CCA-102: Data Communications

ASSIGNMENT

1. What are the different types of networks?
2. Explain the Shielded twisted pair (STP) and Unshielded twisted pair(UTP)
3. What is difference between baseband and broadband transmission?
4. What is the difference between a hub, modem, router and a switch?
5. When you move the NIC cards from one PC to another PC, does the MAC address gets transferred as well?
6. When troubleshooting computer network problems, what common hardware-related problems can occur?
7. In a network that contains two servers and twenty workstations, where is the best place to install an Anti-virus program?
8. Define Static IP and Dynamic IP? Discuss the difference between IPV4 and IPV6.
9. Discuss TCP/IP model in detail.
10. What is a Web Browser (Browser)? Give some example of browsers.
11. What is a search engine? Give example.
12. What is the Internet & WWW? What are the uses of internet in our daily life?
13. What is an Internet Service Provider? Give some example of ISP in India.
14. Discuss the difference between MAC address, IP address and Port address.
15. How do we view my Internet browser's history?

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1. What are the different types of networks?

Ans: 11 Types of Networks in Use Today

1. Personal Area Network (PAN)

The smallest and most basic type of network, a PAN is made up of a wireless modem, a computer or two, phones, printers, tablets, etc., and revolves around one person in one building. These types of networks are typically found in small offices or residences, and are managed by one person or organization from a single device.

2. Local Area Network (LAN)

We're confident that you've heard of these types of networks before – LANs are the most frequently discussed networks, one of the most common, one of the most original and one of the simplest types of networks. LANs connect groups of computers and low-voltage devices together across short distances (within a building or between a group of two or three buildings in close proximity to each other) to share information and resources. Enterprises typically manage and maintain LANs.

Using routers, LANs can connect to wide area networks (WANs, explained below) to rapidly and safely transfer data.

3. Wireless Local Area Network (WLAN)

Functioning like a LAN, WLANs make use of wireless network technology, such as Wi-Fi. Typically seen in the same types of applications as LANs, these types of networks don't require that devices rely on physical cables to connect to the network.

4. Campus Area Network (CAN)

Larger than LANs, but smaller than metropolitan area networks (MANs, explained below), these types of networks are typically seen in universities, large K-12 school districts or small businesses. They can be spread across several buildings that are fairly close to each other so users can share resources.

5. Metropolitan Area Network (MAN)

These types of networks are larger than LANs but smaller than WANs – and incorporate elements from both types of networks. MANs span an entire geographic area (typically a town or city, but sometimes a campus). Ownership and maintenance is handled by either a single person or company (a local council, a large company, etc.).

6. Wide Area Network (WAN)

Slightly more complex than a LAN, a WAN connects computers together across longer physical distances. This allows computers and low-voltage devices to be remotely connected to each other over one large network to communicate even when they're miles apart.

The Internet is the most basic example of a WAN, connecting all computers together around the world. Because of a WAN's vast reach, it is typically owned and maintained by multiple administrators or the public.

7. Storage-Area Network (SAN)

As a dedicated high-speed network that connects shared pools of storage devices to several servers, these types of networks don't rely on a LAN or WAN. Instead, they move storage resources away from the network and place them into their own high-performance network. SANs can be accessed in the same fashion as a drive attached to a server. Types of storage-area networks include converged, virtual and unified SANs.

8. System-Area Network (also known as SAN)

This term is fairly new within the past two decades. It is used to explain a relatively local network that is designed to provide high-speed connection in server-to-server applications (cluster environments), storage area networks (called "SANs" as well) and processor-to-processor applications. The computers connected on a SAN operate as a single system at very high speeds.

9. Passive Optical Local Area Network (POLAN)

As an alternative to traditional switch-based Ethernet LANs, POLAN technology can be integrated into structured cabling to overcome concerns about supporting traditional Ethernet protocols and network applications such as PoE (Power over Ethernet). A point-to-multipoint LAN architecture, POLAN uses optical splitters to split an optical signal from one strand of singlemode optical fiber into multiple signals to serve users and devices.

10. Enterprise Private Network (EPN)

These types of networks are built and owned by businesses that want to securely connect its various locations to share computer resources.

