List of Basic Internet Terminologies

**1.  Internet**

One of the most important and **basic internet terminologies**is the Internet itself. The [Internet](https://www.internetsociety.org/internet/history-internet/brief-history-internet/) is a worldwide network of computers, which provides a wide array of information that follows a standard communication protocol. This communication protocol is what we call as TCP (Transmission Control Protocol) or IP (Internet Protocol).

In 1969, the internet was known as ARPANET. It is coined by the Advanced Research Projects Agency of the United States of America. During that time, the Department of Defense was only using four computers to connect with each other. Today ARPANET is widely termed as the Internet.

**2. World Wide Web**

Another one of the **basic Internet terminologies** is the World Wide Web. World Wide Web or www is a collection of data stored and shared in the digital space. This collection of information form and connect into websites and divides into web pages. Tim Bernes-Lee in the CERN laboratory invented it in 1989.The World Wide Web is accessible anywhere as long as there’s an internet connection. You can use a wireless router, Wi-Fi or Ethernet cable to access www through the internet.

3. Host (Network)

**A Network Host is usually a computer or any device that connects to a computer network. It provides information and facilities to other computers and their users. In addition, you can use the term host when there’s two or more computer system that connects through a modem or other internet connection channels.**

**4. Domain Name**

This is a friendly naming system for giving addresses to web pages and servers. It is a description of a computer’s location on the Internet. Usually, a dot separates a domain name, for example, [www.google.com](http://www.google.com/) or www.slashdigit.com.

In addition, Domain Names are part of the DNS (Domain Name System, a database of [domain](https://www.slashdigit.com/2017s-best-domain-web-hosting-providers/) names and their corresponding IP addresses). Also, a domain name follows certain rules and algorithms in the DNS.

**5. Web Browser**

A web browser or browser is a software program that can access websites. Popular web browsers include Google Chrome, Apple’s Safari, Internet Explorer and Mozilla Firefox. Each web browser has its own settings and works separately from each other. However, they have the same function and that is to serve as portals to the World Wide Web.Moreover, web browsers allow you to surf, search any information from various websites on the internet. You also have a choice to pick your own web browser preference. If you like Chrome, you can stick with chrome or if you’re an Apple user, Safari is the best browser for you.

**6. IP Address**

An IP (Internet Protocol) address is a unique set of numbers assigned to a computing device that uses the internet protocol. Also, IP address identifies a device on the Internet communication network. Furthermore, it allows a system to be acknowledged by other systems.

**7. Homepage**

A Homepage is the main page of a particular website. Usually, this is the first page you see when you open a website. Additionally, a home page can have one of several different filenames.

**8. URL**

URL or short for “Universal Resource Locator.” From the name itself, it provides a way of locating a resource on the web. It also serves as a method of retrieving location on a computer network.

**9. Search Engine**

Search Engine is a software system that works to search information on the World Wide Web. Common examples of online search engines are Google, Yahoo, and Bing. These programs allow you to search keywords and phrases to locate information on the Internet.

**How Computer Networks Send Data Across the Internet** :

1 When you send information across the Internet, the Transmission Control Protocol/ Internet Protocol (TCP/IP) the language computers use when communicating over the Internet first breaks the information up into packets, smaller blocks of information that also contain a variety of data that helps the packets travel across the Internet.

 2 The packets travel through many of networks, computers, and communications lines before they reach their final destinations. A variety of hardware processes those packets and routes them to their proper destinations. Five of the most important pieces of hardware are hubs, bridges, repeaters, and routers.

 3 Hubs/ Switches are important because they link groups of computers to one another and let computers communicate with each other. Bridges link local area networks (LANs) with one another. They enable data destined for another LAN to be sent there, while keeping local data inside its own network.

 4 When data travels across the Internet, it often crosses great distances, which can be a problem because the signal sending the data can weaken over the distance. To solve the problem ,repeaters amplify the data at intervals so the signal doesn't weaken.

 5 Routers play a key role in managing Internet traffic. Their job is to ensure the packets always arrive at the proper destination. If data is being transferred among computers that are on the same LAN, routers often aren't necessary because the network itself can handle its internal traffic. Routers come into play when the data is sent between between two different networks. Routers examine packets to determine their destinations. They take into account the volume of activity on the Internet, and they send the packet to another router that is closer to the packet's final destination.

