# ASSIGNMENT-2

## DATA COMMUNICATIONS

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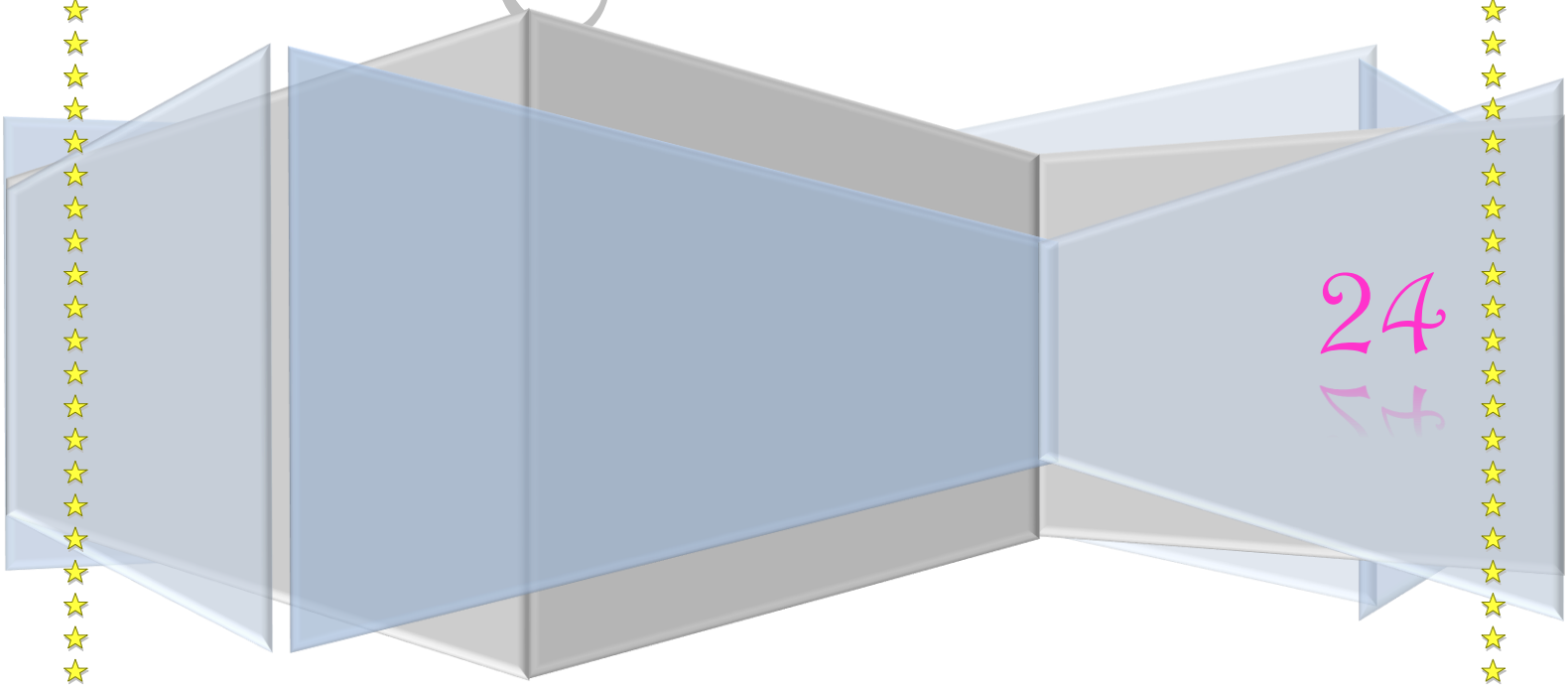