11. Virtual Private Network (VPN)

By extending a private network across the Internet, a VPN lets its users send and receive data as if their devices were connected to the private network – even if they're not. Through a virtual point-to-point connection, users can access a private network remotely.

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

Ans: Shielded twisted pair (STP): **STP (Shielded twisted pair)** is a twisted pair cable confined in foil or mesh shield that guards the cable against electromagnetic interference. **STP** Cabling is **twisted-pair** cabling with additional **shielding** to reduce crosstalk and other forms of electromagnetic interference (EMI). The outer insulating jacket contains an inner braided copper mesh to **shield** the **pairs** of **twisted** cables, which themselves are wrapped in foil.

Unshielded twisted pair (UTP): UTP stands for **Unshielded Twisted Pair cable**. **UTP cable** is a 100 ohm copper **cable** that consists of 2 to 1800 **unshielded twisted pairs** surrounded by an outer jacket. They have no metallic shield. This makes the **cable** small in diameter but unprotected against electrical interference. Its frequency range is suitable for transmitting both data and voice. Therefore, these are most commonly used in telephone systems.

Some major differences are as follow:

s.no	STP	UTP

1	Less susceptible to noise and crosstalk.	High comparatively.
2	Grounding cable necessarily required	Not required
3	Provides high data rates	Slow comparatively
4	Moderately expensive	Cheaper and does not require much maintenance

3. What is difference between baseband and broadband transmission?

Ans: Baseband

Baseband transmissions typically use digital signaling over a single wire; the transmissions themselves take the form of either electrical pulses or light. The digital signal used in baseband transmission occupies the entire bandwidth of the network media to transmit a single data signal. Baseband communication is bidirectional, allowing computers to both send and receive data using a single cable. However, the sending and receiving cannot occur on the same wire at the same time.

Ethernet networks use baseband transmissions; notice the word "base"—for example, 10BaseT or 10BaseFL.

Using baseband transmissions, it is possible to transmit multiple signals on a single cable by using a process known as *multiplexing*. Baseband uses Time-Division Multiplexing (TDM), which divides a single channel into time slots. The key thing about TDM is that it doesn't change how baseband transmission works, only the way data is placed on the cable.

Broadband

Whereas baseband uses digital signaling, broadband uses analog signals in the form of optical or electromagnetic waves over multiple transmission frequencies. For signals to be both sent and received, the transmission media must be split into two channels. Alternatively, two cables can be used: one to send and one to receive transmissions.

Multiple channels are created in a broadband system by using a multiplexing technique known as *Frequency-Division Multiplexing (FDM)*. FDM allows broadband media to accommodate traffic going in different directions on a single media at the same time.

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

Ans: Hubs, switches, and routers are all devices that let you connect one or more computers to other computers, networked devices, or even other networks. Each has two or more connectors called ports, into which you plug the cables to make the connection.

- Hubs are “dumb” devices that pass on anything received on one connection to all other connections.
- Switches are semi-intelligent devices that learn which devices are on which connection.
- Routers are essentially small computers that perform a variety of intelligent tasks.

Hub

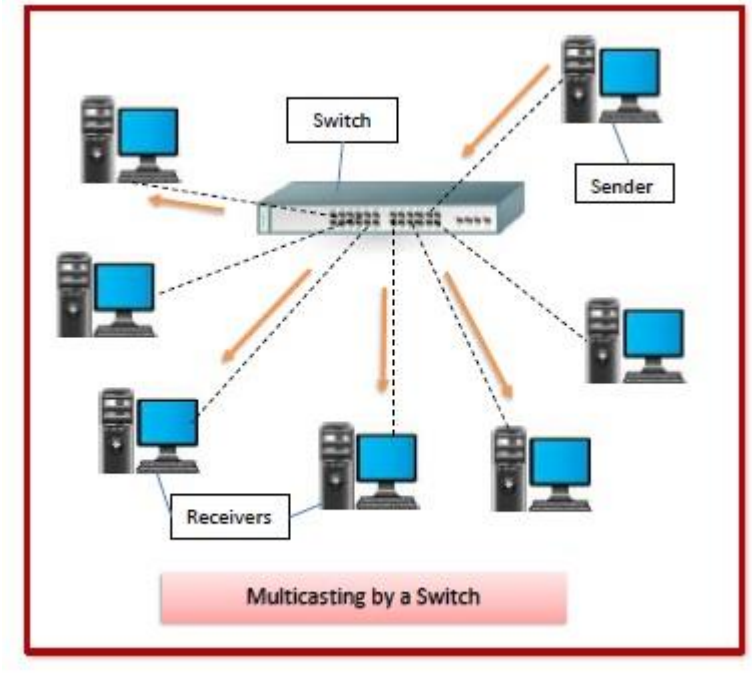
Hub is commonly used to connect segments of a LAN (Local Area Network). A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of Hubs were used for connecting different network devices in a Local Area Network (LAN) long back, but network switches had replaced hubs. These days it is very difficult to spot a Network Hub functioning in a live Local Area Network (LAN). Hubs function as the central connection point for Local Area Network (LAN). In Ethernet networks, hubs were designed to work using twisted pair cables and use RJ45 jack to connect different network devices. Network devices (Servers, Workstations, Printers, and Scanners etc) are attached to the hub by individual network cables. Hubs were available in different shapes and different numbers of ports.