6 All this hardware connects the many networks that make up the Internet. Corporate LANs are at the most local level of networks. Mid level networks hook together these LANs using high-speed telephone lines, Ethernet, and microwave links. A regional network is a mid level network in a geographic area. A wide area network (WAN) is another type of midlevel network. A WAN consists of an organization with many networked sites linked together.

 7 When a packet travels from a computer on a LAN in a midlevel network to a computer somewhere else on the midlevel network, a router (or a series of routers) sends the packet to its proper destination. However, if the destination lies outside the midlevel network, the packet is sent to a network access point (NAP), where it is sent across the country or the world on a backbone. High -speed backbones such as the vBNS (very high-speed Backbone Network Services) can transmit data at an exceedingly high rate155 megabits (millions of bits) per second (Mbps) or higher. Even faster backbones are being built that will transmit data at an astonishing 9.6 billion bits per second.

**Getting connected to the Internet**

Once you've set up your computer, you may want to purchase **home** **Internet access** so you can send and receive email, browse the Web, stream videos, and more. You may even want to set up a **home wireless network**, commonly known as **Wi-Fi**, so you can connect multiple devices to the Internet at the same time.

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The type of Internet service you choose will largely dependon which **Internet service providers**(ISPs) serve your area, along with the types of service they offer. Here are some common types of Internet service.

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* **DSL**: DSL service uses a **broadband connection**, which makes it much faster than dial-up. DSL connects to the Internet **via a phone line** but does not require you to have a landline at home. And unlike dial-up, you'll be able to use the Internet and your phone line at the same time.
* **Cable**: Cable service connects to the Internet **via cable TV**, although you do not necessarily need to have cable TV in order to get it. It uses a broadband connection and can be faster than both dial-up and DSL service; however, it is only available where cable TV is available.
* **Satellite**: A satellite connection uses broadband but does not require cable or phone lines; it connects to the Internet **through satellites orbiting the Earth**. As a result, it can be used almost anywhere in the world, but the connection may be affected by weather patterns. Satellite connections are also usually slower than DSL or cable.
* **3G and 4G**: 3G and 4G service is most commonly used with mobile phones, and it connects **wirelessly** through your ISP's network. However, these types of connections aren't always as fast as DSL or cable. They will also **limit the amount of data** you can use each month, which isn't the case with most broadband plans.

Choosing an Internet service provider

Now that you know about the different types of Internet service, you can do some research to find out what ISPs are available in your area. If you're having trouble getting started, we recommend talking to friends, family members, and neighbors about the ISPs they use. This will usually give you a good idea of the types of Internet service available in your area.

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You'll also want to **consider the cost**of the service, including installation charges and monthly fees. Generally speaking, the faster the connection, the more expensive it will be per month.

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You **don't necessarily need to buy a router** to connect to the Internet. It's possible to connect your computer directly to your modem using an Ethernet cable. Also, many modems include a **built-in router**, so you have the option of creating a Wi-Fi network without buying extra hardware.

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Once you've chosen an ISP, most providers will **send a technician to your house** to turn on the connection. If not, you should be able to use the instructions provided by your ISP—or included with the modem—to set up your Internet connection.

After you have everything set up, you can open your **web browser** and begin using the Internet. If you have any problems with your Internet connection, you can call your ISP's **technical support** number.

Home networking

If you have multiple computers at home and want to use all of them to access the Internet, you may want to create a **home network**, also known asa**Wi-Fi network**. In a home network, all of your devices connect to your **router**, which is connected to the **modem**. This means everyone in your family can use the Internet **at the same time**.

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Getting started with the Internet

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Connecting to the Internet

A device has to be connected to the Internet before you can access it. If you plan to use the Internet at home, you'll usually need to purchase an Internet connection from an **Internet service provider**, which will likely be a phone company, cable company, or the government. Other devices usually connect through **Wi-Fi** or **cellular Internet** connections. Sometimes libraries, cafes, and schools offer free Wi-Fi for their patrons, customers, and students.

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Other things you can do on the Internet

One of the best features of the Internet is the ability to communicate almost instantly with anyone in the world. [**Email**](http://www.gcflearnfree.org/email101/1) is one of the oldest and most universal ways to communicate and share information on the Internet, and billions of people use it. [**Social media**](http://www.gcflearnfree.org/socialmedia) allows people to connect in a variety of ways and build communities online.