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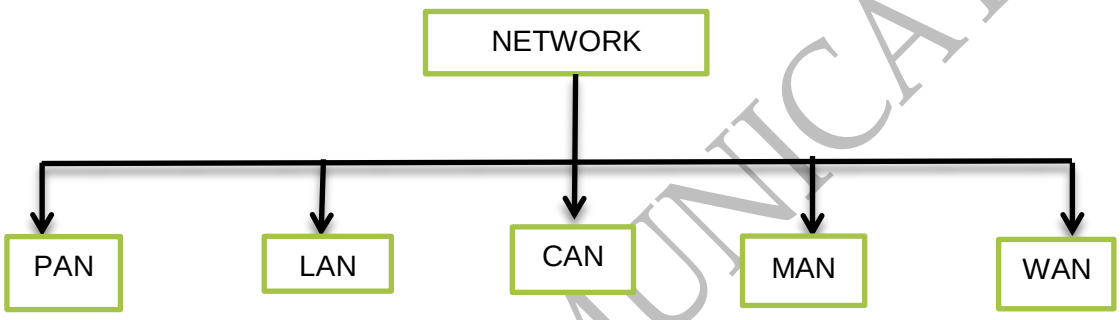
## DATA COMMUNICATION

### 1. WHAT ARE THE DIFFERENT TYPES OF NETWORKS.

The are mainly five types of computer networks

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




### 2. EXPLAIN THE SHIELDED TWISTED PAIR (STP) AND UNSHIELDED TWISTED PAIR (UTP):

**UTP:**

UTP is a type of twisted pair cable. It stand for unshielded pair. Both Data and voice are transmitted through UTP because its frequecy range is suitable. In UTP grounding cable is not necessary also in UTP much more maintence is needed therefore it is cost-effective.

**FEATURES:**

- **COST-EFFECTIVE:** UTP cables are relatively inexpensive compared to other types of network cables.
- **EASY TO INSTALL:** UTP cable are easy to install and terminate, which makes them a popular choice for samall and medium-sized networks.
- **VULNERABLE TO INTERFERENCE:** UTP cables are vulnerable to interference from nearbly sources of electromagnetic radiation, such as power line, motors, and other electrical equipment. This can cause signal degradation and data loss.

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- **LIMITED DISTANCE:** UPT cables have a limited distance over which they can reliably transmit data, typically up to 100 meters.

**STP:**

STP is also the type of twisted pair which stands for shieled twisted pair. In STP grounding cable is required but in UTP grounding cable is not required. In shielded Twisted paid (STP) much more maintenance is needed therefore it is costlier then Unshielded Twisted pair (UTP).

**FEATURES:**

- **ENHANCEED POTECTION:** STP cables are shielded with a layer of metal foil or braided copper mesh , which provides additional protection against electromagnetic interference.
- **BETTER PERFORMANCE:** STP cables can transmit data over longer distances and at higher speeds than UTP cables, making them ideal for high-bandwidth applications.
- **MORE COMPLEX TO INSTALL:** STP cables are more complex to installl and terminate then UTP cables, which can increase installation costs and require specialized skills.
- **MORE EXPENSIVE:** STP cables are more expensive than UTP cables due to the additional shielding and manufacturing costs involved.

**3. WHAT IS DIFFERENCE BETWEEN BASEBAND AND BROADAND TRANSMISSION?**

**BASEBAND TRANSMISSION:**

The information signal is sent directly over the channel without modification**.** Baseband systems use digital signaling to send a single digital signal over the entire bandwidth of the transmission medium. Baseband systems are generally less bandwidth then broadband systems.

**BROADBAND TRANSMISSION:**

The information signal is modified by superimposing it on a higher-frequency signal, called the carrier. Broadband trnsimission is commonly used for application that need to send multiple data types simultaneously, such as voice, video, and data.

Baseband transmission is used in various types of networks, including Ethernet and token ring local area networks. Some examples of broadband transmission technologies include Digital Subscriber Line (DSL),

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cable modem, fibem, fiber-to-the-home (FTTH), mobile wireless, fixed wireless, and satellite.

