The Role of Computer Networks in Modern Research and Organizations

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Abstract

There are a number of issues that are discussed in this extensive piece of writing, including the computer network, the fundamental classification and types of networks, the goals of networks, and the advantages that a computer network provides to individuals, corporations, and academic institutions. The graphical layout of the computer network is also identified, along with the key components of the data transmission process and an overall summary of the process. In addition to this, it provides an overview of the process. Obtaining data from primary sources, such as personal interviews, for the objective of drawing a statistical conclusion, which was then processed and presented, was the method that was utilized. The significance of networks in today's society, which is becoming increasingly interconnected, is demonstrated by this research investigation. The purpose of this paper is to provide a basic overview as well as an introduction to a few of the most important components that make it possible to communicate and transmit data in an efficient and effective manner. We need to have the required information technology abilities, in addition to the appropriate network components, in order to attain a greater degree of efficiency in the networks that we build and execute. This is necessary in order to achieve it. There is the possibility for an increase in the processing power of the network as well as a contribution to an overall rise in the network's productivity when a big number of computers are brought together to form a network.

Keywords: Computer Network, Network classification, Data transmission Process, Data Communication, Topology

Introduction

In today's world, particularly in the context of the business world, every company, regardless of how tiny it may be, employs a computer to manage its daily transactions in order to facilitate the capture of accurate and timely information. "Several individuals are typically required by organizations in order to simultaneously impute and process data. In order to accomplish this, the previous model, which consisted of a single computer taking care of all of the organization's computational requirements, has been replaced with a model in which a number of computers that are distinct from one another but are connected to one another perform the task." The model in question is referred to as a computer network.

The productivity of individual computers has substantially increased as a result of the fact that they are connected to one another through a network. There are hardly many programs that can be used with a stand-alone computer. "The only way that it is able to communicate with other computers and transfer information is through the utilization of removable storage media. Examples of such media include floppy diskettes, flash drives, and other devices within the same category. It is possible that one will not experience a great deal of difficulty when using a computer at home; nevertheless, when working in a large organization, where several departments often share the same data source," it is necessary to have effective networking.

One of the distinctive characteristics of "computer networks in general is the fact that data can enter or exit a general computer network at any point, and that it can be processed at any work station. This is considered to be one of the most important aspects of computer networks. As an illustration, a printer can be operated from any word processor that is installed on any computer that is linked to the network." This is possible because of the network environment.

Computer Network

A computer network is made up of one or more independent computers that are linked (connected) to one another for many different reasons, including the following:

i   Sharing of resources (such as fax machines, printers, and files, among other things)

ii   Enabling connection via technological means

iii   Distribute software programs such as Microsoft Office and others.

Network Protocol: The protocol is a collection of rules that every machine on the network uses to interact with one another. These rules are used to communicate amongst the various software and hardware components. Ethernet is a commonly used protocol for ""local area networks"" (LANs), while the token-ring network is another widely used LAN protocol for personal computers (PCs).

Network objectives: Before beginning the design process for any computer network, engineers should be certain that the network they are developing will accomplish the fundamental network objectives.

➢ Sharing resources, including hardware and software, may result in cost savings.

➢ Availability via the use of several sources of supply in order to provide backup.

➢ Makes available a method that is both effective and efficient for transporting large amounts of data between different locations

➢ Facilitates the sharing of data among users, which in turn leads to an increase in productivity.

➢ It is necessary to provide support for standards and protocols in order to enable a wide variety of equipment available from a variety of suppliers to share the network.

➢ Allows for the control and allocation of network resources such as host processors, transmission facilities, and other resources in a central or distributed manner.

Classification of Networks

During the process of categorizing networks, we take into consideration the transmission technology, which is to say whether or not the network comprises switching parts. There are two sorts of networks that we might evaluate.

1. Broadcast networks
2. Point –to – point or switched network.

Broadcast networks

One communication channel is used by all of the machines that are connected to a broadcast network. This channel is shared by all of the machines. Short messages that are transmitted by any computer on the network are received by all of the machines that are

connected to the network in this form of network. An address field is included in the packet, which allows the sender to specify who the message is intended for. Each and every computer, upon receiving the packet, checks the address field to determine whether or not the packet is meant for itself. If it is not, the machine does not execute the packet and instead ignores it.

Point-to-point or switched network.

One kind of network is characterized by the presence of several connections between individual pairs of devices. Therefore, in order for a packet to go from its source to its destination, it may have to first stop by one or more devices that are considered to be intermediate. It is very important to have a routing algorithm since there are various routes accessible, each of which is of a distinct duration. Among the many examples of switched networks, the international dial-up telephone system is an often used example.