There are many other things you can do on the Internet too. There are thousands of ways to keep up with news or [**shop for anything**](http://www.gcflearnfree.org/using-the-web-to-get-stuff-done/online-shopping-advice/1/) online. You can pay your bills, [**manage your bank accounts**](http://www.gcflearnfree.org/online-money-tips/online-banking-101/1), meet new people, [**watch TV**](http://www.gcflearnfree.org/using-the-web-to-get-stuff-done/streaming-video-services/1), or learn new skills. You can learn or do almost anything online.

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Browsing the web

Most information on the Internet is on **websites**. Once you are connected to the Internet, you can access websites using a kind of application called a **web browser**.

A **website** is a collection of related text, images, and other resources. Websites can resemble other forms of media—like newspaper articles or television programs—or they can be interactive in a way that's unique to computers. The purpose of a website can be almost anything: a news platform, an advertisement, an online library, a forum for sharing images, or an educational site like us!

A **web browser** allows you to connect to and view websites. The web browser itself is not the Internet, but it displays pages on the Internet. Each website has a unique address. By typing this address into your web browser, you can connect to that website and your web browser will display it.

Navigating websites

Websites often have **links** to other sites, also called **hyperlinks**. These are often parts of the text on the website. They are usually colored blue, and sometimes they are underlined or bold. If you click the text, your browser will load a different page. Web authors use hyperlinks to connect relevant pages. This web of links is one of the most unique features of the Internet, lending to the old name World Wide Web.

Each website has a unique address, called a **URL**. You'll notice that when you click a link, the URL changes as your browser loads a new page. If you type a URL in the address bar in your browser, your browser will load the page associated with that URL. It's like a street address, telling your browser where to go on the Internet.

When you're looking for specific information on the Internet, a **search engine** can help. A search engine is a specialized website that's designed to help you find other websites. If you type keywords or a phrase into a search engine, it will display a list of websites relevant to your search terms.

Other things you can do on the Internet

One of the best features of the Internet is the ability to communicate almost instantly with anyone in the world. [**Email**](http://www.gcflearnfree.org/email101/1) is one of the oldest and most universal ways to communicate and share information on the Internet, and billions of people use it. [**Social media**](http://www.gcflearnfree.org/socialmedia) allows people to connect in a variety of ways and build communities online.

There are many other things you can do on the Internet too. There are thousands of ways to keep up with news or [**shop for anything**](http://www.gcflearnfree.org/using-the-web-to-get-stuff-done/online-shopping-advice/1/) online. You can pay your bills, [**manage your bank accounts**](http://www.gcflearnfree.org/online-money-tips/online-banking-101/1), meet new people, [**watch TV**](http://www.gcflearnfree.org/using-the-web-to-get-stuff-done/streaming-video-services/1), or learn new skills. You can learn or do almost anything online.

**Simplex, Half Duplex, Full Duplex-(Modes of data transmission)**

There are three modes of [transmission](https://teachcomputerscience.com/data-transmission/), namely: simplex, half duplex, and full duplex.  The transmission mode defines the direction of signal flow between two connected devices.

The primary difference between three modes of transmission is that in asimplex mode of transmission the communication is unidirectional, or one-way; whereas in the half duplex mode of transmission the communication is two-directional, but the channel is interchangeably used by both of the connected devices.  On the other hand, in the full duplex mode of transmission, the communication is bi-directional or two-way, and the channel is used by both of the connected devices simultaneously.

Comparison Chart

|  |  |  |  |
| --- | --- | --- | --- |
| Basis for Comparison | Simplex | Half Duplex | Full Duplex |
| Direction of Communication | Unidirectional | Two-directional, one at a time | Two-directional, simultaneously |
| Send / Receive | Sender can only send data | Sender can send and receive data, but one a time | Sender can send and receive data simultaneously |
| Performance | Worst performing mode of transmission | Better than Simplex | Best performing mode of transmission |
| Example | Keyboard and monitor | Walkie-talkie | Telephone |

Simplex

In simplex transmission mode, the communication between sender and receiver occurs in only one direction.  The sender can only send the data, and the receiver can only receive the data.  The receiver cannot reply to the sender.

Simplex transmission can be thought of as a one-way road in which the traffic travels only in one direction—no vehicle coming from the opposite direction is allowed to drive through.