**DIFFERENCE BETWEEN HUB, SWITCH AND ROUTER.**

| HUB | SWITCH | ROUTER |
|---|---|---|
| Hub is a physical layer device i.e. layer 1. | Switch is a data link layer device i.e. layer 2. | Router is a network layer device i.e. layer 3. |
| A Hub works on the basis of broadcasting. | Switch works on the basis of MAC address. | A router works on the basis of IP address. |
| A Hub is a multiport repeater in which a signal introduced at the input of any port appears at the output of the all available ports. | A Switch is a tele-communication device which receives a message from any device connected to it and then transmits the message only to the device for which the message is intended. | A router reads the header of incoming packet and forward it to the port for which it is intnded there by determines the route. It can also perform filtering and encapsulation. |
| Hub is not an inttellingent device that may include amplifier on repeater. | A Swith is an intelligent device as it passes on the message to the selective device by inspecting the address. | A roter is more sophisticated and intelligent device as it can red IP address and direct the packets to another network with specified IP adders. Moreover routers can built address table that helps in routing decisions. |

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| | | |
|---|---|---|
| At least single network is required to connect. | At least singles network is required to connect. | Router needs at least two networks to connect. |
| Hub is cheaper as compared to seitch and router. | Switch is an expensive device than hub. | Router is a relatively much more expensive divece than hub and switch. |
| Speed of original hub 10Mbps and modern internet hub is 100Mbps. | Maximum speed is 10Mbps to 100Mbps. | Maximum speed for wireless is 1-10 Mbps and maximum speed for wired connections is 100 Mbps. |
| Hub are used in LANs. | Switch is used in LANs. | Routers are used in LANs, MANs and WAMs. |

**4. WHAT IS THE DIFFERENCE BETWEEN A HUB, MODEM,ROUTER AND A SWITCH?**

**HUB:**

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

It is also knwn as a repeater as it transmits signal to every port except the port from where signal is received. Also, hubs are not that intelligent in communication and processing information for 2nd and 3rd layer.

**SWITCH:**

Switch is a point to point communication device. It operates at the data link layer of OSI model. It uses switching table to find out the correct destination. Asically, it is a kind of bridge that provides better connections. It is kind of device that set up and stop the connections according to the requirements needed at thst time. It comes up with many features such as flooding, filtering and frame transmission.

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**5. WHEN YOU MOVE THE NIC CARDS FROM ONE PC TO ANOTHER PC, DOES THE MAC ADDRESS GETS TRANSFERRED AS WELL?**

Yes, a MAC addressis transferred when a network interface controller (NIC) card is moved from one PC to another.

**EXPLANATION:**

A MAC adderss is a unique 12-digit hexadecimal that identifies a device connected to to a network. It's attached to the NIC, which is the network adapter that allows a devices to connect to a network. When a NIC card is moved, the MAC address associated with it is also transferred.

**MAC ADDRESS CHARACTERISTICS**

MAC adresses are assigned by the hardwere manufacture and never change. They're only used on the local network, while IP addresses are assigned by the network admin or ISP and identfy network devices globally.

**MULTIPLE MAC ADDRESSES**

A device can have more then one MAC address. For example, a laptop with both an ethernet cable port and built-in wi-fi will have tow MAC addresses.

**6. WHEN TROUBLESHOOTING COMPUTER NRTWORK PROBLEMS, WHAT COMMON HARDWARE-RELATED PROBLEMS CAN OCCUR?**

- **HARDWARE LOAD AND UNAVAILABILTY:** These issues are often caused by device misconfigurations.
- **TEMPERATURE INCREASE:** An abrupt increase in temperature can cause hardware problems.

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- **POOR BATTERY:** Apoor battery can cause hardware problems.
- **CABLE PROBLEMS:** Dameged cables can cause connection failues.
- **CONFIGURATION ERRORS:** These can occur when transfering or applying an old configuration to new hardware.
- **SERVER HARDWARE FAILURE:** Faults in the hardware components can result in system crashes.