Different Kinds of Networks

Local Area Networks (LANs)

A "local area network, sometimes known as a LAN, is a kind of computer network that is restricted to a certain geographic area. The vast majority of the time, they are confined to a single building or a set of buildings that are distributed over a campus. Work stations and personal computers (PCs) are often connected via the use of local area networks (LANs). Each node, or individual computer, in a local area network (LAN) is equipped with its own central processing unit (CPU) to execute programs, and it is able to access data and devices that are placed anywhere on the LAN. It is now feasible for several people to share data and equipment that is readily available, such as printers, fax machines, and other devices that are comparable to these." As a consequence of this, one person may establish a connection with another user by sending them chart messages and emails. Ethernet is the kind of local area network (LAN) that is used by personal computers the most often.
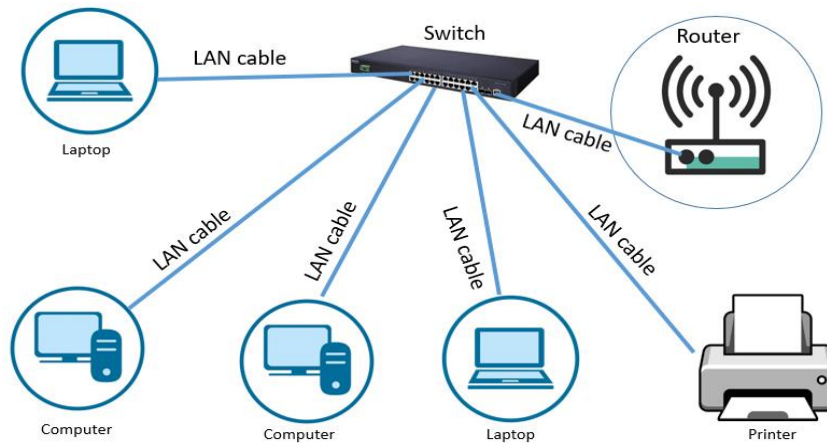
Figure 1: Local Area Network (LAN)

Virtual LAN

The term "virtual local area network" refers to a collection of partitioned computers that are connected to a switch together. Consider the following scenario: you have a switch that has four ports attached to it, and at least four PCs are connected to the ports. The Human Resources department is now represented by a single computer. In addition, there are three computers organised into the services section. As a result, the switch has two virtual local area networks (LANs). One of the groups on the virtual local area network is the human resources group, and the other is the services group. A further advantage of this division is that in the event that any group broadcasts, the information will only be sent to the department in question. That is, the Human Resources department will only broadcast to computers inside the HR department. In the local area network (LAN), this is a virtual split of machines. A virtual local area network (LAN) also helps to prevent departments from being hacked. The fact that another department in the virtual local area network (LAN) belongs to a different group means that it will be protected from the hackers in the event that one of the groups is targeted by them.

Local area networks may be wired or wireless, depending on the user's preference.

1) Wired local area network

Ethernet LAN connection is another name for wired local area networks (LANs). "The computers are connected to one another via the use of cables in this form of connection. When using a wired connection, the connection is quick, and the latency is rather low. A data

transfer's latency refers to the amount of time it takes for the data to reach its destination once it has been sent. So data reach time is minimal in wired LAN. Ethernet local area networks are used in industrial settings because, in this scenario, data is not lost, and each user is provided with a dedicated line for the purpose of data transmission. The speed of Ethernet is around 1 gigabit per second. Wire-based local area networks (LANs) make use of a variety of devices, including modems, switches, hubs, routers, and coaxial cables, in order to establish connections via wired LANs.

2) Wireless local area network

Wireless local area networks are sometimes referred to as Wi-Fi connections. The speed is slower than that of a wired local area network. The speed of Wi-Fi is less than one gigabit per second. The specifications of IEEE 802.11 are followed by Wi-Fi. Because the latency rate in wireless local area networks is high, the amount of time it takes to transport data from one point to another is also significant. If a large number of devices are wirelessly transmitting and receiving data, there is a significant possibility that your data may get entangled with the other data, which means that the signals may come into contact with one another. Because cable connections have a lower latency rate than wireless ones, I would recommend that you utilize them if you are interested in playing games. Wi-Fi connections have a higher one. It is possible to join several devices in a wireless local area network by using a Wi-Fi hotspot. It is not necessary to use cables in order to establish a wireless connection. Wireless modems, wireless routers, and wireless network cards are the pieces of hardware that are used in the process of establishing a wireless connection.

Both forms of local area networks (LANs) are possible. Peer-to-peer or client-server connections are the two types of connections that may be made between computers on a local area network (LAN).

1) Peer to peer network

In a peer-to-peer (P2P) network, computers are linked to one another in a direct manner the use of a hub or switch. As far as the P2P network is concerned, there is no dedicated server. Each and every computer that is part of the network serves both as a client and a server simultaneously. BitTorrent is an example of a peer-to-peer network, in which one computer uses the network to upload data and other computers use the network to receive files. When each computer receives a portion of the data, it also acts as a server and uploads the contents.

