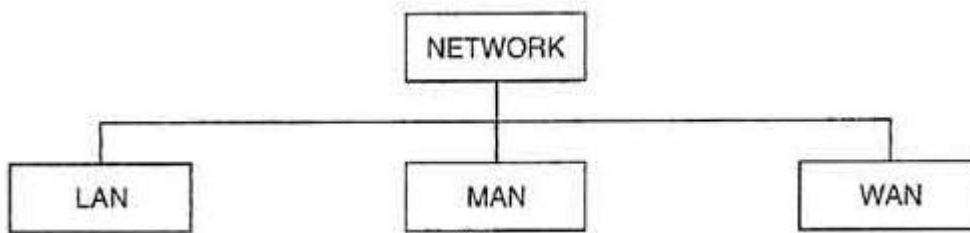# CCA-102: Data Communications

ASSIGNMENT

Q1. What are the different types of networks?

Ans:

- **Personal Area Network** – Often used at home, this network is more on connections between a computer and another gadget such as a telephone or a modem.
- **Local Area Network** – A connection that's used for groups of computers. This is common in small offices and internet cafes. This is where everyone can share files basically, and is also known to be a good way to connect between computers whenever they want to share an internet connection, or whenever they want to play games with each other.
- **Metropolitan Area Network** – A more powerful version of the local area network where it can cover up the whole city in terms of connection. A huge server is usually used for this type of connection.
- **Wide Area Network** – This is a common type of network nowadays that's made possible by wireless technology. Usually, a credential or service from a certain company is needed to enter a connection in this type of network, but there are others that can be used for free. This is good for internet connection. The internet is a well-known version of this one.

types of Network Topologies
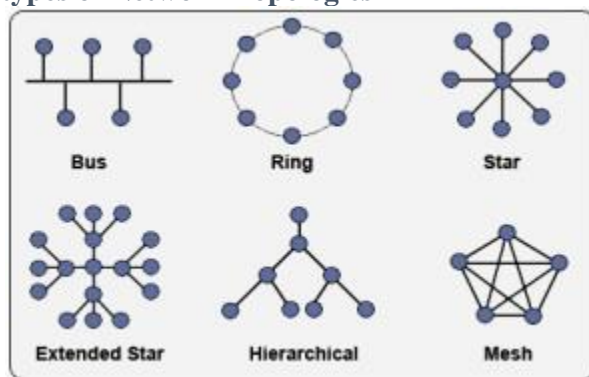
A topology for the network is known to be a layout for the connected devices. This is important because this is used to provide a proper flow of data within the said network. Here are the various topologies:

- **Bus** – This is the type of structure that uses a single medium to connect the computer.
- **Ring** – Each computer is connected to another neighbouring computer for data transfer. One failed network can cause all networks to turn off.
- **Star** – This is a structure that's common in homes. It uses a certain hub or a router to make the network possible.
- **Tree** – This is a complicated structure that connects the star into multiple buses. This is common for internet cafes and offices.
- **Mesh** – this is a connection that leads to various data transmissions which are perfect for routing huge networks.

Types of Network Architecture
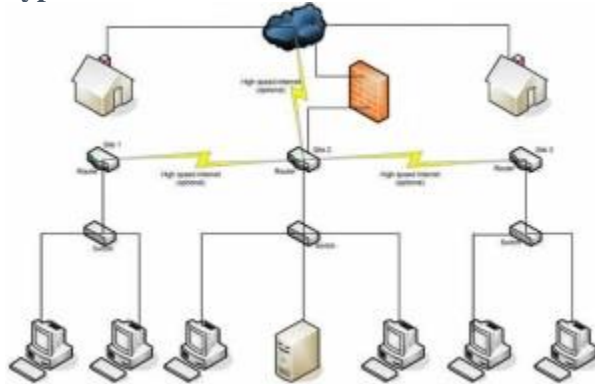
Network architecture is known to be a way of building various kinds of networks with the use of technology and logic combined. This is known to be the basis for all networks, and this research has made your internet accessible nowadays. Here are the common types of network architecture:

- **Physical Layer** – This is more about the wires and its electrical equivalent.
- **Data Linking Layer** – this is more about the structure of the data transmission.
- **Network Layer** – A layer that's focused about the various network connections involved.
- **Transport Layer** – It handles the transfer of data for the end users.
- **Session Layer** – It indicates the session needed to start the connection.
- **Presentation Layer** – This makes the entities of the application layer active for usage.
- **Application Layer** – This is the layer that's closest to the end user which mostly involves the software for the network connection type.