To take a keyboard / monitor relationship as an example, the keyboard can only send the input to the monitor, and the monitor can only receive the input and display it on the screen.  The monitor cannot reply, or send any feedback, to the keyboard.

Half Duplex

The communication between sender and receiver occurs in both directions in half duplex transmission, but only one at a time.  The sender and receiver can both send and receive the information, but only one is allowed to send at any given time.  Half duplex is still considered a one-way road, in which a vehicle traveling in the opposite direction of the traffic has to wait till the road is empty before it can pass through.

For example, in walkie-talkies, the speakers at both ends can speak, but they have to speak one by one.  They cannot speak simultaneously.

Full Duplex

In full duplex transmission mode, the communication between sender and receiver can occur simultaneously.  The sender and receiver can both transmit and receive at the same time. Full duplex transmission mode is like a two-way road, in which traffic can flow in both directions at the same time.

For example, in a telephone conversation, two people communicate, and both are free to speak and listen at the same time.

Key Differences of the Three Transmission Modes

* In simplex mode, the signal is sent in one direction. In half duplex mode, the signal is sent in both directions, but one at a time.  In full duplex mode, the signal is sent in both directions at the same time.
* In simplex mode, only one device can transmit the signal. In half duplex mode, both devices can transmit the signal, but one at a time.  In full duplex mode, both devices can transmit the signal at the same time.
* Full duplex performs better than half duplex, and half duplex in turn performs better than simplex.
* Simplex: The keyboard sends the command to the monitor. The monitor cannot reply to the keyboard.
* Half duplex: Using a walkie-talkie, both speakers can communicate, but they have to take turns.
* Full duplex: Using a telephone, both speakers can communicate at the same time.
* The full duplex transmission mode offers the best performance among the three, on account of the fact that it maximises the amount of bandwidth available.

**Types of Protocols**

**There are various types of protocols that support a major and compassionate role in communicating with different devices across the network. These are:**

1. **Transmission Control Protocol (TCP)**
2. **Internet Protocol (IP)**
3. **User Datagram Protocol (UDP)**
4. **Post office Protocol (POP)**
5. **Simple mail transport Protocol (SMTP)**
6. **File Transfer Protocol (FTP)**
7. **Hyper Text Transfer Protocol (HTTP)**
8. **Hyper Text Transfer Protocol Secure (HTTPS)**
9. **Telnet**
10. **Gopher**

**Let's discuss each of them briefly:**

1. **Transmission Control Protocol (TCP): TCP is a popular communication protocol which is used for communicating over a network. It divides any message into series of packets that are sent from source to destination and there it gets reassembled at the destination.**
2. **Internet Protocol (IP): IP is designed explicitly as addressing protocol. It is mostly used with TCP. The IP addresses in packets help in routing them through different nodes in a network until it reaches the destination system. TCP/IP is the most popular protocol connecting the networks.**
3. **User Datagram Protocol (UDP): UDP is a substitute communication protocol to Transmission Control Protocol implemented primarily for creating loss-tolerating and low-latency linking between different applications.**
4. **Post office Protocol (POP): POP3 is designed for receiving incoming E-mails.**
5. **Simple mail transport Protocol (SMTP): SMTP is designed to send and distribute outgoing E-Mail.**
6. **File Transfer Protocol (FTP): FTP allows users to transfer files from one machine to another. Types of files may include program files, multimedia files, text files, and documents, etc.**
7. **Hyper Text Transfer Protocol (HTTP): HTTP is designed for transferring a hypertext among two or more systems. HTML tags are used for creating links. These links may be in any form like text or images. HTTP is designed on Client-server principles which allow a client system for establishing a connection with the server machine for making a request. The server acknowledges the request initiated by the client and responds accordingly.**
8. **Hyper Text Transfer Protocol Secure (HTTPS): HTTPS is abbreviated as Hyper Text Transfer Protocol Secure is a standard protocol to secure the communication among two computers one using the browser and other fetching data from web server. HTTP is used for transferring data between the client browser (request) and the web server (response) in the hypertext format, same in case of HTTPS except that the transferring of data is done in an encrypted format. So it can be said that https thwart hackers from interpretation or modification of data throughout the transfer of packets.**
9. **Telnet: Telnet is a set of rules designed for connecting one system with another. The connecting process here is termed as remote login. The system which requests for connection is the local computer, and the system which accepts the connection is the remote computer.**
10. **Gopher: Gopher is a collection of rules implemented for searching, retrieving as well as displaying documents from isolated sites. Gopher also works on the client/server principle.**

Computer Network Types

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.