When a hub receives a packet of data (an Ethernet frame) at one of its ports from a network device, it transmits (repeats) the packet to all of its ports to all of the other network devices. If two network devices on the same network try to send packets at the same time, a collision is said to occur.

Switches

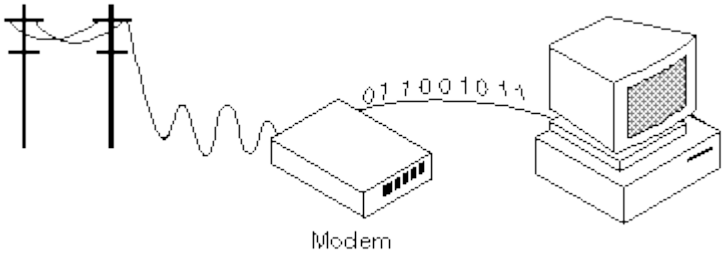
Switches are networking devices operating at layer 2 or a data link layer of the OSI model. They connect devices in a network and use packet switching to send, receive or forward data packets or data frames over the network.

A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address, performs necessary checks and sends the frame to the corresponding device(s).It supports uncast, multicast as well as broadcast communications.



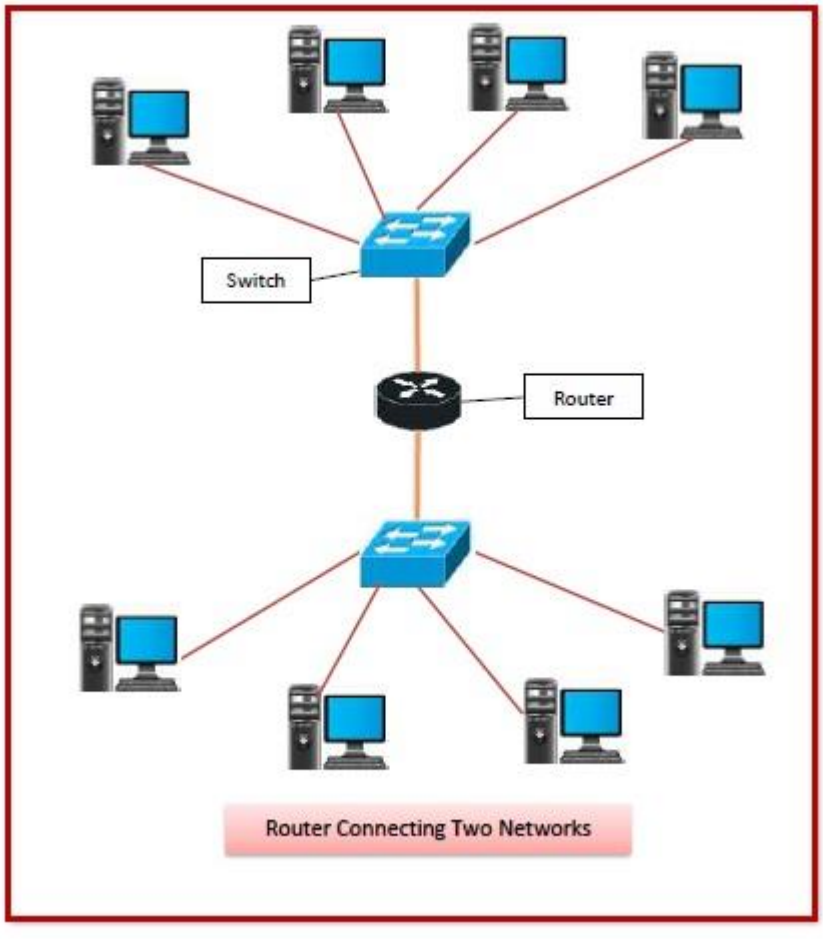
Modem

Modem is a device that enables a computer to send or receive data over telephone or cable lines. ... The modulator converts digital data into analog data when the data is being sent by the computer. The demodulator converts analog data signals into digital data when it is being received by the computer.



Router

Routers are networking devices operating at layer 3 or a network layer of the OSI model. They are responsible for receiving, analyzing, and forwarding data packets among the connected computer networks. When a data packet arrives, the router inspects the destination address, consults its routing tables to decide the optimal route and then transfers the packet along this route.



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

Ans: The Media Access Control address (MAC address) for any network adapter is hard coded into the card itself. Each manufacturer of network adapters has a group of characters assigned that refer specifically to that company. I believe that is the first 1/2 of the MAC address which is 12 hexadecimal characters long. But the MAC address is part and parcel of the network adapter, just as your internal organs are part of you. When you move to a new house,

you take your liver with you. In the same way, when you move a NIC to a different computer, it takes its MAC address with it.

6. When troubleshooting computer network problems, what common hardware-related problems can occur?

Ans: We have to check the LAN DRIVER has been installed.

Most of the time, the troubleshooting comes from cables (Optical fibers included).

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

Ans: The best solution is to install anti-virus on all the computers in the network. This will protect each device from the other in case some malicious user tries to insert a virus into the servers or legitimate users.