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

Ans: <u>Unshielded Twisted Pair (UTP)</u>Unshielded Twisted Pair or UTP are twisted pair cables and are used to transmit both data and voice as their frequency

range is suitable for transmission. UTPs are more cost effective and are not needed to be grounded.

Shielded Twisted Pair (STP)

Shielded Twisted Pair or STP are also a twisted pair cables but are required to be grounded, wants more maintenance, have high data trasmission capacity and are more costly then UTP.

Following are some of the important differences between Unshielded Twisted Pair (UTP) and Abstract Classes in Scala.

Sr. No.	Key	Unshielded Twisted Pair (UTP)	Shielded Twisted Pair (STP)
1	Full for	UTP stands for Unshielded Twisted Pair.	STP stands for Shielded Twisted Pair.
2	Grounding	Grounding cable in not required.	Grounding cable is required.
3	Data Transmission Rate	Data Transmission Rate is slower than STP.	Data Transmission Rate is very high.
4	Cost	UTP cables are cheaper.	STP cables are expensive.
5	Maintenance	Low maintenance cost in case of UTP.	High maintenance cost in case of STP.
6	Noise	Noise is high in UTP.	Noise is quite less in STP.
7	Crosstalk	Possibility of crosstalk is very high in UTP.	Possibility of crosstalk is quiet low in STP.

Q3. What is difference between baseband and broadband transmission?

Ans: The baseband and broadband are the types of signalling techniques. These terminologies were developed to categorise different types of signals depending on particular kind of signal formats or modulation technique.

BASIS FOR COMPARISON	BASEBAND TRANSMISSION	BROADBAND TRANSMISSION
Type of signalling used	Digital	Analog
Application	Work well with bus topology.	Used with a bus as well as tree topology.
Encoding Used	Manchester and Differential Manchester encoding.	PSK encoding.
Transmission	Bidirectional	Unidirectional
Signal range	Signals can be travelled over short distances	Signals can be travelled over long distances without being attenuated.

Baseband transmission uses whole frequency spectrum of the medium for the transmission. That is the reason frequency division multiplexing cannot be used in the transmission but time division multiplexing is used in this transmission as in TDM the link is not divided into multiple channels instead it provides each input signal with a time slot, in which the signal utilize whole bandwidth for a given time slot. The signals are carried by wires in the form of electrical pulse.

Broadband transmission employs analog signals which include optical or electromagnetic wave form of signal. The signals are sent into multiple frequencies permitting multiple signals to be sent simultaneously. Frequency division multiplexing is possible in which the frequency spectrum is divided into multiple sections of bandwidth. The distinct channels can support different types of signals of varying frequency ranges to travel simultaneously (at the same instance).

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

Ans: A **modem** is your gateway to the internet—a cable, fiber optic, or telephone line comes through your neighborhood, to your house, and connects to your modem. The modem translates the digital 1s and 0s from your computer into analog information for the cable or telephone wire to carry out to the world, and translates incoming analog signals in the same way. This is called *modulation* and *demodulation*, respectively, and it's where the "mo-dem" gets its name.

A **router** connects all your home's devices to each other—through Ethernet cables or Wi-Fi—and then connects to the modem. It gives each device its own internal IP address, which it uses to *route* traffic between them. If your modem's IP address is like the street address of a building, your router's internal IP addresses are like apartment numbers. Your modem receives information from the internet, sends it to the router, and the router sends it to the computer that asked for it.

If you run out of Ethernet ports on your router, a **switch** can add more Ethernet ports to your network. You just plug your extra devices into the switch, plug the switch into your router, and they'll appear on your network.

 A switch with a **hub**, which looks almost identical, but acts very differently: instead of routing traffic between multiple devices, a hub merely takes an incoming signal and copies it to all devices on the hub. These are uncommon in modern home usage.

Q5. 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.

Q 6. 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 areas 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: You need at least three levels of security.

1. A good firewall. This can stop intrusions, malware, unauthorized access, etc. before they reach the workstations.

2. Antivirus software on the servers and at the endpoint workstations. This software should be centrally managed to keep end users updated constantly and to minimize user meddling with the settings. Good antivirus will also protect email clients.
3. An anti-virus program must be installed on all servers and workstations to ensure protection.
4. 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: IP stands for **Internet Protocol**. IP address may be a distinctive numerical symbol allotted to every device on a network to spot each affiliation unambiguously.
The distinction between Static and Dynamic IP address lies inside the length of allotted scientific discipline address. The **static** scientific discipline address is fastened scientific discipline address that is manually allotted to a tool for a protracted amount of your time. On the opposite hand, the **Dynamic** scientific discipline address oft changes whenever user boots his/her machine, and it's mechanically allotted.
IPv4 and IPv6 are internet protocol version 4 and internet protocol version 6, IP version 6 is the new version of Internet Protocol, which is way better than IP version 4 in terms of complexity and efficiency.