**7. IN A NETWORK THAT CONTAINS TWO SERVES AND TWENTY WORKSTATIONS, WHERE IS THE BEST PLACE TO INSTALL AN ANTI-VIRUS PROGRAM?**

**THE SERVER**

In a network that contains two serves and twenty workstations, the best place to installl an Anti-virus is on the server. This is because the main port for alll the network traffic, and so it is more important to ensure that the server is free of and virus other security risks.

**8. DEFINE STATIC IP AND DYNAMIC IP ? DISCUSS THE DIFFFERENCE BETWEEN IPV4 AND IPV6.**

**STATIC IP ADDRESSES**

These adresses are manually configured remain the same until the device is decommissioned or the network architecture changes. They are typically used for servers, routers, and priters, and are often more expensive. Static IP addresses are essential for hosting websites, email services, and online gaming servers. They are also used for VPNs and remote access to devices.

**DYNAMIC IP ADDRESSES**

These addresses are temporarily assigned to a device by an internet service provider (ISP) using the Dynamic Host configuration protocol (DHCP) server. They can change when a user reboots their router or system, and when not in use, can be automatically assigned to another device. Dynamic IP addresses provide a level of anonymity and security because it,s more difficult to track a specific device or user. Most devices use dynamic IP addresses.

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IPv4 and IPv6 are two versions of the internet protocol. The main differences between IPv4 and IPv6 are.

- **ADDRESS SPACE:** IPv4 uses a 32-bit address space, while IPv6 uses a 128-bit address space.
- **ADDRESS REPRSENTATION:** IPv4 addresses are represented in decimal notation, while IPv6 addresses are represented in hexadecimal notation.
- **SPEED:** IPv6 has the potential to be faster than IPv4 to feaures like larger packet sizes and more efficient packet forwarding.

## 9. DISCUSS TCP/IP MODEL IN DETAIL.

The TCP/IP model is a fundamental framework for computer networking. It sands for Tansmission control protocol/Internet protocol, which are the core protocols of the Internet. This model defines how data is transmitted over networks, ensuring reliable communication between devices. It consists of four layers: the link Layer, the internet layer, the Transport Layer, and the Application Layer. Each layer has specific funcations that help manage different aspects of network communication, making it essential for understanding and working with modern networks.

TCP/IP was designed and developed by the Department of Defense (DoD) in the 1960s and is based on standard protocols. The TCP/IP model is a concise varion of the OSI model. It contains four layers, unlike the seven layers in the OSI model. In this article, we are going to discuss the TCP/IP model in detail.

TCP/IP model was developed alongside the creation of the ARPANET, which later became the foundation of the modern internet. It was designed with a fous on the practical aspects of networking at the time. The lower-level hardware details and physical transmission medium were largely abstrated away in favor of higher-level networking protocols.



## 10. WHAT IS A WEB BROWSER (BROWSER)? GIVE SOME EXAMPLE OF BROWSERS.

A web browser is a software application that allows users to access and view websites on the internet. It displays websites on

the user's device and allows them to interact with the content by clicking on links or entering text.

**GOOGLE CHROME**

A popular browser that can be used for web development, HTML editing, and more.

**MOZILLA FIREFOX**

An open-source browser that is popular among web developers due to its support for web standards

**APPLE SAFARI**

A browser that is buillt into several of Apple's operating systems, including macOS, iOS, and ipadOS

**MICROSOFT EDGE**

A browser built on the chromium engine, the same technology that powers chrome

**VIVALDI**

A browser with a user-friendly interface that offers a speed Dial and a top button for quick navigation

**BRAVE**

An open-source browser that automatically blocks intrusive ads and trackers.

**11. WHAT IS A SEARCH ENGINE ? GIVE EXAMPLE.**

A seach engine is a software program that helps people find information on the internet using keywords or phrases. When a user enters a search term, the search engine uses algorithms to produce a list of sites, with the most relevant websites at the top.

Here some examples of search engines:

Google, Bing, Yahoo, DuckDuckGo, Baidu, BoardReader, Brave search, creative commons search, Ecosia, and Ekoru.

