshielded Twisted Pair cable is a 100ohm copper cable that consists of 2 to 1800 UTP surrounded by an outer jacket. They have on metallic shield. This makes the cable small in diameter but unprotected against electrical interference. The twisted helps to improve its immunity to electrical noise and EMI.

Unshielded Twisted Pair (UTP) cables are found in many Ethernet networks and telephone systems. For indoor telephone applications, UTP is often grouped into sets of 25 pairs according to a standard 25-pair color code originally developed by AT&T corporation. A typical subset of these colors (white/blue, blue/white, white/orange, orange/white) shows up in most UTP cables. The cables are typically made with copper wires measured at 22 or 24 American Wire Gauge (AWG), with the colored insulation typically made from an insulator such as polyethylene or FEP and the total package covered in a polyethylene jacket.

UTP is also the most common cable used in computer networking. Modern Ethernet, the most common data networking standard, can used UTP cables, with increasing data rates requiring higher specification variants of the UTP cable. CAT3, CAT4, CAT5, CAT5e, CAT6, etc. are some examples of Unshielded Twisted Pair cables.

Q.3.What is difference between baseband and broadband transmission?

Answer:

Differences between –

Baseband	Broadband

1. It refers to a communications channel in which information is carried in digital form.	1. The signals are modulated as radiofrequency analog waves that use different frequency ranges.
2. Communication is bi-directional which means the same channel is used to transmit and receive signals.	2. Communication is unidirectional meaning two different channels are needed in order to send and receive signals.
3. Every device on a baseband system shares the same channel.	3. Multiple independent channels can carry analog or digital information through FDM.
4. Baseband LANs are inexpensive and easier to install and maintain.	4. Broadband system are generally more expensive because of the additional hardware involved.
5. Baseband LANs have a limited distance reach is no more than a couple miles.	5. Broadband LANs span much longer distance than baseband (up to tens of kilometers).

Q.4.What is the difference between a hub, modem, router and a switch?

Answer:

1. Hub: -

A hub is a device that allows several network devices to connect together to exchange data on a single network however, they have on management component. Network hub are also known as repeaters. They are less 'intelligent' than switches. Unlike switches, which forward data to the intended devices, hubs merely send the data packets to all its ports. So as the name repeaters suggests, it only repeats the data from an incoming port to all the other devices; this leads to frequent collisions between packets.

2. Modem: -

A modem is short for a modulator-demodulator. Its function is to facilitate the transmission of data, by converting an analogue signal to code and decoding digital information.

3. Router: -

A network router directs the data packets along networks. A router has a minimum of two networks, usually LANs or WANs or a LAN and its ISP. However, unlike a modem, it cannot work single standing, however is able to connect to multiple nodes.

4. Switch: -

A switch is a network that connect network segments on a single network. It connects many devices together on the same network, sending data to a device that needs or request it. A switch is able to improve the performance of a network by increasing network capacity.

Q.5. When you move the NIC cards from one PC to another PC, does the MAC address gets transferred can occur?

Answer:

Yes, because every NIC card is associated with unique MAC Address.

Q.6.When troubles shooting computer network problems, what common hardware-related problems can occur/

Answer:

When troubleshooting computer network problems, the most common hardware-related problems can be-

- Hard drive multifunctioning
- PABX
- LAN Card
- WAN Card
- Cables
- Routers
- RAM needs to be upgraded
- VGA Cable is not properly connected
- Broken NICs
- Hardware startups.

Q.7.In a network that contains two servers and twenty workstations, where is the best place to install an Anti-virus program?

Answer:

In the network that contains two servers and twenty workstations, the best place to install Anti-virus program is to install in all the computers, systems or workstations. If we want to installed only in one system, install in the main server.

Q.8.Define Static IP and Dynamic IP? Discuss the difference between IPV4 and IPV6.

Answer:

Static IP Address: It is an IP Address that a computer or web server has and is identified by the rest of the internet or systems and does not change at all, instead it remains the same.

Dynamic IP Address: It is an IP Address that a computer or web server has and is identified by the rest of the internet or system and this IP address does not remain the same, instead it changes over time.

