Overview of Computer Network

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ABSTRACT

This article is the overview of computer network. A computer network is a digital telecommunications network which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes. Computer networks support an enormous number of applications and services such as access to the World Wide Web, digital video, digital audio, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications as well as many others. Computer networks differ in the transmission medium used to carry their signals, bandwidth, communication protocols to organize network traffic, the network's size, topology, traffic control mechanism and organizational intent. The best-known computer network is the Internet. There are mainly three types of computer networks based on their size: Local Area Network (LAN), Metropolitan Area Network (MAN) and Wide area network (WAN). Computer network is two or more computers connected together using a telecommunication system for the purpose of communicating and sharing resources. Without having a network, Companies would not be able to share resources and increase productivity more effectively. Computer communication, it seems, will become a much more useful networking tool when large numbers of people with similar interests acquire access to the technology
Keywords: Overview, computer, network

INTRODUCTION

A computer network is a digital telecommunications network which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes [1]. These data links are established over cable media such as twisted pair or fiber-optic cables, and wireless media such as Wi-Fi.

Computer network, two or more computers that are connected with one another for the purpose of communicating data electronically. Besides physically connecting computer and communication devices, a network system serves the important function of establishing a cohesive architecture that allows a variety of equipment types to transfer information in a near-seamless fashion. Two popular architectures are ISO Open Systems Interconnection (OSI) and IBM's Systems Network Architecture (SNA).

Network computer devices that originate, route and terminate the data are called network nodes. Nodes are generally identified by network addresses, and can include hosts such as personal computers, phones, and servers, as well as networking hardware such as routers and switches. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other. In most cases, application-specific communications protocols are layered (i.e. carried as payload) over other more general communications protocols. This formidable collection of information technology requires skilled network management to keep it all running reliably [2].

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During 20th century the most important technology has been the information gathering, its processing and distribution. The computers and communications have been merged together and their merger has had a profound effect on the manner in which computer systems are organized [3].

The old model in which a single computer used to serve all the computational needs of an organization has been replaced by a new one in which a large number of separate but interconnected computers do the job. Such systems are called as computer networks [4].

Types of Computer Network

There are mainly three types of computer networks based on their size:
1. Local Area Network (LAN)
2. Metropolitan Area Network (MAN)
3. Wide area network (WAN)

Local Area Network (LAN)
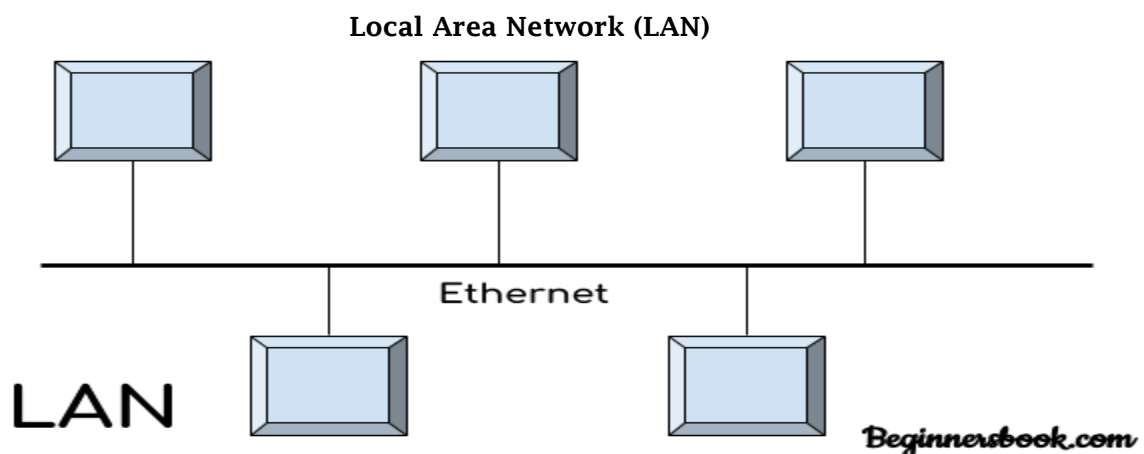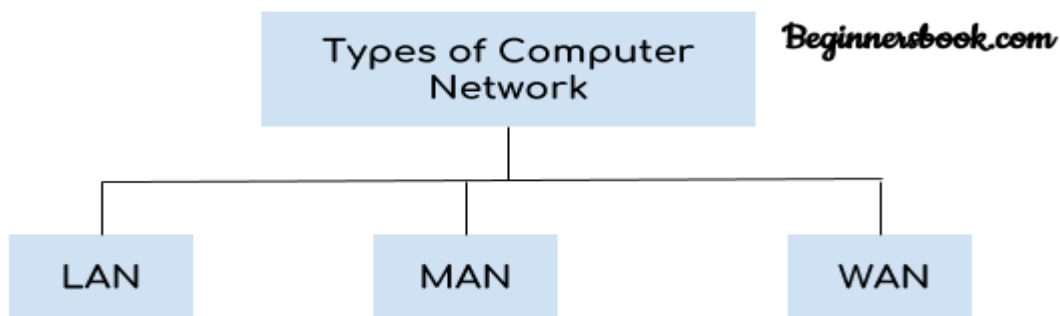
Local area network is a group of computers connected with each other in a small places such as school, hospital, apartment etc.