This is because each computer is acting as a server. When it comes to network security, the P2P network is lacking. A maximum of ten machines may be joined to the peer-to-peer network.

2) Client-server network

A client-server network is a kind of computer network in which one computer serves as the server and other computers serve as clients. It is possible for the server to also function as a database server, a print server, or a file server. In a client-server network, the level of network security is quite high. When compared to peer-to-peer networks, the client-server network has a much higher speed." Your computer will act as a client when you view any video on YouTube, while the YouTube website will act as a server. This is because your computer is acting as a client.

Metropolitan Area Network (MANs)

Through the use of a computing channel known as the Metropolitan Area Network, users are able to connect to the computer services offered by a metropolitan area. The phrase "managed area network" (MAN) refers to the process of combining many local area networks (LANs) that are located inside a single site into a single, more complete network that is able to connect to a wide area network in a convenient manner. It is also possible to use this phrase to refer to the process of connecting many local area networks (LANs) in a metropolitan region by means of point-to-point connection.

A network that is larger than a local area network but smaller than a wide area network is referred to as a metropolitan area network (MAN). Local area connections that are geographically scattered are often connected using this method. As a consequence of this, the objective of the definition of the metropolitan area network is to create a network connection that spans two different local area network hub components. Fiber optic cables are often used in the construction of metropolitan area networks. Switches and routers are used in the construction of the network. In the context of data filtering, a switch is a terminal that typically operates in a frame format. Every single switch is a piece of equipment that has two ports, and it filters information on one terminal while controlling connection on the other interface.
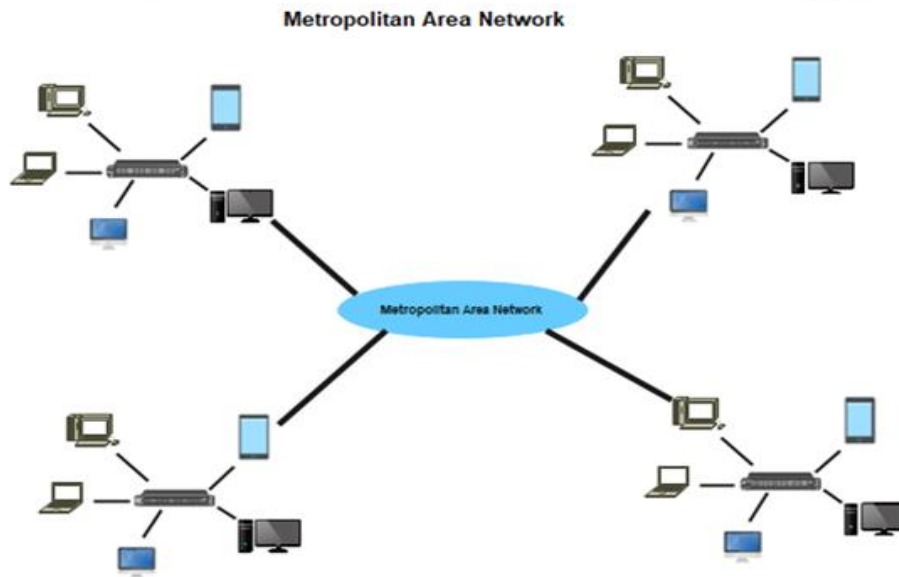
Metropolitan Area Network

Figure 2: Metropolitan Area Network (MAN)

The Metropolitan Area Network (MAN) used for

The metropolitan area network may be used for a variety of purposes, some of which include the following:

- Developing and establishing a networking platform that links systems to transmit the connection that is used by companies and governments in order for them to participate in activities such as chatting, texting, streaming, and a variety of other activities.

- Despite the fact that there are a number of additional networks, the Metropolitan Area Network is the one that is employed the most often to connect cities. When it comes to constructing a Metropolitan Area Network (MAN), telecom operators have the ability to join communications systems that span significant distances.

- Because of the computer networks that are located in the metropolitan region, the transmission will become even more productive, the business will become less complicated, and the connection will be safe.

- It is connected to a broadcasting or cable television network and has the capability to send both textual and spoken information.

- The Metropolitan Area Network's principal purpose is to interconnect network services from one area to another. This is considered to be its primary role.

Wide Area Networks (WANs)

A WAN, or wide area network, is a comprehensive collection of computers that are not physically connected to a single location. Through a WAN provider, WANs enable the exchange of information, communication, and other services between devices on a global scale. The internet is the world's largest WAN, making WANs essential for multinational enterprises and essential for routine use.

Businesses, educational institutions, governments, and the general public frequently employ these networks that service providers construct. Despite their geographical location, these clients have access to the network, which they can use to transmit and store data or communicate with other operators. They have thus far maintained a connection to the established WAN. It is feasible to establish connectivity through various means, such as cellular networks, virtual private networks, internet access, or wireless networks.