**There are two types of Personal Area Network:**

* Wired Personal Area Network
* Wireless Personal Area Network

**Wireless Personal Area Network:** Wireless Personal Area Network is developed by simply using wireless technologies such as WiFi, Bluetooth. It is a low range network.

**Wired Personal Area Network:** Wired Personal Area Network is created by using the USB.

Examples Of Personal Area Network:

* **Body Area Network:** Body Area Network is a network that moves with a person. **For example**, a mobile network moves with a person. Suppose a person establishes a network connection and then creates a connection with another device to share the information.
* **Offline Network:** An offline network can be created inside the home, so it is also known as a **home network**. A home network is designed to integrate the devices such as printers, computer, television but they are not connected to the internet.
* **Small Home Office:** It is used to connect a variety of devices to the internet and to a corporate network using a VPN

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 Local Area Network(LAN).

Uses Of Metropolitan Area Network:

* MAN is used in communication between the banks in a city.
* It can be used in an Airline Reservation.
* It can be used in a college within a city.
* It can also be used for communication in the military.

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.

Examples Of Wide Area Network:

* **Mobile Broadband:** A 4G network is widely used across a region or country.
* **Last mile:** A telecom company is used to provide the internet services to the customers in hundreds of cities by connecting their home with fiber.
* **Private network:** A bank provides a private network that connects the 44 offices. This network is made by using the telephone leased line provided by the telecom company.

Advantages Of Wide Area Network:

Following are the advantages of the Wide Area Network:

* **Geographical area:** A Wide Area Network provides a large geographical area. Suppose if the branch of our office is in a different city then we can connect with them through WAN. The internet provides a leased line through which we can connect with another branch.
* **Centralized data:** In case of WAN network, data is centralized. Therefore, we do not need to buy the emails, files or back up servers.
* **Get updated files:** Software companies work on the live server. Therefore, the programmers get the updated files within seconds.
* **Exchange messages:** In a WAN network, messages are transmitted fast. The web application like Facebook, Whatsapp, Skype allows you to communicate with friends.
* **Sharing of software and resources:** In WAN network, we can share the software and other resources like a hard drive, RAM.
* **Global business:** We can do the business over the internet globally.
* **High bandwidth:** If we use the leased lines for our company then this gives the high bandwidth. The high bandwidth increases the data transfer rate which in turn increases the productivity of our company.

Disadvantages of Wide Area Network:

The following are the disadvantages of the Wide Area Network:

* **Security issue:** A WAN network has more security issues as compared to LAN and MAN network as all the technologies are combined together that creates the security problem.
* **Needs Firewall & antivirus software:** The data is transferred on the internet which can be changed or hacked by the hackers, so the firewall needs to be used. Some people can inject the virus in our system so antivirus is needed to protect from such a virus.
* **High Setup cost:** An installation cost of the WAN network is high as it involves the purchasing of routers, switches.
* **Troubleshooting problems:** It covers a large area so fixing the problem is difficult.

What is Topology?

Topology defines the structure of the network of how all the components are interconnected to each other. There are two types of topology: physical and logical topology.

Physical topology is the geometric representation of all the nodes in a network.



Bus Topology



* The bus topology is designed in such a way that all the stations are connected through a single cable known as a backbone cable.
* Each node is either connected to the backbone cable by drop cable or directly connected to the backbone cable.
* When a node wants to send a message over the network, it puts a message over the network. All the stations available in the network will receive the message whether it has been addressed or not.
* The bus topology is mainly used in 802.3 (ethernet) and 802.4 standard networks.
* The configuration of a bus topology is quite simpler as compared to other topologies.
* The backbone cable is considered as a **"single lane"** through which the message is broadcast to all the stations.
* The most common access method of the bus topologies is **CSMA** (Carrier Sense Multiple Access).

**CSMA:** It is a media access control used to control the data flow so that data integrity is maintained, i.e., the packets do not get lost. There are two alternative ways of handling the problems that occur when two nodes send the messages simultaneously.

* **CSMA CD:** CSMA CD (**Collision detection**) is an access method used to detect the collision. Once the collision is detected, the sender will stop transmitting the data. Therefore, it works on "**recovery after the collision**".
* **CSMA CA:** **CSMA CA (Collision Avoidance)** is an access method used to avoid the collision by checking whether the transmission media is busy or not. If busy, then the sender waits until the media becomes idle. This technique effectively reduces the possibility of the collision. It does not work on "recovery after the collision".