LAN is secure because there is no outside connection with the local area network thus the data which is shared is safe on the local area network and

can't be accessed outside. LAN due to their small size are considerably faster, their speed can range anywhere from 100 to 100Mbps. LANs are not limited to wire connection, there is a new evolution to the LANs that allows local area network to work on a wireless connection [5].

Metropolitan Area Network (MAN)
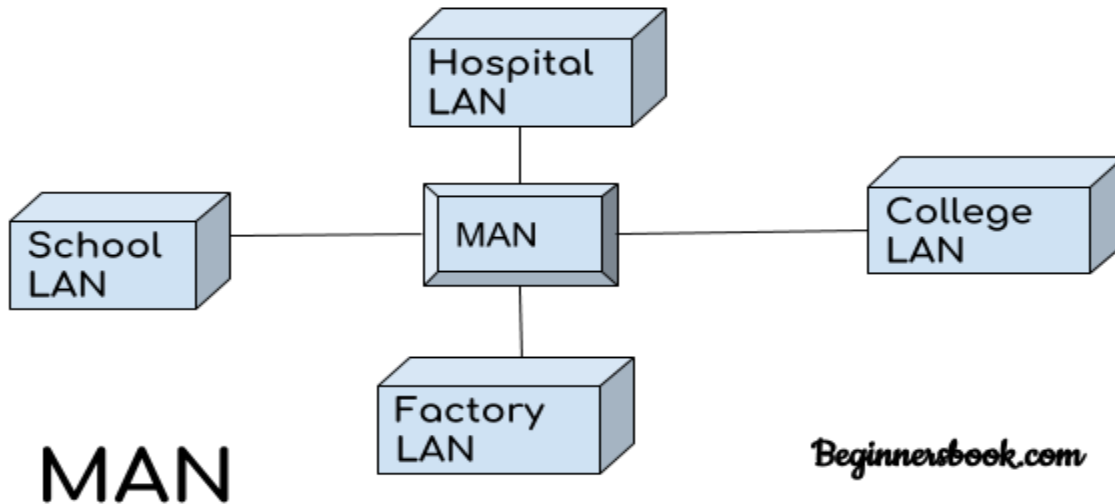
MAN network covers larger area by connections LANs to a larger network of computers. In Metropolitan area network various Local area networks are connected with each other through telephone lines. The size of the Metropolitan area network is larger than LANs and smaller than WANs(wide area networks), a MANs covers the larger area of a city or town.

3. Wide area network (WAN)
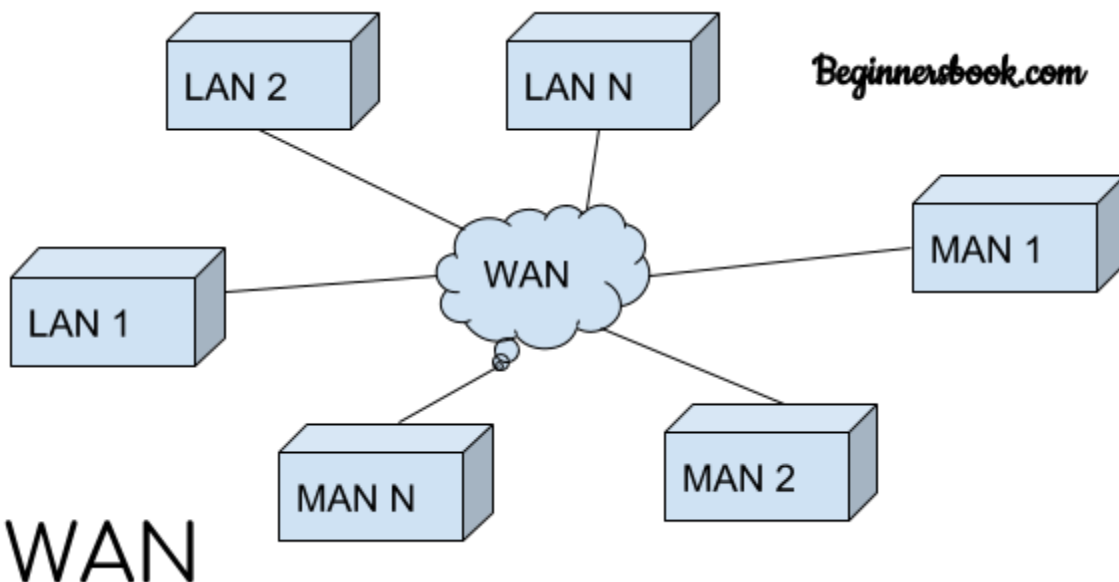
Wide area network provides long distance transmission of data. The size of the WAN is larger than LAN and MAN. A WAN can cover country, continent or even a whole world. Internet connection is an example of WAN. Other examples of WAN are

mobile broadband connections such as 3G, 4G etc..