The execution of fundamental daily activities by international groups is facilitated by WANs, which ensure uninterrupted operations. A company's WAN enables employees to communicate with colleagues, share information, or maintain a connection to the company's data resource point from anywhere in the world. Network professionals who are qualified assist organizations in the maintenance of their internal WAN networks and other critical IT infrastructure.
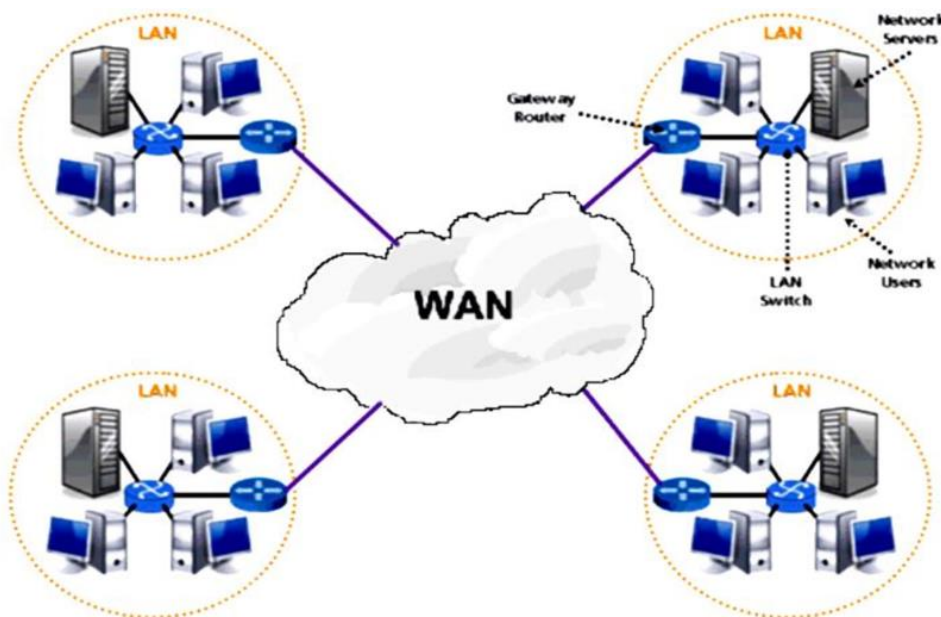

Figure 3: Wide Area Network (WAN)

Wide Area Network (WAN) Used for

In the absence of wide area network (WAN) connection, businesses would be confining their operations to certain areas or regions of interest. In spite of the fact that local area networks (LANs) make it possible for companies to operate inside their own homes, expanding to other regions, such as other cities or even countries, would be impractical due to the fact that the necessary infrastructure would be highly expensive for many enterprises. "Wide area networks (WANs) make it possible for organizations to communicate with one another, exchange information, and maintain connections as they go worldwide and extend their operations. Employees, for instance, are able to access the information they need to do their tasks when they are traveling thanks to wide area networks (WANs). The dissemination of information to customers and business associates is yet another use of a wide area network. Wi-Fi networks, on the other hand, provide a significant benefit to the general population. For instance, university students may utilize wide area networks (WANs) to do research or examine databanks from libraries. On a daily basis, people utilize wide area networks (WANs) to communicate, shop, bank, and other activities.

Advantages and Disadvantages of Computer NetworksAdvantages

The following advantages are considered for this paper work.

1. Exchange of resources
2. The quality of performance
3. Trustworthiness
4. The availability of resources
5. Continuous increase in the amount of processing power

Disadvantages

1. As a result of the very high initial cost of installation, many firms are reluctant to even contemplate using it.
2. Due to the fact that hackers are able to get access to firewalls that are not adequately secured, security vulnerabilities indicate a major danger.
3. When it comes to loss, instances of downtime might be quite disastrous.

Benefits of computer Networks.

The ability to connect workstations and personal computers at any distance is very advantageous for almost all researchers, students, and institutions since it enables the following:

1. Through the sharing of resources, including hardware and software, costs may be reduced.

2. Offer a high level of dependability by using a variety of different supply sources.

3. High throughput is achieved by providing an effective way of transporting huge amounts of data between a number of different places.

4. Communication between the user and the processor is made possible by this feature.

5. The pace at which communications are sent and received is very rapid.

Network Nodes

A node is a device that is linked to a computer network and is considered to be part of the network. There are a variety of programs that may be run on a node, including network apps that allow users to connect with other users on the network as well as local applications like database programmers and word processors. A node is a general-purpose computer work station. On the other hand, a network node may also be an intermediary network device, such as a router, which performs the function of facilitating the transmission of data, or a printer. It is necessary to have some form of hardware interface device in order to join a node to a network using this process. This piece of hardware is often referred to as a network adapter. Using a personal computer that is compatible with IBM as an example, the network adapter is referred to as a network interface card (NIC).

