

Computer Networking: A Survey

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Abstract

Networks can be very simple, such as a small group of computers that share information, or they can be very complex, spanning large geographical areas. The computer network uses distributed processing in which tasks are shared among multiple computers. Computing devices are connected to exchange data between nodes via a data link called a computer network. In other words, a computer network is a set of interconnected computer nodes. The connected computer is called a network node. If the connection is wired, it will be connected via Ethernet. If the connections are wireless then the connections are radio waves.



Keywords- Peer-to-peer, Client / Server, Inter-networks, Intra-networks, Communication medium, Internet Protocol, Open Systems Interconnection.

INTRODUCTION

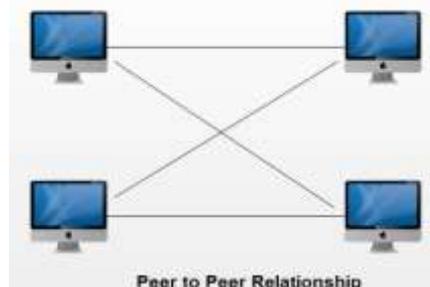
In the computer world, the term network describe two or more connected computers that can share resources such as data, printer, a n internet connection, applications or a combination of these. A computer network is a group of two or more interconnected computer systems. Computer networks help you connect to multiple computers to send and receive information. The switch acts as a controller to connect computers, printers, and other hardware devices. The integration of computers and communications has had a major impact on how computer systems are organized. The old model of a single computer for all the computing needs of an organization has been replaced by a model in which a number of separate but interconnected computers take over the fob. These systems are called computer networks. Via Ethernet. We live in a networked world. Information is created, exchanged and tracked in real time around the world. That's possible because almost everyone and everything in the digital world are connected in some way. A set of two or more similar or interconnected people is called a network. Here are some examples of networks in our daily lives: • Social networks • Mobile networks • Computer networks • Airline, rail, bank and hospital networks. A computer network is a links between two or more computers or computing devices. Such connections allow computers to share data and resources with each other. A simple network can connect several computers in a room. Network sizes vary from small to large, depending on the number of connected computers. Computer networks can include various types of hosts (also known as nodes), such as servers, desktops, laptops, and mobile phones.

TYPES OF NETWORK CONFIGURATION

Broadly speaking, there are two types of network configuration, peer-to-peer networks and client/server networks.

• Peer to Peer Networks

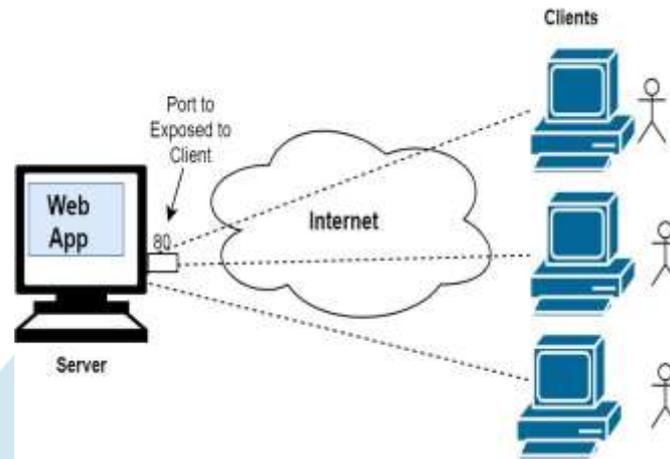
In Peer-to-peer network, the connected computers have no centralized authority. From an authority viewpoint, all of these are equal/ In other words, they are peers. If a user of one computer wants access to a resource on another computer, the security check



for access rights is the responsibility of the computer holding the resources.

- **Client Server Technology:-**

A Client server network uses a network operating system designed to manage the entire network from centralized point, which is the server. Clients make requests of the server, and the server responds with the information or access to a resource.



COMPONENTS OF A NETWORK

- A minimum of at least two computers.
- Cables that connect the computers each other, although wireless communication is becoming more common.
- A network interface device on each computer (this is called a network interface card or NIC).
- A “switch” used to switch the data from one point to another. Hubs are outdated.
- Network operating system software.

