



## Computer Networking: A Survey

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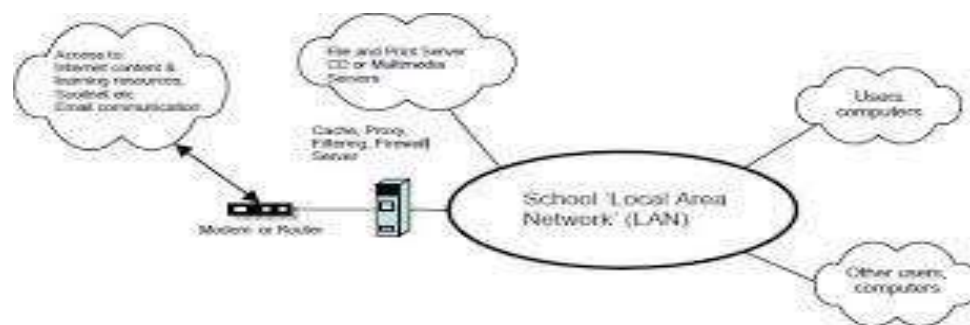
### ABSTRACT –

Computer networks are used more and more frequently. A computer network today is considerably more than just a collection of computers. a network of gadgets. The use of computer networks a network of connected computers that is used to digital information exchange. The network of computers allows for the analysis, Organization, and dissemination of information that is necessary for success. A rise in the crucial component of the internet and intranets is digital networking. Private business networks based on the internet include intranets and the internet. The companies are presently putting into practice creating intranets quickly and exclusively for one purpose Using an intranet, a company can gather, manage, and spread knowledge more easily and quickly than more recently. Numerous companies are using merely to stay competitive; businesses that they risk having their competition outrun them if they wait them. We are outlining the fundamentals in this article. ideas about networking.

**KEYWORDS-** Peer-to-peer; Client / Server; Internetworks; Intra-networks; Communication medium; Internet Protocol; Open Systems Interconnection.

### I. INTRODUCTION

Communication between two or more applications operating on physically separate machines is supported by networking. A computer network is a group of connected computers that may communicate with one another and other computers on the network by exchanging data. When two or more computers are linked to share data and resources, a network is formed. a group of computers communicating via communication mediums while adhering to a set of protocols. A computer network is simply a group of interconnected computers that can share information and/or resources like hard drives, CD-ROMs, fax modems, printers, etc. [2]. A computer network is an interconnected group of autonomous computers, where autonomous means no computer can start, stop, or control any other computer connected to the network, and interconnected means the computers can exchange information. Local area network, or LAN, is used in Fig. 1 to illustrate a network in a school that links computers to one another, the internet, and different servers [4].



**Fig 1: Representation of Network in a school.**

### II. TYPES OF NETWORK CONFIGURATION

Peer-to-peer networks and client/server networks are the two main forms of network configuration.

#### A. Peer-to-peer networks

When there are fewer than ten computers involved and when strict security is not required, peer-to-peer networks are more frequently implemented. Since they all have the same status and interact with one another on an equal basis, computers are referred to as peers. All the computers connected to the

network can share shared resources like printers and scanners that are attached to any one computer, as well as files. In a peer-to-peer network, the connection between the computers is shown in Fig. 2. [4]



FIG 2: PEER TO PEER NETWORKING

### B. Client/server networks

Larger networks are more suited for client/server networks. Files and applications shared across a network are stored on a central computer, or "server." The server typically outperforms a machine with ordinary performance. The other computers, also referred to as "client computers," have their network access controlled by the server. The server will only be accessible to the network administrator, and nobody else. Only the client PCs may be used by others. A client/server network's computer connections are shown in Fig 3 [4].



FIG 3: CLIENT SERVER NETWORKING

## III. COMPONENTS OF A NETWORK

A computer network comprises the following components:

- 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 [4]

## IV. Types of network

These broad categories and geographic divisions of the network are possible.

- LAN (LOCAL AREA NETWORK)
- WAN (WIDE AREA NETWORK)
- MAN (METROPOLITAN AREA NETWORK)
- WIRELESS NETWORKS

## 1. Local Area Network

A LAN is typically restricted to a single area, such as a floor, building, or other small space. Being constrained typically allows for the use of a single transmission medium (cabling). Because you can typically get higher speeds with this technology and keep all of your expenses in one place, it is less expensive to implement than WAN. They are frequently used to link workstations and personal computers in workplaces and factories so that resources can be shared. Traditional LANs operate at speeds between 10 and 100 mbps with little delay and few errors.

Never allow LANs to operate at speeds greater than 100 mbps.

