A Research Paper on Basic of Computer Network

Anuj Kumar Bharti, Department of Computer Science Engineering
Galgotias University, Yamuna Expressway Greater Noida, Uttar Pradesh
E-mail id - bharti.anujk@gmail.com

ABSTRACT:* In computer network system are interconnected with each other for the purpose of sharing digital information. Computer Networks is basically a set of devices connected through links. Computer Network uses distributed processing in which task is divided among several computers. One of the most significant challenges to networks is to attack on their resources. This research paper highlights the concept of computer networks. Computer network is a set of devices which is connected through links. Nodes can include hosts in personal computers, phones, servers as well as networking hardware. Computer networks support applications access to the World Wide Web, shared use of application and storages servers, printers, and fax machines, and use of email and instant messaging applications. Computer networks are used to perform a great number of tasks by information sharing. There are two types of system open system and closed system. Open system can be easy connected to the network and prepared for communication. On the other hand closed system is not easily connected with other network as proper authentication is needed.

***KEYWORDS:* Computer networks, Protocols, Types of networks, Topology, Nodes, Data transfer.**

INTRODUCTION

A computer network or data network is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data by data connections. The connections (network links) between nodes are established using cable media or wireless media. Internet is the best known computer network. Network nodes devices originate, route and terminate the data. Nodes can include hosts in personal computers, phones, servers as well as networking hardware. Two devices are 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 with each other. Computer networks support applications access to the World Wide Web, shared use of application and storages servers, printers, and fax machines, and use of email and instant messaging applications [1]. In the physical media computer network used to transmit their signal, the communications protocols to organize network traffic, size, topology and organizational intent [2].

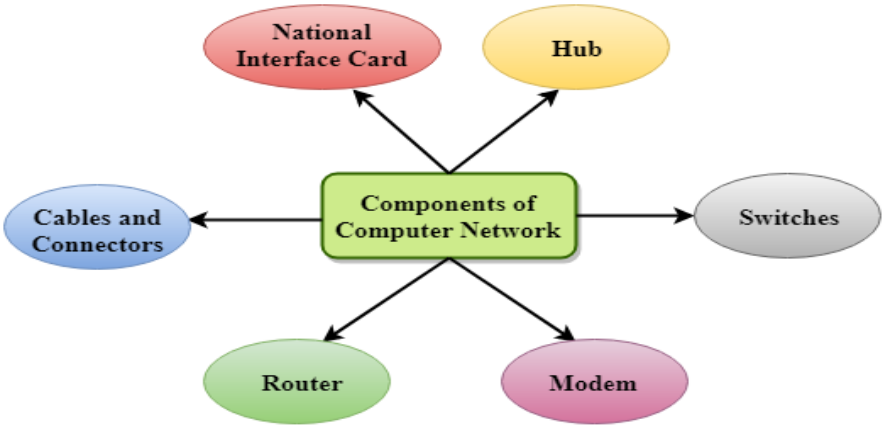

Fig. 1: Components of Computer Network

COMPONENTS OF A COMPUTER NETWORK

1. National interface card (NIC)

NIC is a device that helps the computer to communicate with another device. The NIC contains the hardware addresses, the data-link layer protocol use this address to identify the system on the network so that it transfers the data to the correct destination [3]. There are two of NIC: Wireless NIC and Wired NIC.

- Wireless NIC are used by all the modern laptops and a connection is made using the antenna that employs the radio wave technology.
- Wired NIC is used by Cables to transfer the data over the medium.

2. *Hub*

Hub is also called central device because its splits the network connection into multiple devices. Whenever computer requests for information from a computer, it sends the request to the Hub. All the interconnected devices get the request by the hub [4].

3. *Router*

Router is a device that used to connects the LAN to the internet. To connect with distinct networks or connect the internet to multiple computers router is used [5].

4. *Modem*

To connect the computer to the internet over the existing telephone line modem is used. A modem is a separate part on the PC slot found on the motherboard. Computer motherboard is not integrated with the modem [6].

5. *Switches*

Grouping of all the devices over the network to transfer the data to another device switch is used. A switch is better than Hub because it does not broadcast the message over the network, i.e., it sends the message to the actual receiver. Switch sends the message directly from source to the destination [7].

6. *Cables*

Cable is used as transmission media that transmits the communication signals. There are three types of cables:

a. Coaxial cable

It is more expensive than twisted pair cable, but it provides the high data transmission speed. It resembles like a TV installation cable.

b. Twisted pair cable

It is a high-speed cable that transmits the data over 1Gbps or more.

c. Fibre optic cable

It is a high-speed cable that transmits the data using light beams and provides high data transmission speed as compared to other cables. It is installed at the government level and it is more expensive as compared to other cables [6].

APPLICATION OF COMPUTER NETWORK

1. *Resource share*

Permit sharing of files, data, and other types of information in a network environment, authorized users may get access over data and information stored on other computers in the network.

2. *Interpersonal communications*

People can communicate easily and efficiently via email, instant messaging, chat rooms, telephone, video telephone calls, and video conferencing using a network.

3. *Server-Client model*

The server-client model is used in Computer networking in which a server is a central computer used to store the information and maintained by the system administrator. Clients are the machines used to access the information stored in the server remotely.

4. E-commerce

In businesses also Computer network plays an important role. Run Business on the internet. For example, amazon.com is doing their business over the internet, is the best example of e-commerce [8].

5. Communication medium

Among the several users Computer network behaves as a communication medium For example, if a company contains more than one computer has an email system which the employees use for daily communication [9].