Difference Between IPv4 and IPv6:

| IPV4	IPV6
IPv4 has 32-bit address length	IPv6 has 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 4.29×109	Address space of IPv6 is quite large it can

IPV4	IPV6
address space	produce 3.4×1038 address space
Security feature is dependent on application	IPSEC is 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 IPv6 fragmentation performed only by sender
In IPv4 Packet flow identification is not available.	In IPv6 packet flow identification are Available and uses flow label field in the header.

Q9. Discuss TCP/IP model in detail?

Ans: The purpose of TCP/IP model is to allow communication over large distances.

TCP/IP stands for Transmission Control Protocol/ Internet Protocol. TCP/IP Protocol Stack is specifically designed as a model to offer highly reliable and end-to-end byte stream over an unreliable internetwork.

Four Layers of TCP/IP model
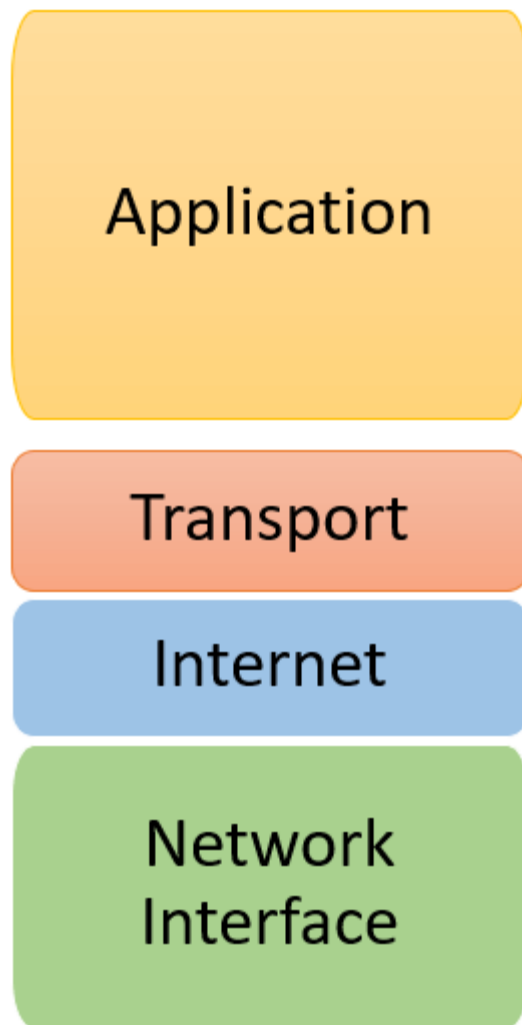
TCP/IP Conceptual Layers

The functionality of the TCP IP model is divided into four layers, and each includes specific protocols.

TCP/IP is a layered server architecture system in which each layer is defined according to a specific function to perform. All these four TCP/IP layers work collaboratively to transmit the data from one layer to another.

- Application Layer
- Transport Layer
- Internet Layer
- Network Interface

Application Layer

Application layer interacts with an application program, which is the highest level of OSI model. The application layer is the OSI layer, which is closest to the end-user. It means the OSI application layer allows users to interact with other software application.

Transport Layer

Transport layer builds on the network layer in order to provide data transport from a process on a source system machine to a process on a destination system. It is hosted using single or multiple networks, and also maintains the quality of service functions.

Internet Layer

An internet layer is a second layer of TCP/IP layes of the TCP/IP model. It is also known as a network layer. The main work of this layer is to send the packets from any network, and any computer still they reach the destination irrespective of the route they take.

The Network Interface Layer

Network Interface Layer is this layer of the four-layer TCP/IP model. This layer is also called a network access layer. It helps you to defines details of how data should be sent using the network.

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

Ans: A web browser is a software program that allows a user to locate, access, and display web pages. In common usage, a web browser is usually shortened to "browser."

Web browsers are used primarily for displaying and accessing websites on the internet, as well as other content created using languages such as Hypertext Markup Language (HTML) and Extensible Markup Language (XML).

Browsers translate web pages and websites delivered using Hypertext Transfer Protocol (HTTP) into human-readable content. They also have the ability to display other protocols and prefixes, such as secure HTTP (HTTPS), File Transfer Protocol (FTP), email handling (mailto:), and files (file:).

In addition, most browsers also support external plug-ins required to display active content, such as in-page video, audio and game content.