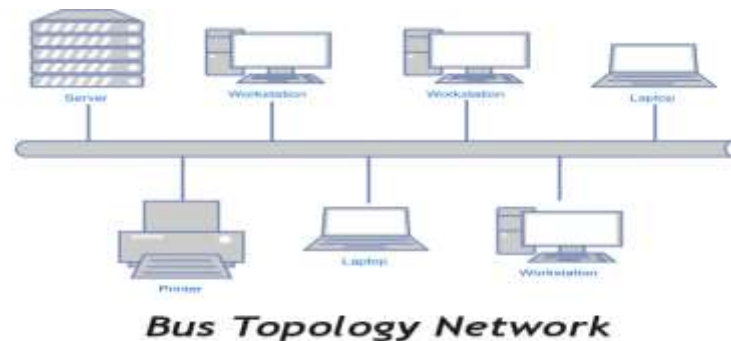
## 2. Common Physical Topologies

There are various types of physical and logical topologies. The most typical and crucial for comprehending the topologies of Ethernet and Token Ring are

- Bus topology.
- Ring topology
- Star topology.
- Mesh topology.
- Cellular topology.

### a. Bus topology

When all devices are connected to a single shared cable, this is referred to as a bus physical topology. A backbone is a long cable that is typically used in physical bus topology networks. Computers (workstations and servers) are connected to the backbone directly using terrestrial microwave-connectors. In order to cut off the signal from the wire after it has passed through all devices, the backbone is terminated at both ends. The first topology to be used to connect the computers in a network is the bus topology. The oldest type of topology is this one. This is a model for failure. Electric or electromagnetic signals can move in both directions on the majority of bus topologies. A LAN with BUS stopology is represented in Fig 4



### b. Ring topology

Ring topologies have circular wiring. Each node is connected to the nodes on each side and only moves in one way around the ring. Each unit functions as a repeater by combining a receiver and a transmitter and sending the signal to the following unit in the ring. Signal degeneration is minimal because each device regenerates the signal. After some time, the RING topology was established. The RING topology was created to circumvent the drawbacks of BUS topology. But this is also a model for failure. Ring topologies are the best choice for access methods that use token passing. Only the node holding the token is able to transmit data as it moves around the ring.

Ring topologies are not very common. In Fig. 5, a LAN with a RING topology is shown.



Fig: 5 LAN with RING topology

### c. Star topology

In star topologies, drop connections that reach in every direction are connected to a central device. Each networked device is linked to the hub, multiport repeater, or switch at the centre by a point-to-point connection. A tree or hierarchical network topology can be created by nesting star topologies inside of other stars. In a star topology, electrical or electromagnetic signals are transmitted from a networked device to a switch through a drop cable before being forwarded to another network. The STAR topology was created in order to avoid the drawbacks of the BUS topology and the RING topology. This is not a model for failure. However, it is a widely accepted model, and this topology is now utilised everywhere. In Fig. 6, a LAN with a STAR topology is shown.

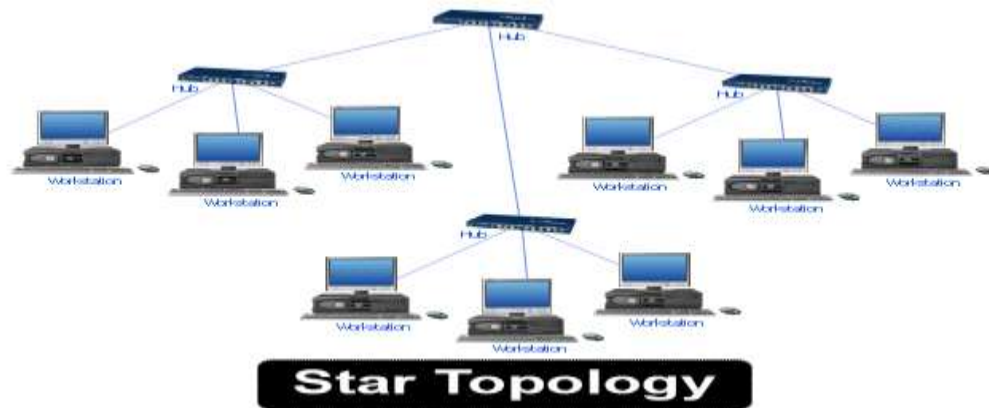


Fig: 6 LAN with STAR topology

### d. Mesh topology

A mesh network has point-to-point connections between each device. Because each device on the network needs to be connected to every other device, Mesh topologies are frequently not considered to be useful for networks. In contrast, mesh networks have excellent fault tolerance and each link has a guaranteed capacity.

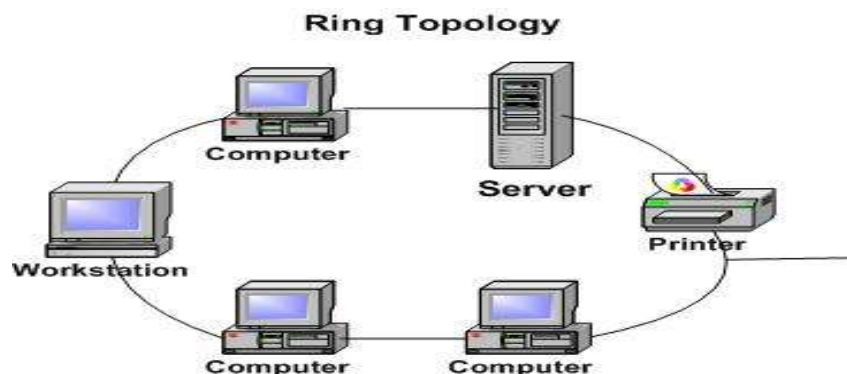


Fig: 5 LAN with RING topology

### e. Cellular topology:

A cellular topology divides a geographic area into cells using wireless point-to-point and multipoint techniques. Each cell represents the area of the entire network that a particular connection uses. A central station or switch receives communications from devices inside the cell. Switches are linked together to provide the full network infrastructure and to route data across the network. Devices could, for instance, move between cells while still staying connected to the network

