iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IV **Month of publication:** April 2022

DOI: https://doi.org/10.22214/ijraset.2022.41553

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue IV Apr 2022- Available at www.ijraset.com

Computer Network Topologies

Ms. Mrunali Nagesh Sankpal[1], Ms. Pratiksha Vijay Chinchwade[2], Ms. Rutuja Rajkumar Kognole[3], Ms. K. N. Rode [4]
[1, 2, 3, 4]*Electronics & Telecommunication Department, Sharad Institute Of Technology college of engineering Yadrav, Maharashtra, India*

Abstract: ***Network topologies is various components of network link nodes, link, peripherals are arranged. The way of connecting the computers is called as the topology.so depending on the manner of connecting the computers we can have different network topologies. Network topology is links and nodes of a network are arranged to related are arranged to each other. They describe the physical and logical arrangement of network nodes. The way in which different system and node are connect and communicate with each other is determined by topology of the network.***
Keywords: Star Topology, Bus Topology, Ring Topology, Hybrid Topology, Mesh Topology, Tree Topology

I. INTRODUCTION

Computer Network Topology is logical arrangement of the nodes(computer). The word physical network topology is used to explain the manner in which a network is connected. Devices or nodes in a network get connected to each other via communication links and all these links are related to each other in one way or the other. The geometric representation of such a relationship of links and nodes is know as the topology of that network. The network topology defines the way in which computers, printers, and other devices are connected. A network topology describes the layout of the wire and devices as well the paths used by data transmission.

II. PHYSICAL NETWORK TOPOLOGIES

The arrangement specific way is called a Network Topology. In network topologies, the components are arranged in a systematic order for smooth data flow in a communication network.

In a computer network, there are mainly six types of physical topology, they are

1) Bus Topology
2) Ring Topology
3) Star Topology
4) Mesh Topology
5) Tree Topology
6) Hybrid Topology

III. BUS TOPOLOGY

Bus topology, also know as line topology, is a type of network topology, is a type of network topology in which all devices in the network are connected by one central RJ-45 network cable or coaxial cable. Bus topology is network type in which every computer and network device is connected to a single cable. It transmits the data from one end to another in single direction. No bidirectional feature is in bus topology. It is a multi-point connection and non -robust topology.

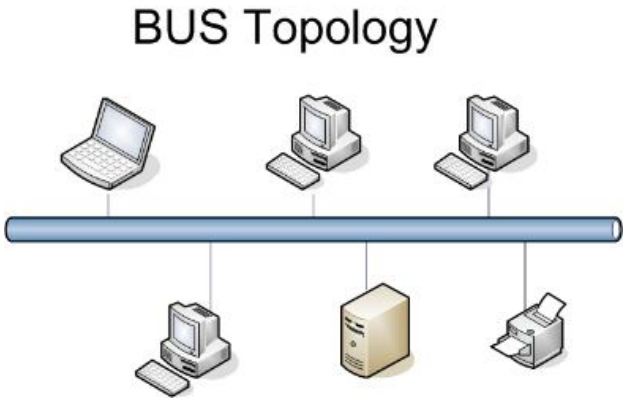


Fig1.Bus Topology

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When a sender sends a message, all other computers can hear it, but only the receiver accepts it(verifying the mac address attached with the data frame)and others reject it. Bus technology is mainly suited for small network like LAN, etc.
In a bus topology, each computer communicates to another computer on the network independently. Every computer can share the network's total bus capabilities. The devices share the flow of data from one point to other in the network.

Features of Bus Topology

1) It transfer the data in a single direction.
2) There is a single connection between the node/system and the channel.

IV. RING TOPOLOGY

Ring topology is network topology in which each node connects exactly to two other nodes, to form a single closed pathway for signal through each node.

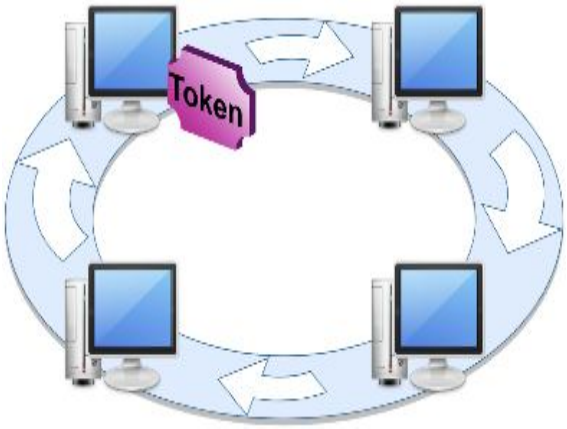


Fig2.Ring Topology

In a ring topology, each computer is connected to the next computer, with the least one connected to the first. Each computer is connected to the next computer in the ring and each retransmits what it receives from the previous computer hence the ring is an active network. The message flow around the ring in one direction. Some ring network do token passing. A short message called a token is passed around the ring until a computer wishes to send information to another computer.