Advantages of Bus topology:

* **Low-cost cable:** In bus topology, nodes are directly connected to the cable without passing through a hub. Therefore, the initial cost of installation is low.
* **Moderate data speeds:** Coaxial or twisted pair cables are mainly used in bus-based networks that support upto 10 Mbps.
* **Familiar technology:** Bus topology is a familiar technology as the installation and troubleshooting techniques are well known, and hardware components are easily available.
* **Limited failure:** A failure in one node will not have any effect on other nodes.

Disadvantages of Bus topology:

* **Extensive cabling:** A bus topology is quite simpler, but still it requires a lot of cabling.
* **Difficult troubleshooting:** It requires specialized test equipment to determine the cable faults. If any fault occurs in the cable, then it would disrupt the communication for all the nodes.
* **Signal interference:** If two nodes send the messages simultaneously, then the signals of both the nodes collide with each other.
* **Reconfiguration difficult:** Adding new devices to the network would slow down the network.
* **Attenuation:** Attenuation is a loss of signal leads to communication issues. Repeaters are used to regenerate the signal.

Ring Topology



* Ring topology is like a bus topology, but with connected ends.
* The node that receives the message from the previous computer will retransmit to the next node.
* The data flows in one direction, i.e., it is unidirectional.
* The data flows in a single loop continuously known as an endless loop.
* It has no terminated ends, i.e., each node is connected to other node and having no termination point.
* The data in a ring topology flow in a clockwise direction.
* The most common access method of the ring topology is **token passing**.
	+ **Token passing:** It is a network access method in which token is passed from one node to another node.
	+ **Token:** It is a frame that circulates around the network.

Working of Token passing

* A token moves around the network, and it is passed from computer to computer until it reaches the destination.
* The sender modifies the token by putting the address along with the data.
* The data is passed from one device to another device until the destination address matches. Once the token received by the destination device, then it sends the acknowledgment to the sender.
* In a ring topology, a token is used as a carrier.

Advantages of Ring topology:

* **Network Management:** Faulty devices can be removed from the network without bringing the network down.
* **Product availability:** Many hardware and software tools for network operation and monitoring are available.
* **Cost:** Twisted pair cabling is inexpensive and easily available. Therefore, the installation cost is very low.
* **Reliable:** It is a more reliable network because the communication system is not dependent on the single host computer.

Disadvantages of Ring topology:

* **Difficult troubleshooting:** It requires specialized test equipment to determine the cable faults. If any fault occurs in the cable, then it would disrupt the communication for all the nodes.
* **Failure:** The breakdown in one station leads to the failure of the overall network.
* **Reconfiguration difficult:** Adding new devices to the network would slow down the network.
* **Delay:** Communication delay is directly proportional to the number of nodes. Adding new devices increases the communication delay.

Star Topology



* Star topology is an arrangement of the network in which every node is connected to the central hub, switch or a central computer.
* The central computer is known as a **server**, and the peripheral devices attached to the server are known as **clients**.
* Coaxial cable or RJ-45 cables are used to connect the computers.
* Hubs or Switches are mainly used as connection devices in a **physical star topology**.
* Star topology is the most popular topology in network implementation.

Advantages of Star topology

* **Efficient troubleshooting:** Troubleshooting is quite efficient in a star topology as compared to bus topology. In a bus topology, the manager has to inspect the kilometers of cable. In a star topology, all the stations are connected to the centralized network. Therefore, the network administrator has to go to the single station to troubleshoot the problem.
* **Network control:** Complex network control features can be easily implemented in the star topology. Any changes made in the star topology are automatically accommodated.
* **Limited failure:** As each station is connected to the central hub with its own cable, therefore failure in one cable will not affect the entire network.
* **Familiar technology:** Star topology is a familiar technology as its tools are cost-effective.
* **Easily expandable:** It is easily expandable as new stations can be added to the open ports on the hub.
* **Cost effective:** Star topology networks are cost-effective as it uses inexpensive coaxial cable.
* **High data speeds:** It supports a bandwidth of approx 100Mbps. Ethernet 100BaseT is one of the most popular Star topology networks.