**Computer Network Properties**
- Scope: A network architecture should solve so many general problems as possible.
- Scalability: A network must work well independently of the number of nodes that compose it.
- Robustness: The design of a network should allow it to function correctly, even though there are defective nodes.
- Self-configuration and Optimization: A network should have a minimal intervention of the administrator [6]. In turn, you must have a series of parameters that allow the administrator to adjust them to obtain an optimal configuration for some and other networks according to their characteristics.

- Migration: If you decide to change networks, migration should not be affected in its properties and operation.
- Determinism: Under the same conditions, the network must always work the same.

Computer Network Model

A computer networks communication can be based on centralized, distributed or collaborative computing. Centralized computing involves many workstations or terminals, connected to one central mainframe or other powerful computer. Distributed computing interconnects one or more personal computers and allows various services like Data sharing, hardware sharing resources sharing or network sharing [7] [8]. The collaborative computing is the combination of centralized and distributed computing.

Computer Network Components
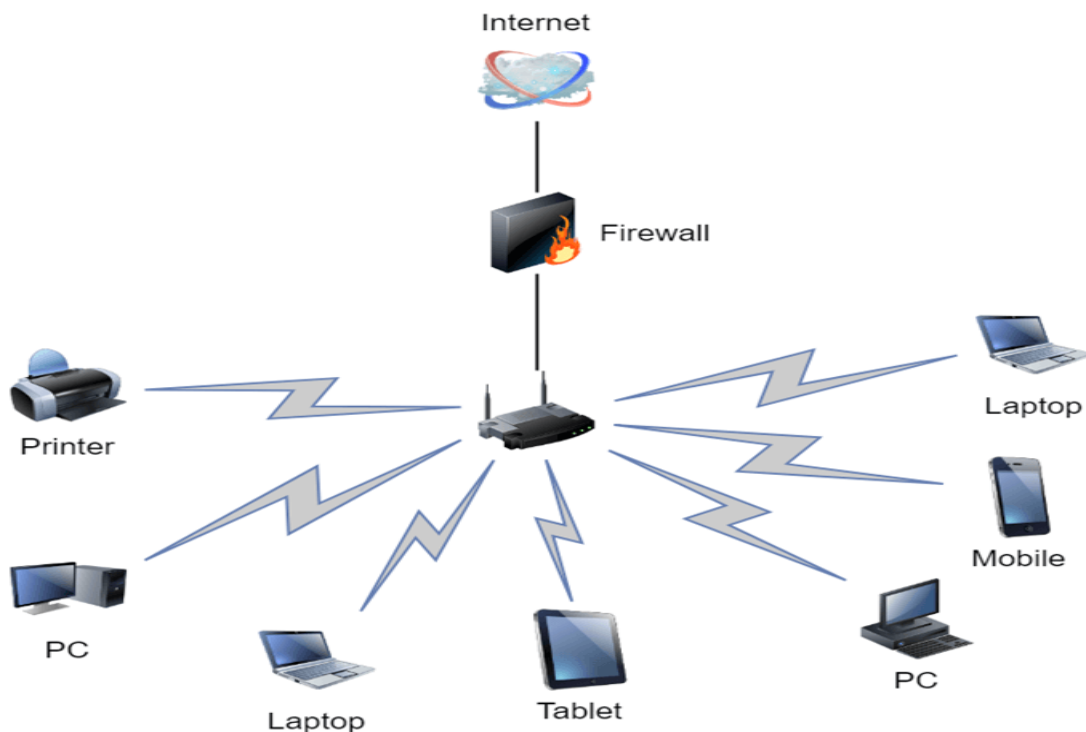
Switches

Switches work as a controller which connects computers, printers, and other hardware devices to a network in a campus or a building. It allows devices on your network to communicate with each

other, as well as with other networks. It helps you to share resources and reduce the costing of any organization [9].

Routers

Routers help you to connect with multiple networks. It enables you to share a single internet connection with multiple devices and saves money [10]. This networking component acts as a dispatcher, which allows you to analyze data sent across a network. It automatically selects the best route for data to travel and send it on its way.