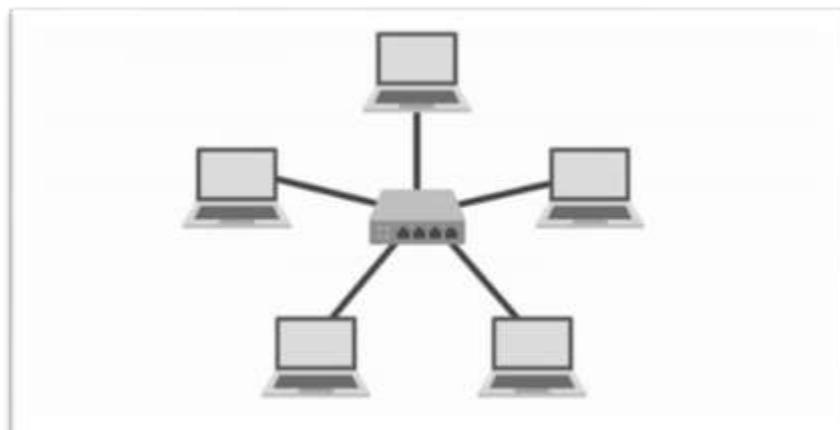
Network Topologies

- **Bus** – A bus topology all computers are connected to a single continuous cable that is terminated at both ends, which is the simplest way to create a physical network.

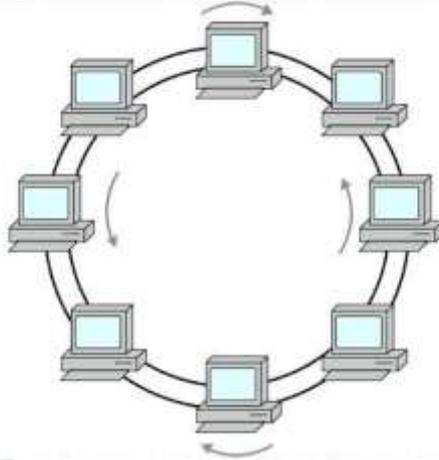
Bus Topology



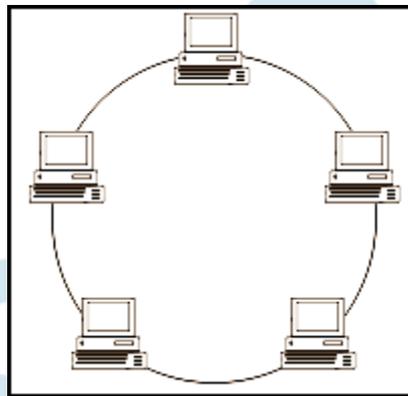
- **Star** – In a star topology, each computer in a star topology is connected to a central point by a separate cable or wireless connection. The central point is a device known by such names as hub, switch and access point.



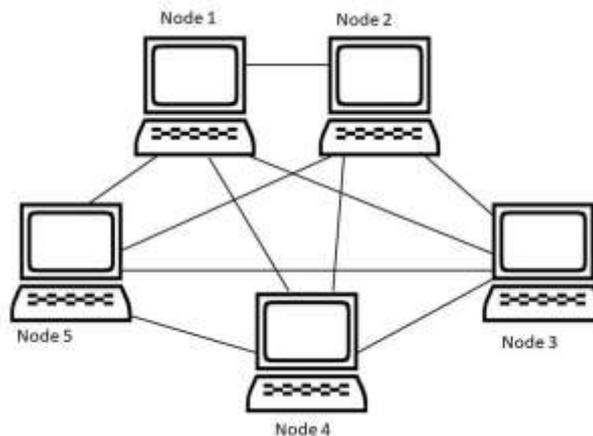
- **Ring** – In this topology, each computer is connected directly to two or other computers in the networks Data moves down a one way path from one computer to another.



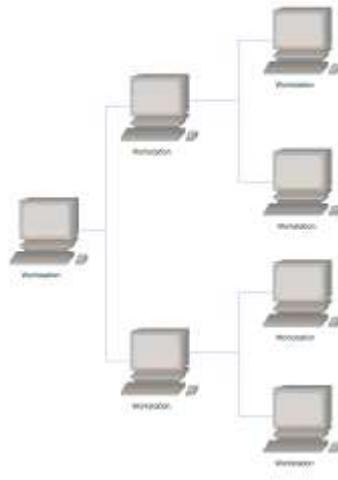
- **Token Ring** – The Token Ring topology uses one protocol. Tokens are passed from one node to another. Nodes wishing to send data need to get a token.



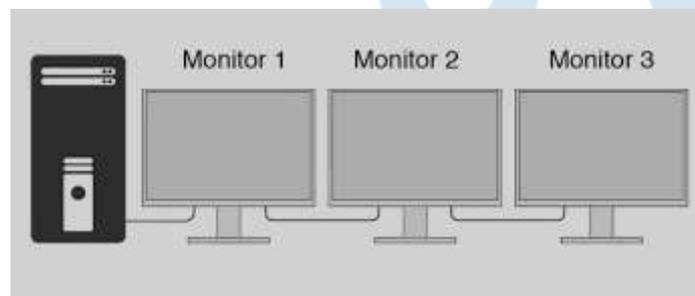
- **Mesh** – In a mesh network, a path exists from each station to every other station in the network, resulting in the most physical connections per node of any topology. Mesh topology networks can have multiple connections between some locations, but this is done only for redundancy.