Features of Ring topology

1) It is very easy to install and reconfigure.
2) It is suitable for high performance, large, BW network

V. STAR TOPOLOGY

In star topology, all the devices are connected to a single hub through a cable. This hub is the central node and all other nodes are connected to the central node. The central device (hub or switch has point to point communication link(the dedicated link between the devices which can not be accessed by some other computer) with the devices.

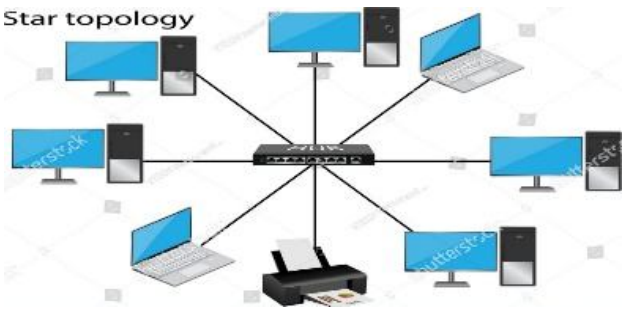


Fig3.Star Topology

Star are used in concentrated network, where the endpoint are directly reachable from a central location. when network expansions is expected and when the greater reliability of a star topology. Each computer on star network communicates with a central hub. The hub then resends the message either to all the computer in a broadcast star network.

Features of Star Topology:

1) Every computer is connected to the hub through a dedicated connection/cable.
2) Hub also acts as a repeater.

VI. MESH TOPOLOGY

Mesh topology is a computer network topology in which nodes are interconnected with each other. In a mesh topology every device is physically connected to every other device with a point to point dedicated link. The mesh topology does not traffic congestion problem ,because dedicated lines are being used to connected the nodes.

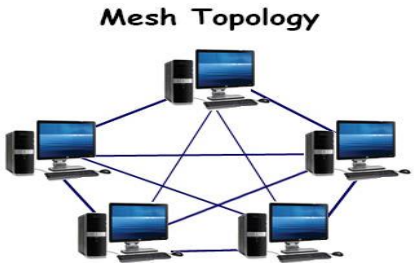


Fig4.Mesh Topology

In mesh topology each device is connected to every other device on the network through a dedicated point -to-point link.

Features of Mesh Topology:

1) Full connected mesh topology: all the nodes connected to every other node.
2) Partially connected mesh topology: It does not have all the nodes connected to each other.

VII. TREE TOPOLOGY

Tree topology is a computer network topology in which all the nodes are directly or indirectly connected to the main bus cable. Tree topology is a combination of bus and star topology.

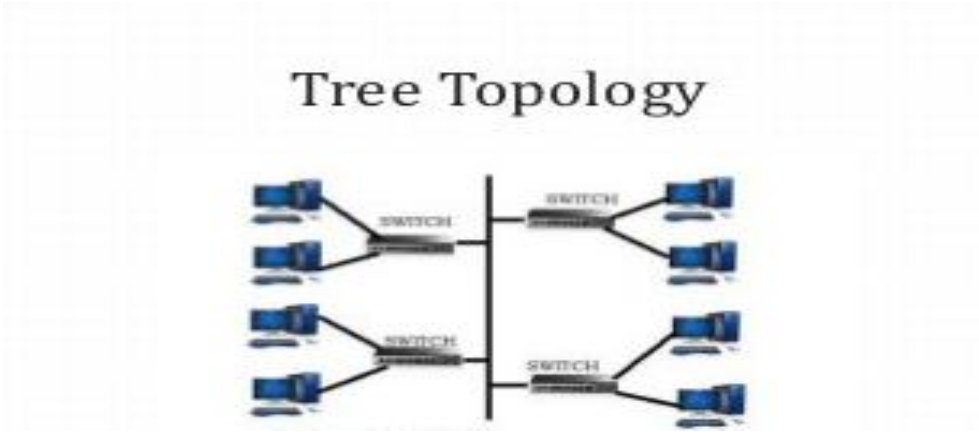


Fig5.Tree Topology

In a tree topology, the whole network is divided into segments, which can be easily managed and maintained. There is a main hub and all the other sub-hubs are connected to each other I this topology.

Features of Tree Topology:

1) Usually implemented in WAN.

VIII. HYBRID TOPOLOGY

A Hybrid topology is a computer topology which is a combination of two or more topologies. In practical use, they are the most widely used. For example a combination of star and mesh topology is know as hybrid topology. Hybrid topology is the one which makes use of two or more topologies.