Servers:

Servers are computers that hold shared programs, files, and the network operating system. Servers allow access to network resources to all the users of the network.

Clients:

Clients are computer devices which access and uses the network as well as shares network resources. They are also users of the network, as they can send and receive requests from the server [11].

Transmission Media:

Transmission media is a carrier used to interconnect computers in a network, such as coaxial cable, twisted-pair wire, and optical fiber cable. It is also known as links, channels, or lines.

Access points

Access points allow devices to connect to the wireless network without cables [12]. A wireless network allows you to bring new devices and provides flexible support to mobile users.

Shared Data:

Shared data are data which is shared between the clients such as data files, printer access programs, and email.

Network Interface Card:

Network Interface card sends, receives data, and controls data flow between the computer and the network.

Local Operating System:

A local OS which helps personal computers to access files, print to a local printer and uses one or more disk and CD drives which are located on the computer [13].

Network Operating System:

The network operating system is a program which runs on computers and servers. It allows the computers to communicate via network.

Protocol:

A protocol is the set of defined rules that allows two entities to communicate across the network. Some standard protocols used for this purpose are IP, TCP, UDP, FTP, etc.

Hub:

Hub is a device that splits network connection into multiple computers. It acts a distribution center so whenever a computer requests any information from a computer or from the network it sends the request to the hub through a cable. The hub will receive the request and transmit it to the entire network [14].

LAN Cable:

Local Area Network(LAN) cable is also called as Ethernet or data cable. It is used for connecting a device to the internet.

OSI:

OSI stands for Open Systems Interconnection. It is a reference model which allows you to specify standards for communications.

Unique Identifiers of Network

- **Hostname:**

Every device of the network is associated with a unique device, which is called hostname.

- **IP Address:**

IP (Internet Protocol) address is as a unique identifier for each device on the Internet. Length of the IP address is 32-bits. IPv6 address is 64 bits.

- **DNS Server:**

DNS stands for Domain Name System. It is a server which translates URL or web addresses into their corresponding IP addresses.

- **MAC Address:**

MAC (Media Access Control Address) is known as a physical address is a unique identifier of each host and is associated with the NIC (Network Interface Card). General length of MAC address is : 12-digit/ 6 bytes/ 48 bits

- **Port:**

Port is a logical channel which allows network users to send or receive data to an application. Every host can have multiple applications running. Each of

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these applications are identified using the port number on which they are running.

Uses of Computer Networks

Here are some common application of computer networks

- Helps you to share resource such as printers
- Allows you to share expensive software's and database among network participants
- Provides fast and effective communication from one computer to another computer
- Helps you to exchange data and information among users via a network.

Advantages of a Computer Network

Here are the fundamental benefits/pros of using Computer Networking:

- Helps you to connect with multiple computers together to send and receive information when accessing the network.
- Helps you to share printers, scanners, and email.

- Helps you to share information at very fast speed
- Electronic communication is more efficient and less expensive than without the network.

Disadvantages of using Computer Networks

Here are drawbacks/ cons of using computer networks:

- Investment for hardware and software can be costly for initial set-up
- If you don't take proper security precautions like file encryption, firewalls then your data will be at risk.
- Some components of the network design may not last for many years, and it will become useless or malfunction and need to be replaced.
- Requires time for constant administration
- Frequent server failure and issues of regular cable faults

CONCLUSION

In conclusion, computer network is two or more computers connected together using a telecommunication system for the purpose of communicating and sharing resources. Without having a network, Companies would not be able to share resources and increase productivity more effectively. Computer communication, it seems, will become a much more useful networking tool when large numbers of people with similar interests acquire access to the technology [15]. Though it can expedite the formation of new interpersonal networks by overcoming the space and time barriers faced by traditional networking techniques, it still requires a great deal of concentrated effort and resources to get the people to use it. This problem should become increasingly minimized over the coming years as the technological innovations become more diffused throughout society.

A computer network is a group of two or more interconnected computer systems. Computer networks help you to connect with multiple computers together to send and receive information. Switches work as a controller which connects computers, printers, and other hardware devices. Routers help you to connect with multiple networks. It enables you to share a single internet connection and saves money. Servers are computers that hold shared programs, files, and the network operating system. Clients are computer device which accesses and uses the network and shares network resources. Hub is a device that split a network connection into multiple computers. Access points allow devices to connect to the wireless network without cables. Network Interface card sends, receives data and controls data flow between the computer and the network. A protocol is the set of defined rules which that allows two entities to communicate across the network. Hostname, IP Address, DNS Server, and host are important unique indetenfiters of computer networks. Computer network helps you to share expensive software's and database among network participants. The biggest drawback of installing computer network is that its initial investment for hardware

and software can be costly for initial set-   up.

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