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**SEARCH ENGINES WORK BY:**

- Scanning the internet: Search engines use automated software applications called robots, bots, or spiders to travel the web, following links from page to page.
- Indexing: The spiders gather information and create a searchable index of the web.
- Ranking: Search engines rank content based on factors like query meaning, relevance, quality, usability, and user data.

## 12. WHAT IS THE INTERNET & WWW? WHAT ARE THE USES OF INTERNET IN OUR DAILY LIFE?

**INTERNET:**

The full form of the internet is an interconnected network. The interconnected network is basically a combination of various computer nodes along with a mobile, computer, and various servers that are engaged together to comlete successful data-transmission. The internet, sometimes simply called the net, is a wroldwide system of interconnectedcomputer networks and electronic devices that commuication with each other using an established set of protocols. The internet was conceived by the Advanced Reseach Projects Agency (ARPA) of the U . S. government in 1969. Internet is a global network that connects billions of computers the world with each other and the World Wide Web.

**WWW:**

WWW Stands for world wide web, which is a collection of punlic web pages that are accessible over the internet. It's a hypertext –based system that allows users to assesss information by clicking on words in a document that link to other documents with more information. The world wide web is one of many applications built on top of the internet, but the two are not the same thing. The internet is a glpbal network of connected computers, while the world wide web is the collection of web pages found on that network.

The world wide web was invented by British scientist Tim Berners-Lee in 1989. It was originally developed to allow scientists to share information with each other. The first webside was hosted on Berners-Lee's NEXT computer at CERN.

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**SOME COMPONENTS OF THE WORLD WIDE WEB INCLUDE:**

- Hypertext Markup Language (HTML): A text-based way of describing how content is structured in an HTML file
- HTTP protocol: Governas how data is transferred between a server and a client
- URL (uniform resource locator) or URI (uniform resource identifier): A unique identifier that a client usres to access a web component.

**13. WHAT IS AN INTERNET SERVICE PROVIDER? GIVE SOME EXAMPLE OF ISP IN INDIA.**

An internet service provider (ISP) is any company that provides Internet access to consumers and businesses. The Internet is provided through a variety of channels, including cable, DSL, fiber optics, dial-up, and wireless, with most ISPs offfering all optiong.

**JIO**

As of january 2023, Jio was the top ISP in india by number of subcribers.

**AIRTEL**

As of January 2023, Airtel was the second-ranked ISP in India by number of subscribers

**VI**

As of January 2023, VI was the third-ranked ISP in India by number of subscribers

**BSNL**

As of January 2023, BSNL was the fourth-ranked ISP in India by number of subscribers

**14. DISCUSS THE DIFFERENCE MAC ADDRESS, IP ADDRESS AND PORT ADDRESS.**

The main difference between MAC addresses, IP addressess, and port addresses is their purpose and how they are used:

MAC ADDRESS:

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A device's physical address that's used for local communicativity to a within a network. MAC addresses are usually fixed and are assigned by the device's manufacturer.

IP ADDRESS:

A device's logical address that's used to identify a device's connectivity to a network. IP addresss are used for routing and transmission of data packets over the internet. . IP addresss can change when a device connects to a different network.

PORT ADDRESS:

A number that completes the destination or origination address of a message. Specific port numbers are reserved for specific services.

Here are some other differences between MAC addresses and IP addresses:

How they are assigned

MAC addresses are integrated into device's network Interface Card (NIC). IP addresses are supplied by the network administrator, DHCP (Dynamic Host Configuration Protocol), or the ISP (Internet Service Provider).

How they are used:

MAC addresses are used for local communication within a network. IP addresses are used for routing and transmission of data packets over the internet.

How they are visible:

A thied party can find out a device's MAC address, but the IP address stays hidden from display.



**15. HOW DO WE VIEW MY INTERNET BROWSER'S HISTORY?**

**HISTORY.**

On your computer, open chrome.

- In the address bar, enter @history.

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- Press tab or space. You can also click Search History. In the suggestions.
- Enter keywords for the page you previously visited.
- Select the page from the list.