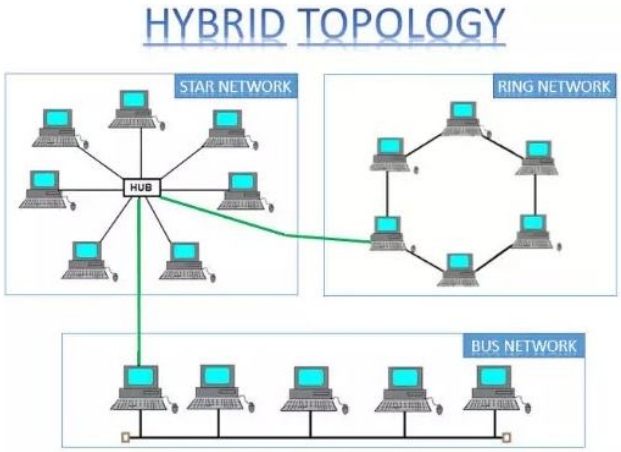


Fig6.Hybrid Topology

In a tree topology, the whole network is divided into segments, which can be easily managed and maintained. There is a main hub and all the other sub-hubs are connected to each other in this topology.

Features of Hybrid Topology:

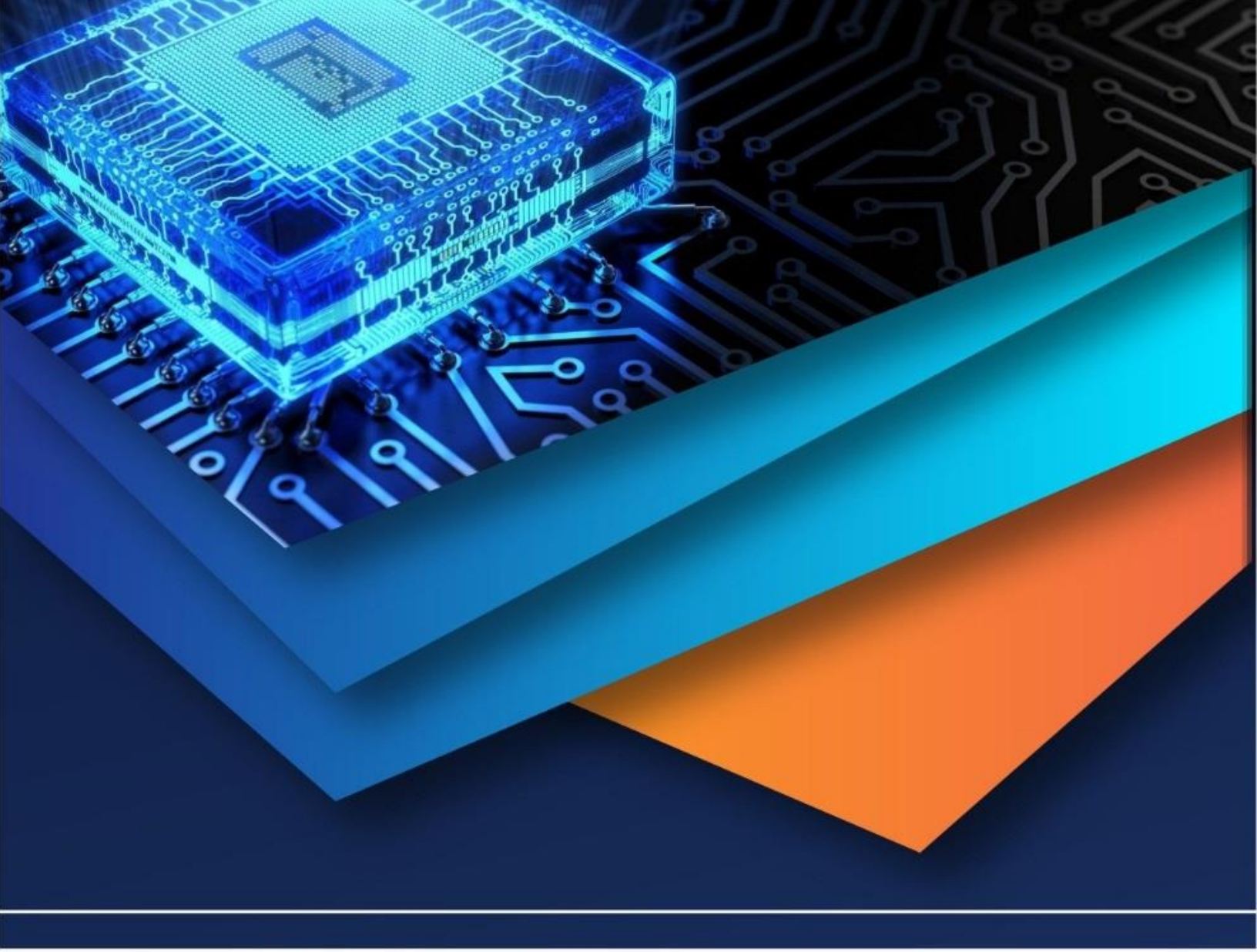
1) Collection of two or more topology
2) If there occurs any error in the network then it is detected easily and that network device or node can be exchanged with a new device or node.

IX. CONCLUSION

The aim of computer network in topologies is of core important of computer network. which structure or topology is best for organization or business. Network topologies define the layout, virtual shape or structure of network, not only physically but also logically. The way in which different systems and nodes are connected and communicate with each other is determined by topology of the network. Physical Topology is the physical layout of node, workstations and cables in the network. while logical topology is way information flows between different components.

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