Differences between:

IPv4	IPv6
IPv4 has a 32-bit address length	IPv6 has a 128-bit address length
It supports manual and DHCP address configuration	It supports Auto and renumbering address configuration

In IPv4 end to end connection integrity is Unachievable	In IPv6 end to end, connection integrity is Achievable
It can generate 4.29×10^9 address space	Address space of IPv6 is quite large it can produce 3.4×10^{38} address space
The security feature is dependent on application	IPSEC is an inbuilt security feature in the IPv6 protocol
Address representation of IPv4 is in decimal	Address representation of IPv6 is in hexadecimal
Fragmentation performed by sender and forwarding routers	In IPv4 fragmentation performed only by the sender
In IPv4 packet flow identification is not available	In IPv6 packet flow identification are available and uses the flow label field in the header
In IPv4 checksum field is available. It has broadcast Message Transmission Scheme	In IPv6 checksum field is not available. It has multicast and any cast message transmission scheme is available
In IPv4 has a header of 20-60 bytes	In IPv6 has header of 40 bytes fixed

Q9.Discuss TCP/IP model in detail.

Answer:

TCP/**IP** Model:

The TCP/IP model was developed prior to the OSI model. The TCP/IP model is not exactly similar to the OSI model. The TCP/IP model consists of five layers: the application layer, transport layer, network layer, data link layer and physical layer.

The first four layers provide physical standards, network interface, internetworking and transport functions that correspond to the first four layers of the OSI model and these four layers are represented in TCP/IP model by a single layer called the application layer. TCP/IP is a hierarchical protocol made up of interactive modules, and each of them provides specific functionality. Each upper-layer protocol is supported by two or more lower-level protocols.

Application Layer: An application layer is the topmost layer in the TCP/IP model. It is responsible for handling high-level protocols, issues of representation. This layer allows the user to interact with the application. When one application layer protocol wants to communicate with another application layer, it forward its data to the transport layer. There is an ambiguity occurs in the application layer. Every application cannot be placed inside the application layer except those who interact with the communication system.

Transport Layer: Transport Layer is the second layer of the TCP/IP model. It is end-to-end layer used to deliver messages to a host. It is termed as an end-to-end layer because it provides a point-to-point connection rather than hop-to-hop, between the source host and destination host to deliver the services reliably. The unit of data encapsulation in the Transport Layer is a segment. The standard protocols used by Transport Layer to enhance its functionalities are TCP (Transmission Control Protocol), UDP (User Datagram Protocol), DCCP (Datagram Congestion Control Protocol), etc.

Network Layer: A network layer is the lowest layer of the TCP/IP model. A network layer is the combination of the Physical layer and Data Link layer defined in the OSI reference model. It defines how the data should be sent physically through the network. This layer is mainly responsible for the transmission of the data between two devices on the same network. The functions carried out by this layer are encapsulating the IP datagram into frames transmitted by the network

and mapping of IP addresses into physical address. The protocols used by this layer are Ethernet, token ring, FDDI, X.25, frame relay.

Data Link Layer: The data link layer is a 4th layer from the top and 2nd layer from the bottom. The communication channel that connects the adjacent nodes is known as links and in order to move the datagram from source to the destination, the datagram must be moved across an individual link. The main responsibility of the data link layer is to transfer the datagram across an individual link. The data link layer protocols are Ethernet, token ring, FDDI and PPP.

Physical Layer: The physical layer is the first and lowest layer; The layer most closely associated with the physical connection between devices. This layer may be implemented by a PHY chip. The physical layer provides an electrical, mechanical and procedural interface to the transmission medium. The shapes and properties of the electrical connectors, the frequencies to broadcast on, the line code to use and similar low-level parameters, are specified by the physical layer.

The physical layer defines the means of transmitting a stream of raw bits over a physical data link connecting network nodes. The bit stream may be grouped into code words or symbols and converted to a physical signal that is transmitted over a transmission medium.

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

Answer:

A **web browser** is an application software for accessing the world wide web or a local website. When a user requests a web page from a particular website, the web browser retrieves the necessary content from a web server and then displays the page on the user's device.

A web browser is not the same thing as a search engine, though the two are often confused. A search engine is a website that provides links to other websites. However, to connect to a website's server and display its web pages, a user must have a web browser installed. Web browsers are used on a range of devices, including desktops, laptops, tablets and smartphones.

Some examples of Browsers are –

(a) Google Chrome **(b)** Internet Explorer **(c)** Mozilla Firefox **(d)** Opera **(e)** Apple Safari **(f)** Microsoft edge.

Q11. What is a search engine? Give example.

Answer:

A **search engine** is a software that is accessed on the internet to assist a user to search its query on the World Wide Web. It is a web-based tool that enables users to locate information on the World Wide Web. The search engine is helpful as it carries out a systematic search on the web and displays the results that best match the user's query.