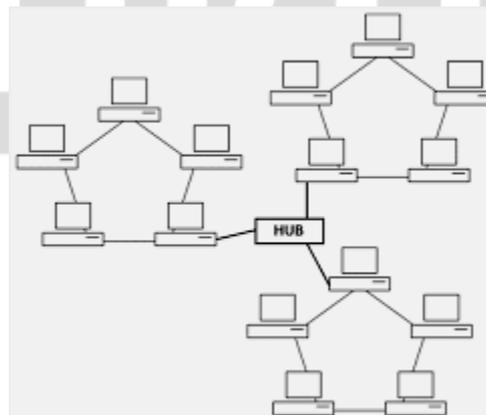
- **Tree** – This is a combination of bus topology and star topology. It consists of groups of star-configured workstations connected to a linear bus backbone cable. Tree topologies allow for the expansion of an existing network, and enable schools to configure a network to meet their needs.



- **Daisy Chain** – A daisy chain is a type of network topology that directs how network nodes – typically, computers – are linked. Connecting one or more computer in a series next to each other in a computer network is called daisy chaining. Daisy chaining is used to pass a message down the line for a computer partway. Once the message is passed, it goes down the line until the message reaches the intended computer.



- **Hybrid** – It is a combination of two or more topologies. When two or more network topologies combine to provide a network facility they are called Hybrid topology. It's a huge network in which bus, star, mesh, and ring topology are involved. For example, if bus and ring topology are combined to make a huge network then this type of network is called Hybrid topology.



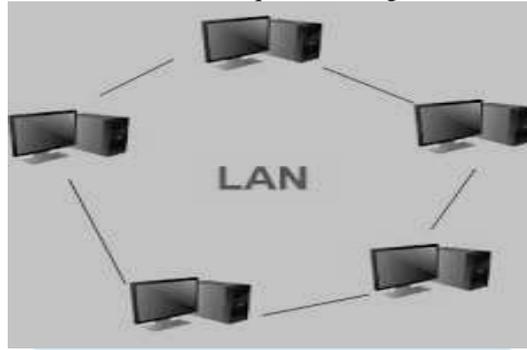
Types of Networks

The network can be divided into geographical areas and fall into these major categories.

- ❖ **Local Area Network (LANs)**
- ❖ **Wide Area Network (WANs)**
- ❖ **Metropolitan Area Network (MANs)**

- **Local Area Network:-**

LAN is stand for Local Area Network is a limited to a specific area, usually an office and cannot extend beyond the boundaries of a single building. The first LANs were limited to a range of 185 meters and no more than 30 computers. Today's technology allows a larger LAN, but practical administration limitations require dividing it into small, logical areas called workgroups.

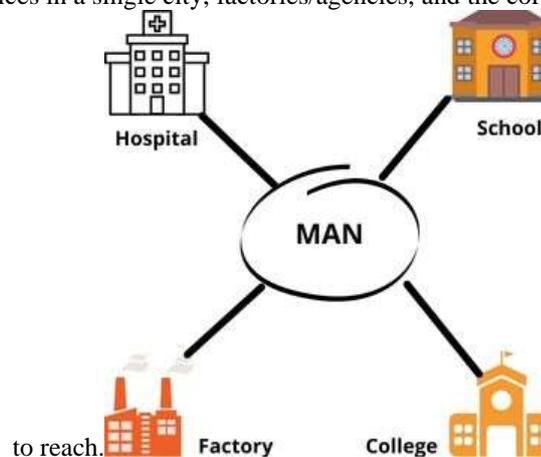


Advantages of LAN

- **Resource Sharing:** Unlimited data exchange via Wi-Fi, Ethernet cable between computer and printer. This will reduce costs.
- **Software Applications Sharing:** Instead of purchasing individually licensed software, it is cheaper for each customer to use the same software on the network.
- **Easy and Cheap Communication:** Communication is practical and inexpensive because you can easily transfer data and messages to a networked computer.
- **Centralized Data:** All user data is stored in the server's database. You don't have to worry about losing data and documents. There are backup options to avoid such errors.
- **Internet Sharing:** Local area networks make it easy to share a single internet connection between all users connected to a LAN.