Links and Nodes Fundamentals

When we speak about a network, the first thing that often comes to mind is a computer system that is able to cover and provide signals that spread across a huge geographical region, even up to an entire continent. However, in the true sense, a network can also be formed by linking two computers together using a cable." Nodes are the device components that must be included in the hardware building blocks of a computer network in order for it to be considered an effective computer network.

Links

The physical medium that connect the nodes are referred to as links. Signals may be sent from one node to another. This is accomplished via the use of a connection. In contrast to analogue connections, which carry continuous electromagnetic signals, digital links transport discontinuous signals such as electromagnetic pulses.

Network Adaptor

In order to connect nodes to the network, a hardware interference device known as an adapter provides the necessary connection. Using a personal computer that is compatible with IBM as an example, the network adapter is often referred to as a network interface card (NIC).

The network adapter is the component that is accountable for both the transmission of data from the computer's memory to the external network as well as the reception of data that is intended for the computer from various external networks.

The data that is sent back and forth between nodes is measured in frames. Data on a computer is made up of binary numbers, often known as bits, which are comprised of 0s and 1s. A frame is a block of bits. In the process of networking, bits are traded between adapters.

Fundamentals of Data Transmission

It is possible for a connection to be full-duplex, half-duplex, or simplex, depending on the kind of application it is used for. It is claimed that a connection is full-duplex if it is capable of transmitting two streams of data simultaneously, going in opposing directions at the same time.

The telephone network is a good example of a practical example.

In the event that a connection permits the transmission of data in both ways, but only in one direction at a time, the link is referred to as being half-duplex. For instance, the walkie-talkie communication technology is an illustration of this.

For example, a radio set and a television set are examples of simple connections that only let data to travel in one way.

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Data Transmission Signal

The two primary forms of signals that we are familiar with are known as analog signals and digital signals. The transmission of these two different kinds of signals from their origin to their destination may likewise be accomplished via two different methodological techniques.

Analog and Digital data transmission

An analog signal is characterized by a continuous change in one or more values; the variations in value may be used to represent other types of information. "A continuous signal is referred to as an analog signal, and it may be used to represent sine waves.

Analog signals include things like the human voice, for instance. Both its amplitude (volume) and frequency are subject to change.

Digital data transmission is a term that may be used to describe any system that is based on interrupted data or events. Computers are considered to be digital machines due to the fact that, at their most fundamental level, they can be characterized as using just two values, namely, "off" and "on" or "0" and "1."

Basics of Error Detection.

The network need to make certain that the data is sent in a manner that is both comprehensive and accurate from the source node to the destination node. On the other hand, data is often distorted while it is being sent. Data may be corrupted or altered by a variety of sources, which might result in an error.

During transmission via the network, there is the potential for a number of different sorts of errors to occur.

  ➢ 1 – bit error
  ➢ Burst error
  ➢ Lost message (frame).

1 –bit or single bit error: During the process of data transmission from the source node to the destination node, a single bit error occurs when only one bit gets altered in the data. i.e., either the value of O is changed to 1, or the value of 1 is changed to 0.

Burst error: The term "burst error" refers to the phenomenon in which two or more bits of data are altered while being transmitted from the source node to the destination node.

Parked loss: The proportion of a packet that is delivered from a measurement agent to a point for which the measurement agent does not get an acknowledgment from the test point is referred to as this fraction. Not only does this contain acknowledgment that is lost before returning to the measuring agent computing information system development information and allude research joined, but it also includes packets that are not received by the test.

Routers and Gateways.

The router is also referred to as a gateway on occasion. It is a device that is used for the purpose of directing the direction in which data travels across networks that utilize various technologies such as Microsoft Token Ring, Novell, and the Internet. These are the unique characteristics of routers:

i   In addition, it offers support for many protocols.

ii It has a variety of interfaces for use with various networks.

iii It functions inside the protocol layer of the internet.

In most cases, routing is comprised of many interfaces that are used to construct information that is sent over an inter network from the source to the destination. It is important to note that the internet is not a network that utilizes homogenous technology." Developing source network devices that are capable of transferring data across various technologies is an essential step that must be taken. Routers are specifically built to provide this function.

Cabling

There are three different kinds of cables that are used in the modern network. Coaxial cable, twisted pair cable, and optical fiber cable are all included in this category.

Optic Fiber cable:This strand of glass is absolutely very thin. The cable is made up of an optic fiber that is referred to as the core, which is surrounded by a concentrated layer of glass that is referred to as the cladding. The cladding is then covered by an outer plastic jacket. This ensures that light rays are unable to exit the cable and go downward in a reflected route. Many times, a laser or a light emitting diode (LED) is the light source that

is used in the field of fiber optics. This enormous bandwidth allows a single fiber optic cable to carry more than 30,000 telephone lines and to transport data at a rate of more than 400 megabits per second. Fiber optics exhibit extremely large frequency ranges, which are more than 20,000 megahertz.