ADVANTAGES OF COMPUTER NETWORK

- Easy to install and extendable.
- It requires least amount of cables to connect devices with each other so it is less expensive.
- Suitable for small and temporary networks like small organization (school).
- Repeater is also used for extension.

DISADVANTAGES OF COMPUTER NETWORK

- Heavy network traffic slow down the network bus.
- Proper termination is required.
- Sometime complex to implement.
- Fault in the cable stops all transmission.

TOPOLOGY IN COMPUTER NETWORK

Basically topology defines the structure of the network how all the devices are interconnected with each other. There are two types of topology physical or logical. The purpose of physical topology is the geometric representation of all the nodes in a network [10].

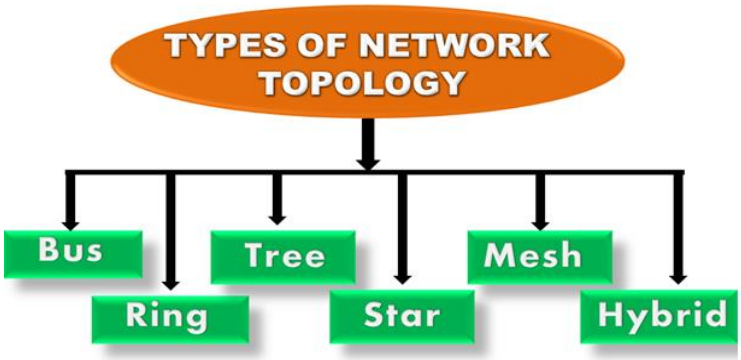

Fig. 2: Types of Network Topology

1. Bus Topology

- Bus topology is also called as backbone cable. In bus topology all the nodes are connected through a single cable.

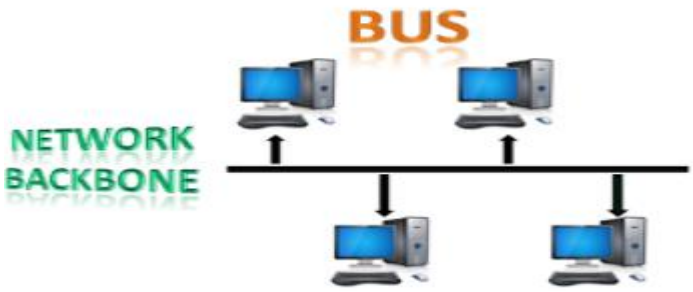

Fig. 3: Bus Topology

- Each node is either connected directly to the backbone cable or connected to the backbone cable by drop cable.
- When node (system) want to send a message over a network then it simply put the message over the network. All the nodes available in the network get the message either they have address or not.
- 802.3 (Ethernet) and 802.4 standard networks mainly use bus topology.
- Bus topology configuration is quite simple than other topology.
- Backbone means as "single lane" over which message is broadcast to all the nodes [11].

2. *Ring Topology*

Fig. 4: Ring Topology

- This topology same as bus topology but the all the nodes are connected with each other point to point manner.
- It is unidirectional means data flow in one direction.
- In this each node is connected to other node and having no termination point.
- Because of ring like structure it is called as ring topology.
- Data flow in clockwise direction in ring topology.

3. *Star Topology*
   - In this topology all the nodes are connected with central hub.
   - Not Nodes are directly connected with each other.
   - All the message first come on the hub then hub send the message to all the connected nodes.

Fig. 5: Star Topology

4. Mesh Topology

Fig. 6: Mesh Topology

- In this topology multiple paths from one computer to another computer.
- Mesh does not contain the switch, hub or any central computer which acts as a central point of communication. It is mainly used in the wireless networks.
- The Internet is an example of the mesh topology

5. Tree Topology

This topology is the combination of star and bus topology. In this topology all the nodes are connected with each other in hierarchical fashion.

Fig. 7: Tree Topology

There is only one path exists between two nodes for the data transmission.

6. Hybrid Topology

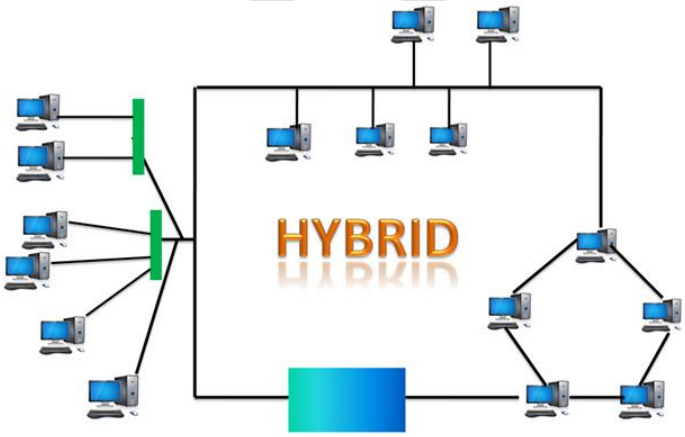

Fig. 8: Hybrid Topology

- Combination of different topology is called as Hybrid Topology.
- This topology is a connection between different links and nodes to transfer the data.

CONCLUSION

In this paper tell about analytical study of different basic topologies which provide us a brief idea about each topology. Topology is reliable, scalable, flexible and effective. Only disadvantage in it is complexity of design, costly infrastructure when combining two or more different topologies. Computer Networks have forever changed the way of human lifestyles. Humans will work, play, and communicate using networks. Computer network has changed the world evolution. New protocols and standards will emerge and new applications will be conceived and our lives will be further changed and enhanced by the networks. In a network 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. Fundamental knowledge regarding the prediction of complex network properties is primitive. It seems that electronic communication can become a much more valuable networking tool if large numbers of people with similar interests have access to the technology.

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