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

Ans: Difference between Static and Dynamic IP address:

S.NO	STATIC IP ADDRESS	DYNAMIC IP ADDRESS
1.	It is provided by ISP (Internet Service Provider).	While it is provided by DHCP (Dynamic Host Configuration Protocol).
2.	Static ip address does not change any time, it means if a static ip address is provided then it can't be changed or modified.	While dynamic ip address change any time.
3.	Static ip address is less secure.	While in dynamic ip address, there is low amount of risk than static ip address's risk.
4.	Static ip address is difficult to designate.	While dynamic ip address is easy to designate.
5.	The device designed by static ip address can be trace.	But the device designed by dynamic ip address can't be trace.
6.	Static ip address is more stable than dynamic ip address.	While dynamic ip address is less stable than static ip address.
7.	The cost to maintain the static ip address is higher than dynamic ip address.	While the maintaining cost of dynamic ip address is less than static ip address.

S.NO	STATIC IP ADDRESS	DYNAMIC IP ADDRESS
8.	It is used where computational data is less confidential.	While it is used where data is more confidential and needs more security.

9. Discuss TCP/IP model in detail?

Ans: TCP/IP means Transmission Control Protocol and Internet Protocol. It is the network model used in the current Internet architecture as well. **Protocols** are set of rules which govern every possible communication over a network. These protocols describe the movement of data between the source and destination or the internet. They also offer simple naming and addressing schemes.

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

Ans: A **web browser** is a type of software that allows you to find and view websites on the Internet. Even if you didn't know it, you're using a web browser right now to read this page! There are many different web browsers, but some of the most common ones include **Google Chrome**, **Internet Explorer**, **Safari**, **Microsoft Edge**, and **Mozilla Firefox**.

11. What is a search engine? Give example.

Ans: A search engine is a web-based tool that enables users to locate information on the World Wide Web. Popular examples of search engines are Google, Yahoo!, and MSN Search. Search engines utilize automated software applications (referred to as robots, bots, or spiders) that travel along the Web, following links from page to page, site to site. The information gathered by the spiders is used to create a searchable index of the Web.