Coaxial cable: These cables have been around since the early 1940s and are extensively utilized for many different purposes, such as local area networks, long-distance toll trunks, metropolitan regions, and cable television. The technology is comprised of a single core conductor that is surrounded by an insulating layer, as well as a conductive shield. When compared to twisted cables, coaxial cables provide much better data transmission quality and have a bandwidth of up to 400 MHz.

Twisted Pair: These are used widely in the telephone lines that are often found in buildings and trunks. Insulated and encased in a cable are a number of wires that are connected together. A twisted pair cable may have a bandwidth of up to 250 kilohertz and can have up to three thousand wires in partnership. It is true that the performance of these cables is superior than that of open wire. In order to communicate across small distances, twisted pair cables are an excellent choice.

Network Topology.

A network's topology is the form of the network, often known as the layout of the network. The network topology is what determines how distinct nodes in a network are linked to one other via connections and how they interact with each other across the network.

There are two types of topology: physical and conceptual. The phrase "network topology" refers to the arrangement of nodes and the linkages that enable them to communicate with one another, as well as the physical medium that is used to carry out the link. It is the factor that influences the speed of the network as well as the effectiveness of communication. The selection of this option is influenced by a number of factors, including the geographical context, the kind of application that is running on the network, and the cost of deployment.

There are mainly three type of topology used.

There is a topology that consists of a bus, a star, and a ring. The hybrid topology, the mesh topology, and the cellular topology are the three topologies that we have, despite the fact

that we also have three more topologies. Only the first three will be discussed in this research since that is all that is applicable to it.

Bus Topology.

All of the devices in a Bus Topology structure are linked to a central cable, which is referred to as the bus or back bone. Through the use of a single cable, the bus topology is possible to link workstations. Every single node or workstation is linked to the subsequent node in a manner that is known as point-to-point. There is just one wire that connects all of the nodes.

If one of the nodes in this sort of topology fails, it is possible that all of the other nodes will too. owing to the fact that all of the workstations use the same wire to transmit and receive information.
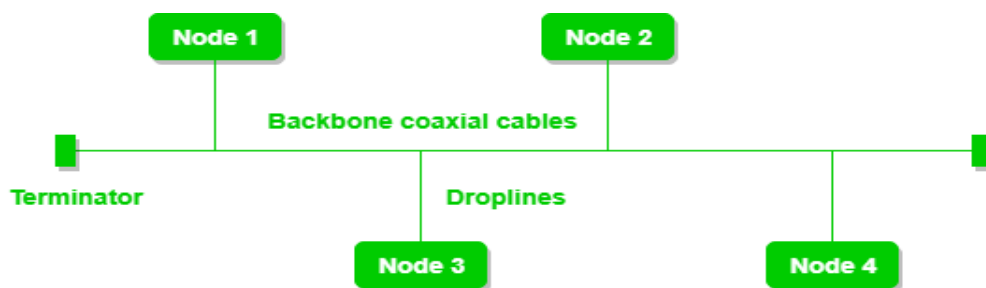

Figure 4: Shared backbone cable bus topology. Drop lines link the nodes to the channel.

Advantages of Bus Topology

- In the event where N devices are linked to one another in a bus topology, the number of cables that are necessary to connect them is one, which is referred to as the backbone cable. Additionally, N drop lines are needed.

- In bus-based networks that are capable of supporting up to 10 Mbps, the most common kind of cable utilized is either coaxial or twisted pair.

- The cable is used to construct smaller networks, despite the fact that its cost is lower in comparison to that of other topologies.

- Because the methods for installation and troubleshooting are generally known, bus topology is a technology that is considered to be familiar.

- CSMA is the approach that is used the most often for this kind of topology.

Drawbacks of Bus Topology

- Although a bus topology is a lot less complicated, it still calls for a significant amount of cabling.

- Whenever the common wire breaks, the whole system will come to a complete and utter halt.

- When there is a lot of traffic on the network, there is a greater likelihood of collisions occurring. The MAC layer makes use of a number of different protocols, such as Pure Aloha, Slotted Aloha, CSMA/CD, and others, in order to circumvent this issue.

- Network speeds would be slowed down if more devices were added to the network.

- There is virtually little security.