Early Beginnings of the Web Browser

Early web browsers started prior to the beginning of the 21st century, with a text-only browser called Lynx and another browser called Mosaic.

Later, Netscape Navigator and Microsoft Internet Explorer emerged as the two main choices, until the launch of Mozilla Firefox in 2004.

Meanwhile, Apple's Safari products launched in 2003, and became the standard operating system for the company's iPhones in 2007.

Since then, Google Chrome has also become a contender in the browser wars – the competition to power the bulk of end user activity.

Q11. What is a search engine? Give example?

Ans: A **search engine** is software accessed on the Internet that searches a database of information according to the user's query. The engine provides a list of results that best match what the user is trying to find. Today, there are many different search engines available on the Internet, each with its own abilities and features. The first search engine ever developed is considered Archie, which was used to search for FTP files, and the first text-based search engine is considered Veronica. Currently, the most popular and well-known search engine is Google. Other popular search engines include AOL, Ask.com, Baidu, Bing, DuckDuckGo, and Yahoo.

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

Ans: The Internet, sometimes called simply "the Net," is a worldwide system of computer networks -- a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPANet.

USES OF COMPUTER IN OUR DAILY LIFE:

Below is the list of important uses of internet in different sectors.

1. Access to Information
2. Communication
3. Entertainment
4. Online shopping
5. Uses of internet in Education
6. Multi-conferencing
7. Social Networks
8. Access to the News
9. Location access
10. Searches for new jobs

The invention of the Internet has been the best ever technology gift to mankind.

The **Internet** is the driving force in today's world.

The Internet makes our lives much easier. If you feel hungry, order your favorites foods online. Have to go somewhere in the town, book a taxi online. Have to pay utility bills, use internet banking. Want anything i-e shoes, clothes, groceries, shop for everything online through the internet without leaving your home. The invention of the internet has been the best gift to us. The Internet makes the world a global village and is a driving force in today's world. Today, with the internet, from just a click we can not only read our local newspaper but also the newspaper from anywhere in the world, with a permanent content update.

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

Ans: An Internet service provider (ISP) is a company that provides customers with Internet access. It is often referred to as just "the provider." Data may be transmitted using several technologies, including dial-up, DSL, cable modem, wireless or dedicated high-speed interconnects.

Typically, ISPs also provide their customers with the ability to communicate with one another by providing Internet email accounts, usually with numerous email addresses at the customer's discretion.

Other services, such as telephone and television services, or personal websites or home pages may be provided as well. The services and service combinations may be unique to each ISP.

Today, ISPs are usually cable companies or mobile phone companies that offer Internet subscriptions in addition to TV or mobile communications services.

The following table shows the top 6 ISPs in India by total subscriber base as of 31 March 2020. Broadband is defined as "an always-on Internet connection with download speed of 512 kbit/s or above." The number of internet users is 743.19 million, out of which 55.75 million are narrow band subscribers and 687.44 million are broadband subscribers.

Rank	ISP	Narrowband	Broadband	Total
1	Reliance Jio	0	388,390,116	388,390,116
2	Airtel	27,111,012	148,569,937	175,680,949
3	Vodafone Idea	22,019,406	117,451,416	139,470,822
4	BSNL	6,400,380	24,507,496	30,907,876
5	ACT Fibernet	0	1,607,015	1,607,015
6	MTNL	170,697	855,744	1,026,441

The type of Internet access varies depending on what the customer requires. For home use, cable or DSL (digital subscriber line) is the perfect, affordable choice. The amount of bandwidth is usually what drives the price. Bandwidth is the amount of data that can be sent through an internet connection in a given amount of time. The speed for home use usually varies from 14 kilobits per second to 100 megabits per second. For large companies and organizations, their bandwidth requirements may be 1 to 10 gigabits per second, which is both insanely fast and expensive

Q14. 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	A device attached with IP Address can retrieve by

	protocol.	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:

Ø   Port address is a feature of a network device that translates TCP or UDP communications made between a host and port on an outside network

Ø   It allows a single IP address to be used for many internal hosts.

Ø   Port address can automatically modify the IP packets' destination or source host IP and port fields belonging to its internal hosts.

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

Ans:

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

2.)Click ⋮ **.** This option is in the top-right corner of the window.

3.)Select History **.** You'll see this option near the top of the drop-down menu. Selecting it will prompt a pop-out menu.

4.)Click History **.** It's at the top of the pop-out menu. Doing so will take you to your search history.

5.)Review your browsing history. You can scroll down through your browsing history to see items from earlier in your history, or you can click a link to re-open its page.