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

Ans: *The Internet* is a global network of networks while *the Web*, also referred formally as World Wide Web (www) is collection of information which is accessed via *the Internet*. Another way to look at this difference is; *the Internet* is infrastructure while *the Web* is service on top of that infrastructure. Alternatively, *the Internet* can be viewed as a big book-store while *the Web* can be viewed as collection of books on that store. At a high level, we can even think of *the Internet* as hardware and *the Web* as software

There are many uses of internet in our daily life-

1. Order food and medicine
2. Advertisement
3. Online booking
4. Constructive communication
5. E- learning
6. Online banking
7. Job searching
8. Social networking

- **Order food and medicine** -If you do not want to prepare food, just order on the food delivering websites and, you will get your favorite food at your home within a few minutes.

It makes the life of a human being much leisure.

Most famous food delivery websites are Zomato, FoodPanda, UberEats, etc.

Nowadays you can also order medicines online. Medicine delivery websites are also trusted and reviewed by famous doctors of the country.

- **Advertisement -** Now a day internet is mostly used for advertising. It entertains us with many features like facebook, instagram, youtube etc.

Online booking - Online booking is an astonishing tool on the internet. By this, we can book a train ticket, flight ticket (International and domestic), and you can book a taxi which will pick-up you from your doorstep.

In the present climate, you do not have to wait in queue for hours for ticket booking at the ticket counter. Now, while sitting at home you can book tickets online with the help of the laptop, tab, or Smartphone provided you should have an internet connection.

Constructive communication - It's an amazing tool of the internet by which you can communicate with your friend or family members at thousands of mile away from you.

By this, people from the various parts of the world can work as a team and can buildup a strong relationship and understating.

By this, a sole person can handle its business from the thousands of miles away.

Some communication websites are Internet Relay Chat, Instant Messaging Services, Smart Phone Messaging Apps, Internet Phone Calling, etc.

E-learning - The Internet plays a vital role in an effective education.

Internet reduces the cost of education and increases its accessibility to the ordinary person.

Now students can be continuously in touch with their teachers.

The internet increased the quality of the education because here students can learn by the help of videos, infographics, images, etc.

Online banking- Online banking makes life human being secure and comfortable.

Now, anybody does not have to carry hard cash in pocket or suitcase from one place to other because now most of the rights of your bank account are in your hand. You can excess and manage your account while sitting at home or traveling in abroad.

Job searching- Internet helps a lot in finding a job according to your interest.

Post your resume on some famous websites so that recruiter can contact you. On social networking sites also you can get know the job opening in any field. A famous job-related website is Linkedin, here most of the members are professionals. You have to make an account you will gather information.

Even on Linkedin, you can also promote your business.

Social networking- Social networking sits helps a lot in connecting the world together.

On social networking sites, you will get each and everything from informative stuff to entertainment.

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

Ans: A company that provides subscribers with access to the Internet. BSNL, Airtel, Vodafone etc are some examples of ISP in India.

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

Ans:

S.NO	MAC ADDRESS	IP ADDRESS
1.	MAC Address stands for Media Access Control Address.	IP Address stands for Internet Protocol Address.
2.	MAC Address is a six byte hexadecimal address.	IP Address is either four byte (IPv4) or six byte (IPv6) address.
3.	A device attached with MAC Address can retrieve by ARP protocol.	A device attached with IP Address can retrieve by RARP protocol.
4.	NIC Card's Manufacturer provides the MAC Address.	Internet Service Provider provides IP Address.
5.	MAC Address is used to ensure the physical address of computer.	IP Address is the logical address of the computer.
6.	MAC Address operates in the data link layer.	IP Address operates in the network layer.
7.	MAC Address helps in simply identifying the device.	IP Address identifies the connection of the device on the network.
8.	MAC Address of computer cannot be changed with time and environment.	IP Address modifies with the time and environment.
9.	MAC Address can't be found easily by third party.	IP Address can be found by third party.

Port Address Translation (PAT) is an extension of Network **Address** Translation (NAT) that permits multiple devices on a LAN to be mapped to a single public IP **address** to conserve IP **addresses**.

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

Ans: If you are using Windows, Linux, or macOS, there are quick shortcut key combinations that allow you to view your history.

Windows and Linux users: Ctrl+H

Apple users: Command + Shift + H

Once one of the above shortcut keys is pressed, a history section similar to the example below should appear. In the following screenshot, browsing history is being viewed in Google Chrome.