Star Topology

The Star Topology setup calls for all of the devices to be connected to a single hub via the use of a cable. This hub, which acts as "the center node, is connected to all of the other nodes in the network. The linked node is this hub in question. It is conceivable for the hub to have a passive character, which indicates that it is not an intelligent hub the way that broadcasting devices are. Alternatively, the hub may also be intelligent, which is referred to as an active hub. Additionally, the hub may be active." Repeaters are a typical component of active hubs across the world. When it comes to connecting the computers, either RJ-45 cables or coaxial cables are used as the means of connection. "Star Topology makes use of a broad range of well-known Ethernet local area network protocols, including CD (Collision Detection), CSMA (Carrier Sense Multiple Access), and a number of additional protocols."
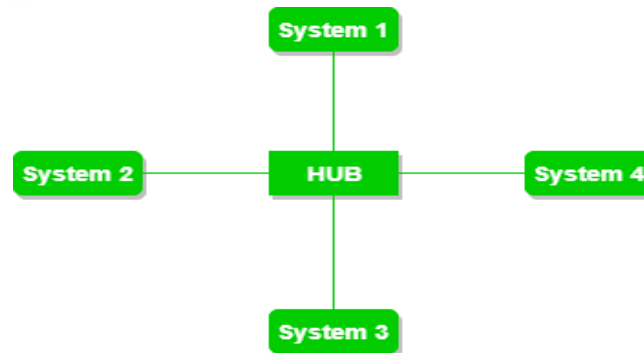
Figure 5: Star Topology linking with four separate systems via a central hub.

Advantages of Star Topology

- If a star topology is used to link N devices to each other, then the number of cables that are necessary to connect these devices is also N. This means that it is simple to set up.

- N is the total number of ports that are necessary since each device only needs one connection, or port, in order to connect to the hub.

- Strong and reliable. The failure of a single link will only have an effect on that particular connection and not on any other links.

- The detection and isolation of faults is simple and straightforward.

- Coaxial cable is quite affordable, which contributes to the cost-effectiveness of the star topology.

Drawbacks of Star Topology

- The whole system will come to a halt in the event that the concentrator, also known as the hub, on which the entire topology is dependent fails.

- The installation process comes at a considerable expense.

- The single concentrator, also known as the hub, is the basis for performance.

Ring Topology

"A Ring Topology is a kind of network architecture that involves the creation of a ring that links devices by placing exactly two linked devices in close proximity to one another. When a Ring topology is implemented, a significant number of repeaters are used because of the large number of nodes. With a ring topology consisting of 100 nodes, if someone intends to send some data to the final node, then the data will have to go via 99 nodes

before arriving at the 100th node. This is because the data will have to travel through 99 nodes." Additionally, in order to prevent the loss of data, repeaters are used inside the network.

The manner in which the data is sent is known as unidirectional, and it only goes in one direction. By creating two connections between each Network Node, it is feasible to have the data flow in both ways. This is a possibility. The setup in question is considered to be a Dual Ring Topology. Within the Ring Topology, the workstations make use of the Token Ring Passing protocol in order to facilitate the transfer of data.
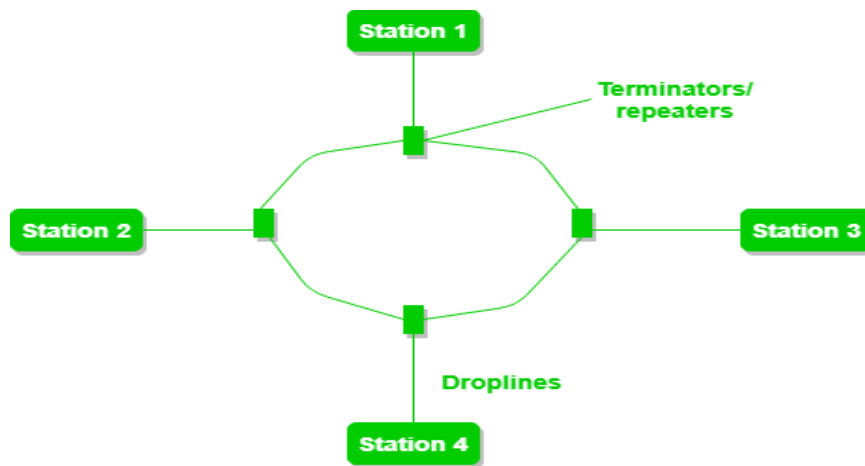

Figure 6: A ring topology has four stations linked for a ring.

Advantages of Ring Topology

- A high-speed data transfer is being carried out.
- When using this form of topology, the likelihood of a collision occurring is quite low.
- Installing and expanding at a low cost.
- Compared to a star topology, it is more cost-effective.

Drawbacks of Ring Topology

- A high-speed data transfer is being carried out.
- When using this form of topology, the likelihood of a collision occurring is quite low.
- Installing and expanding at a low cost.
- Compared to a star topology, it is more cost-effective.

Connection Oriented Service

The term "connection-oriented services" refers to a method of data transmission between a sender and a receiver, in which an end-to-end connection is created prior to the transmission of any data. After a connection has been established, it is possible to send a series of packets in a sequential order, beginning with the source and ending with the destination.

The message's packets are all sent from the same connection at the same time. The connection is severed after all of the message's packets have been sent to their intended recipients.