Disadvantages of LAN

- **Setup Cost:** LANs save money over time by sharing computer resources, but the initial cost of setting up a local area network is slightly higher.
- **LAN Maintenance:** Local area networks require a LAN administrator due to software installation, cabling, wireless router hardware failure, or cable failure.
- **Server Load:** If the server is not very good, many computer connections cannot be overloaded and can cause damage..
- **Network Security:** There is a risk of anxiety as hackers can break into your system. Similarly, viruses and malware can infiltrate a LAN and damage everyone connected.
- **Covers Limited Area:** The local network is limited and covers only small areas such as: A nearby house, office, building, or cluster of buildings
- **Metropolitan Area Network (MANs):**-Multiple local area networks are connected to form MANs, which are larger than LANs, but smaller than wide-area networks (WANs), which can cover vast geographical expanse and connect users around the world directly. This MAN provides coverage of between 10 to 50 km using a wide network, making it ideal or building a connection between offices in a single city, factories/agencies, and the corporate headquarters within its ability



Advantages of MAN

The MAN network has several advantages, some of which are listed below.

- Cost-Effective
- Sending Emails to People in Your Area
- Faster than the WAN
- LAN to MAN Conversion is Simple
- High Level of Security

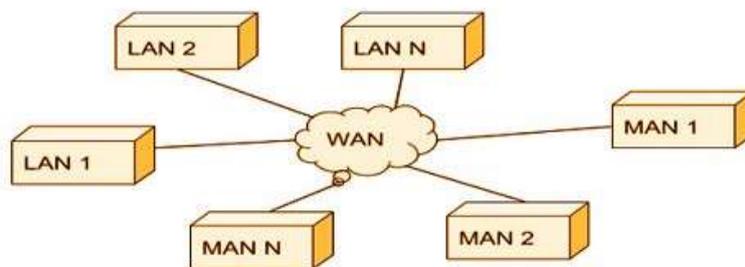
Disadvantages of MAN

- MAN needs more cables from joining connections from one place to another.
- Greater will be the cable length, the more will be the cost of establishing the MAN.
- At such a big distance anyone can hack the network. One can't put security at each point of the network in the widespread areas; hence it becomes easier for unwanted people to access it for their own benefits.
- It is difficult for the system to protect from the graphical areas of hackers and industrial espionage.

- **Wide Area Network**

Wide Area Network (WAN) spans over multiple geographic locations, which is composed of multiple LANs. It is nearly impossible for a small to medium organization (except Network Service Providers) to pull network cables between their two offices in two different countries located 1000s of kilometers away. Network Service Providers (also called as ISPs) provide the connectivity solutions for Wide Area Networks (WAN).

Wide Area Network (WAN)



Advantages of WAN

- Covers large geographic areas and allows long-distance businesses and businesses to connect over a single network.
- Share software and resources with connected workstations.
- Messages can be sent very quickly to someone else in the system, and sending large files larger than 10MB will result in very high transfer speeds.
- Everyone on the network can use the same data. This avoids the problem that some users may have older versions of the information than others.
- All clients connected over the WAN are always in sync with each other, so there is no potential for communication gaps between clients.

Disadvantages of WAN

- To prevent anonymous hackers from hacking your data and disrupting your network, you need a good firewall.
- Network setup is very expensive, time consuming and complex. The more comprehensive the system, the higher the cost of the system.
- A technician and supervisor must be appointed for full-time maintenance of the connection.
- You have to spend a lot of money for security.

Conclusion

Computer communication seems to be much more useful network tool when a large number of people with similar interests to can access technology. It can accelerate the formation of the new interpersonal network by space and hours barrier faced by traditional networking technology to get people to use 444 It requires a lot of intensive effort and resources. As you can see, there are many different types of computer networks in the world today. The options range from wired to wireless, to a network that only extends to a 20-30 foot radius to a network that could span across an entire nation. Networks enable you to print an essay when you're in a completely different room from your printer, or to email a friend or family member in another state. The technology we have today is truly amazing and will only continue to grow and connect people from all over the world. So next time you e-mail a long-lost friend who is miles away you can thank computer networking for making it possible. Presently, a computer network has become one of the important factors in the information technology market. Almost all the companies require the computer networking at some point. Only there is a need for effective use of computer networks for overcoming the communication problems.

References

1. Pranab Kumar Chakravarty, Computer Networking Technologies and Application to IT Enabled Services.
2. Cherita L. Corbett, Raheem A. Beyah, John A. Copeland, Using Active Scanning to Identify Wireless NICs, in: Proceedings of the 7th IEEE Workshop on Information Assurance, U.S. Military Academy, West Point, NY, 21-23 June 2006.
3. Teodora Bakardjieva, Introduction to Computer Networking.
4. Peter L. Dordal, An Introduction to Computer Networks, Release 1.8.07, June 16, 2015.
5. Bob Dickerson, Computer Networks, January 2005.
6. Russell Anthony Tantillo, Network Security through Open Source Intrusion Detection Systems, May 2012.