Disadvantages of Star topology

* **A Central point of failure:** If the central hub or switch goes down, then all the connected nodes will not be able to communicate with each other.
* **Cable:** Sometimes cable routing becomes difficult when a significant amount of routing is required.

Tree topology



* Tree topology combines the characteristics of bus topology and star topology.
* A tree topology is a type of structure in which all the computers are connected with each other in hierarchical fashion.
* The top-most node in tree topology is known as a root node, and all other nodes are the descendants of the root node.
* There is only one path exists between two nodes for the data transmission. Thus, it forms a parent-child hierarchy.

Advantages of Tree topology

* **Support for broadband transmission:** Tree topology is mainly used to provide broadband transmission, i.e., signals are sent over long distances without being attenuated.
* **Easily expandable:** We can add the new device to the existing network. Therefore, we can say that tree topology is easily expandable.
* **Easily manageable:** In tree topology, the whole network is divided into segments known as star networks which can be easily managed and maintained.
* **Error detection:** Error detection and error correction are very easy in a tree topology.
* **Limited failure:** The breakdown in one station does not affect the entire network.
* **Point-to-point wiring:** It has point-to-point wiring for individual segments.

Disadvantages of Tree topology

* **Difficult troubleshooting:** If any fault occurs in the node, then it becomes difficult to troubleshoot the problem.
* **High cost:** Devices required for broadband transmission are very costly.
* **Failure:** A tree topology mainly relies on main bus cable and failure in main bus cable will damage the overall network.
* **Reconfiguration difficult:** If new devices are added, then it becomes difficult to reconfigure.

Mesh topology



* Mesh technology is an arrangement of the network in which computers are interconnected with each other through various redundant connections.
* There are multiple paths from one computer to another computer.
* It does not contain the switch, hub or any central computer which acts as a central point of communication.
* The Internet is an example of the mesh topology.
* Mesh topology is mainly used for WAN implementations where communication failures are a critical concern.
* Mesh topology is mainly used for wireless networks.
* Mesh topology can be formed by using the formula:
**Number of cables = (n\*(n-1))/2;**

Where n is the number of nodes that represents the network.

**Mesh topology is divided into two categories:**

* Fully connected mesh topology
* Partially connected mesh topology



* **Full Mesh Topology:** In a full mesh topology, each computer is connected to all the computers available in the network.
* **Partial Mesh Topology:** In a partial mesh topology, not all but certain computers are connected to those computers with which they communicate frequently.

Advantages of Mesh topology:

**Reliable:** The mesh topology networks are very reliable as if any link breakdown will not affect the communication between connected computers.

**Fast Communication:** Communication is very fast between the nodes.

**Easier Reconfiguration:** Adding new devices would not disrupt the communication between other devices.

Disadvantages of Mesh topology

* **Cost:** A mesh topology contains a large number of connected devices such as a router and more transmission media than other topologies.
* **Management:** Mesh topology networks are very large and very difficult to maintain and manage. If the network is not monitored carefully, then the communication link failure goes undetected.
* **Efficiency:** In this topology, redundant connections are high that reduces the efficiency of the network.

Hybrid Topology



* The combination of various different topologies is known as **Hybrid topology**.
* A Hybrid topology is a connection between different links and nodes to transfer the data.
* When two or more different topologies are combined together is termed as Hybrid topology and if similar topologies are connected with each other will not result in Hybrid topology. For example, if there exist a ring topology in one branch of ICICI bank and bus topology in another branch of ICICI bank, connecting these two topologies will result in Hybrid topology.

Advantages of Hybrid Topology

* **Reliable:** If a fault occurs in any part of the network will not affect the functioning of the rest of the network.
* **Scalable:** Size of the network can be easily expanded by adding new devices without affecting the functionality of the existing network.
* **Flexible:** This topology is very flexible as it can be designed according to the requirements of the organization.
* **Effective:** Hybrid topology is very effective as it can be designed in such a way that the strength of the network is maximized and weakness of the network is minimized.

Disadvantages of Hybrid topology

* **Complex design:** The major drawback of the Hybrid topology is the design of the Hybrid network. It is very difficult to design the architecture of the Hybrid network.
* **Costly Hub:** The Hubs used in the Hybrid topology are very expensive as these hubs are different from usual Hubs used in other topologies.
* **Costly infrastructure:** The infrastructure cost is very high as a hybrid network requires a lot of cabling, network devices, etc.