Internet

"Internet" is an abbreviation that stands for "international network," and it refers to the network that connects millions of computer networks all over the globe. using the World Wide Web in order to accomplish the goal of reducing the amount of computer resources. A well-known communication standard protocol, such as TCP/IP, is used (FUO computer lab. Manual).

The number of networks, computers, and users increased quickly once the ARPANET and NSFNET were linked to one another. Additionally, a large number of regional networks came together, and links were established across a great number of nations.

When many networks, such as BITNET and EARN, came to an agreement in 1982 to use the TCP/IP protocol as a standard, it is generally accepted that the internet was brought into existence formally.

Data Collection and Analysis

There was a personal interview that took place at "the Reserve Bank of India in Warri. Data was gathered from both junior and senior staff members of the bank, and the analysis of the data was provided. Statistical hypothesis testing is the method that we use to evaluate the data that has been gathered in order to determine whether or not the utilization of several computers in a network result in enhanced productivity and processing power in comparison to the usage of each individual computer.

Through the use of the Microsoft Excel software, we were able to record an improvement in productivity whenever a greater number of nodes were linked to the network.

Column 1	Column 2
Node1	5
Node4	23
Node30	80
Node7	30
Node2	20
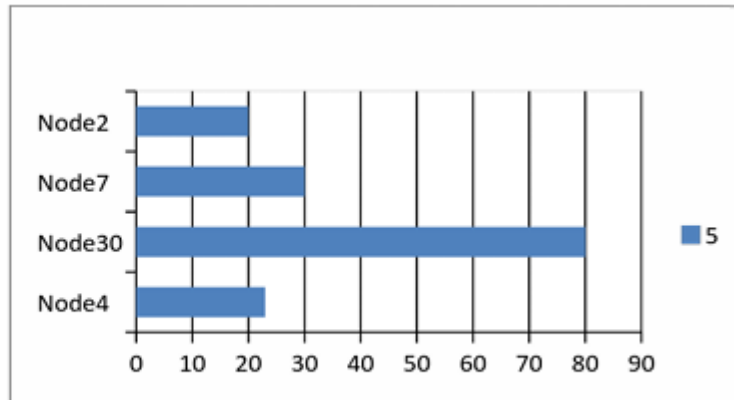
Hypothesis Testing:

Response	Junior staff	Senior staff	Total
Agreed	30	10	40
Disagreed	6	-	6
Undecided	-	4	4
Row total	36	14	50

When compared to the usage of a single huge system, the use of several computers in a network makes the expansion of computing capacity easier and more productive.

Response	Junior staff		Senior staff		Total
Agreed	30	28.8	10	11.2	40
Disagreed	6	4.32	-	1.68	6
Undecided	-	2.88	4	1.12	4
Total	36	-	14	-	50

Fo	Fe	fo-fe	(fo-fe)^2	$\dfrac{(fo-fe)^2}{fe}$
30	28.8	1.2	1.44	0.05
6	4.32	1.68	2.82	0.65
	2.88	-2.88	8.29	2.88
	11.2	-1.68	2.82	0.71

	1.68	-1.68	2.82	1.67
4	1.12	2.88	8.29	7.40

Data analysis and computation

H_0, $\mu = 0$

$H1$, $\mu \neq 0$

D.F= degree of freedom = (c-1)(R-1)

α = level of S.F = 5%

F_o = frequency observed

F_e = frequency expected

$$F_e = \frac{colume\ total * row\ toatl}{Grand\ Total}$$

$$F_e(F_o 30) = \frac{36 * 40}{50} = 28.8$$

$$F_e(F_o 6) = \frac{36 * 6}{50} = 4.32$$

$$F_e(F_o -) = \frac{36 * 4}{50} = 2.88$$

$$F_e(F_o 10) = \frac{14 * 40}{50} = 11.2$$

$$F_e(F_o -) = \frac{14 * 6}{50} = 1.68$$

$$F_e(F_o 4) = \frac{14 * 4}{50} = 1.12$$

$$X^2 = \sum \frac{(fo-fe)2}{fe} = 0.05 + 0.65 + 2.88 + 0.71 + 1.67 + 7.40 = 13.36$$

D.F= degree of freedom = (c-1)(R-1) = (2-1)(3-1) = 2

α = level of S.F = 5% = 0.05

Table value = 5.97

We reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1) if the calculated value is greater than or equal to the table value. In this particular instance, the calculated value is 13.36, and the table value is 5.97. As a result, we accept the alternative

hypothesis (H₁), which asserts that the formation of a network by multiple numbers of computers provides an increase in computing power and productivity.

Conclusion

Computer networks are an important component in the modern-day commercial sector, as well as in research institutes, governmental organizations, and the globe at large. Because networking has provided us with an easy basis for excellent data connection and transmission, we truly do not need to regard distance as a barrier if we are tasked with completing our work as fast as feasible. using the fact that information is now being converted into digital format. In general, the principles of communication technology and networks are going to be the primary subject of this study.

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