Search engines utilize automated software applications that travel along the web, following links from page to page, site to site. The results are usually retrieved in the form of a list often referred to as SERPs or Search Engine Result Pages. These results or information may be links to web pages, or a mix of images and videos, research papers, newspaper articles, etc.

Examples of search engine are as follows:

- Microsoft Bing
- Wiki.com

- Yahoo
- CC Search
- Duck Duck Go
- Google
- Baidu

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

Answer:

Internet: The internet is the global system of interconnected computer networks that uses the internet protocol suite (TCP/IP) to communicate between networks and devices. It is a network of networks that consists of private, public, academic, business and government networks of local to global scope, linked by a broad array of electronic, wireless and optical networking technologies. The internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications for the World Wide Web, electronic mail, telephony and file sharing.

World Wide Web (WWW): The World Wide Web is a global collection of documents, images, multimedia, applications and other resources logically interrelated by hyperlinks and referenced with Uniform Resource Identifiers (URIs), which provide a global system of named references. URIs symbolically identify services, web servers, databases, and the documents and resources that they can provide. Hypertext Transfer Protocol (HTTP) is the main access protocol of the World Wide Web.

Uses of internet in our daily life are as follows:

1. Online booking and orders.
2. Cashless transactions.
3. Online Banking and Trading.
4. Social Networking.
5. Job search.
6. Electronic Mail
7. Education.
8. Research and Development.
9. Communication.
10. Entertainment.
11. Shopping.
12. Utility Bill payment.
13. Business.

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

Answer:

Internet Service Provider (ISP):

An Internet Service Provider (ISP) is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers can be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

Internet services typically provided by ISPs can include Internet access, Internet transit, domain name registration, web hosting, Usenet service and colocation. An ISP typically serves as the access point or the gateway that provides a user access to everything available on the Internet.

Some examples of ISP in India are – BSNL, Airtel X-stream Fiber, Hatchway, ACT Broadband, Excite Broadband, Reliance Jiao Fiber, etc.

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

Answer:

MAC Address

Media Access Control (MAC) refers to the piece of hardware that controls how data is pushed out onto a network. In the OSI reference model for networking, the MAC is a layer 2 -- or data link layer – device, and the MAC address is a layer 2 address. In the current internet era, most devices are connected physically with Ethernet cables or wirelessly with Wi-Fi. Both methods use MAC address to identify a device on the network.

A MAC address consists of 12 hexadecimal digits, usually grouped into six pairs separated by hyphens. MAC address are available from 00-00-00-00-00-00 through FF-FF-FF-FF-FF-FF. The first half of the number is typically used as a manufacturer ID, while the second half is a device identifier. Each MAC address is unique to the network card installed on a device, but the number of device-identifying bits is limited, which means manufacturers do reuse them.

IP Address

IP controls how devices on the internet communicate and defines the behavior of internet routers. It corresponds to Layer 3, the network layer, of the OSI reference model. The internet was initially built around IP version 4 (IPv4) and is in transition to IPv6. An IP address identifies a device on the global internet, acting as the device's logical address to identify that network connection. An IPv4 address consist of 32 bits, usually written as four decimal numbers, or a dotted quad.

The IP address combines network identification and device identification data. The network prefix is anywhere from eight to 31 bits and the remainder identify the device on the network. Steady, rapid growth in the number of internet-connected devices had led to the looming exhaustion of the IPv4 address list one of Several reasons for the development of IPv6. An address IPv6 consists of 128bits, with the first 64 reserved for network identification and the second 64 dedicated to identifying a device on the network.

Port Address

A Port Address is the logical address of each application or process that uses a network or the internet to communicate. A port number uniquely identifies a network-based application on a computer. Each application/program is allocated a 16-bit integer port number. This number is assigned automatically by the OS, manually by the user or is set as a default for some popular applications.

A port number primarily aids in the transmission of data between a network and an application. Port numbers work in collaboration with networking protocols to achieve this. Port numbers are mainly used in TCP and UDP based networks, with an available range of 65,535 for assignment port numbers. Although an application can change its port number, some commonly used internet/network services are allocated with global port numbers such as Port Number 80 for HTTP, 23 for Telnet and @% for SMTP.

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

Answer:

Steps to view internet browser history:

I. Open the browser and click on the above three dots and then History.
II. After clicking, the history recent pages will appear.
III. Scroll down and view or revisit the desire page.

THE END