### B. Wide Area Network

A wide area network typically covers a whole country or continent. It multiplies numerous linked LANs that may be separated by any conceivable chasm in space. In the majority of WANs, the network is made up of a large number of cables or phone lines, each of which connects two routers. If two routers want to communicate but do not share a cable, they must do it indirectly. We use a modem to communicate indirectly with other computers on personal PCs. In Fig. 7, the WAN connecting two distinct networks is shown.

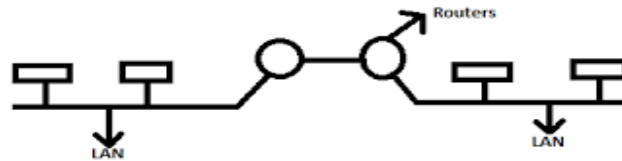


FIG:7 WAN connecting two different networks

### 1. Metropolitan Area

Network Metropolitan Area Network, which typically employs the same technology as LAN, is essentially a larger version of it. It could be private or public, and it could cover a city or a cluster of nearby business locations. On the other hand, MAN is a network that spans an urban area and functions as a phone service provider's backbone. A MAN does not have any switching components and only has one or two cables.

### 2. Wireless Networks

The fastest-growing sector of the computer business is portable computers, such as laptops and notebook computers. Since a cable connection cannot be made, wireless networks must be used if users want to link this computer to their office LANs so they may access the data while they are away from the office. A single router, for instance, might maintain a radio link with another router on the ground while switching routers as the aircraft flies by. This configuration is similar to a traditional LAN, with the exception that the connection to the outside world is made via a radio link rather than a wired line.

## V. COMMUNICATION LINKS

Various types and forms of communication medium are Fiber-optic cable

1. Twisted-pair copper wire.
2. Coaxial cable.
3. Wireless local-area links. (e.g. 802.11,Bluetooth)
4. Satellite channel [3]

## VI. INTERNET PROTOCOL (IP)

The Internet Protocol was created to address the scaling issue with Ethernet and to enable support for other LAN types and point-to-point links. IP offers a global addressing and routing mechanism to support universal connectivity, allowing packets to be delivered from any host to any other host. The IP header, which typically follows the Ethernet header, contains IP addresses, which are 4 bytes (32 bits) long (for the most popular version 4, which we denote IPv4). While the IP header travels with a packet during its entire Internet journey, the Ethernet header only stays with a packet for one hop. The ability to separate IPv4 addresses into a "network" and a "host" part is a crucial component [5]. In IPv4, there are various classes, and Table 1 lists their respective ranges.

## VII. OPEN SYSTEMS INTERCONNECTION (OSI) MODEL

The Open Systems Interconnection model, or OSI, a procedure for developing new network standards, was established by the International Organization for Standardization, or ISO, in 1977. The OSI initiative was an attempt to develop networking standards without the involvement of any one government. The seven-layer networking model of the OSI model is likely most known today. Table 2 lists the seven OSI model layers and their respective functions. The OSI uses its own variants of TCP and IP. Although OSI also provides a connection-oriented protocol, CMNS, it is the IP equivalent known as CLNP, or Connection Less Network Protocol. TP4 is the TCP equivalent..

## CONCLUSION

The use of computer communication as a networking tool appears to increase significantly as more people with similar interests gain access to the technology. Although it can speed up the creation of new interpersonal networks by removing the time and space constraints that hinder traditional networking techniques, getting people to use it still takes a lot of focused effort and resources. As technological advancements are more widely embraced by society, this issue should be reduced over the ensuing years [8].

## References

- [1]. Cherita L. Corbett, Raheem A. Beyah, John A. Copeland, Using Active Scanning to Identify Wireless NICs, in: Proceedings of the 7th

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IEEE Workshop on Information Assurance, U.S. Military Academy, West Point, NY, 21-23 June 2006.

- [2]. Pranab Kumar Chakravarty, Computer Networking Technologies and Application to IT Enabled Services.
- [3]. Antonio Carzaniga, Basic concepts in Computer Networking, September 19, 2014.
- [4]. TeodoraBakardjieva, Introduction toComputer Networking.
- [5]. Peter L. Dordal, An Introduction to Computer Networks, Release 1.8.07, June 16, 2015.
- [6]. Bob Dickerson, Computer Networks, January 2005.
- [7]. Russell Anthony Tantillo, Network Security through Open Source Intrusion Detection Systems, May 2012.
- [8]. <http://web.net/~robrien/papers/mpconclusion.html>
- [9]. <http://www.computerhope.com/jargon/i/ip.html>