<epam>

Networks Concept

Computer Networks

Computer Science Basics

Lesson #3

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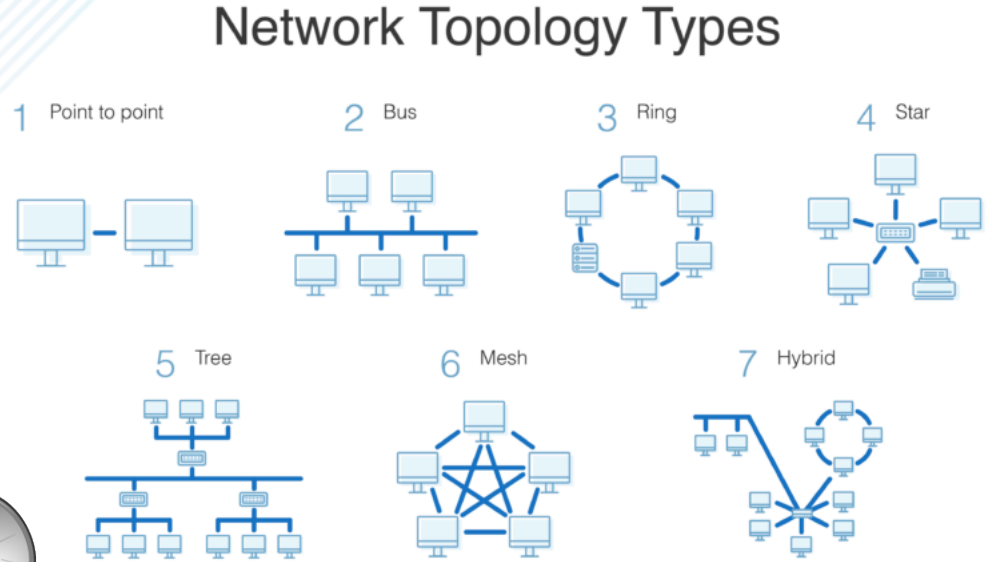
Network TOPOLOGIES

Network Topologies

Network topology goes beyond logical or physical arrangement of devices. This brings us to the various types of network topologies available today.

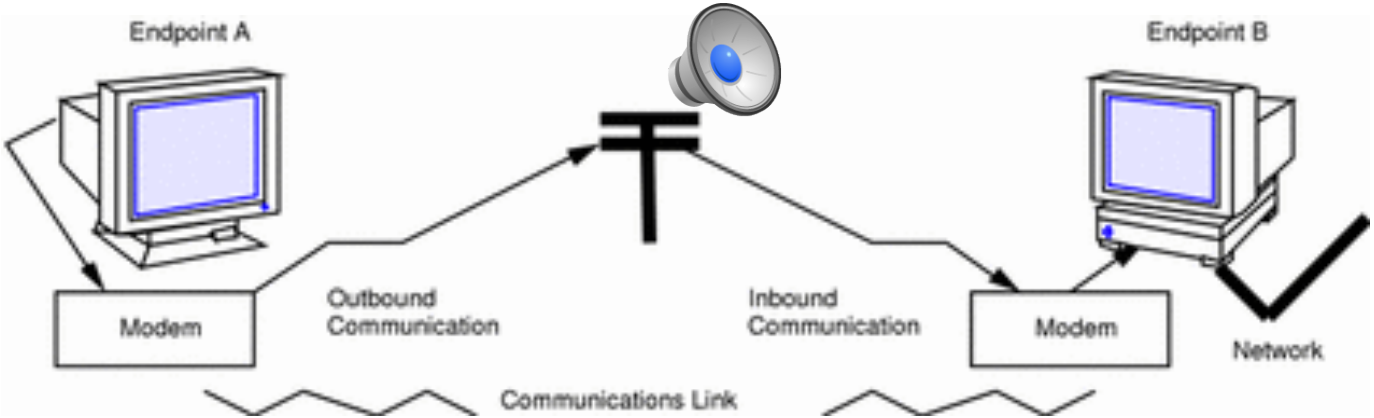
- Physical – The physical network topology refers to the actual connections (wires, cables, etc.) of how the network is arranged. Setup, maintenance, and provisioning tasks require insight into the physical network.
- Logical – The logical network topology is a higher-level *idea* of how the network is set up, including which nodes connect to each other and in which ways, as well as how data is transmitted through the network



POINT-TO-POINT

Point-to-point topology

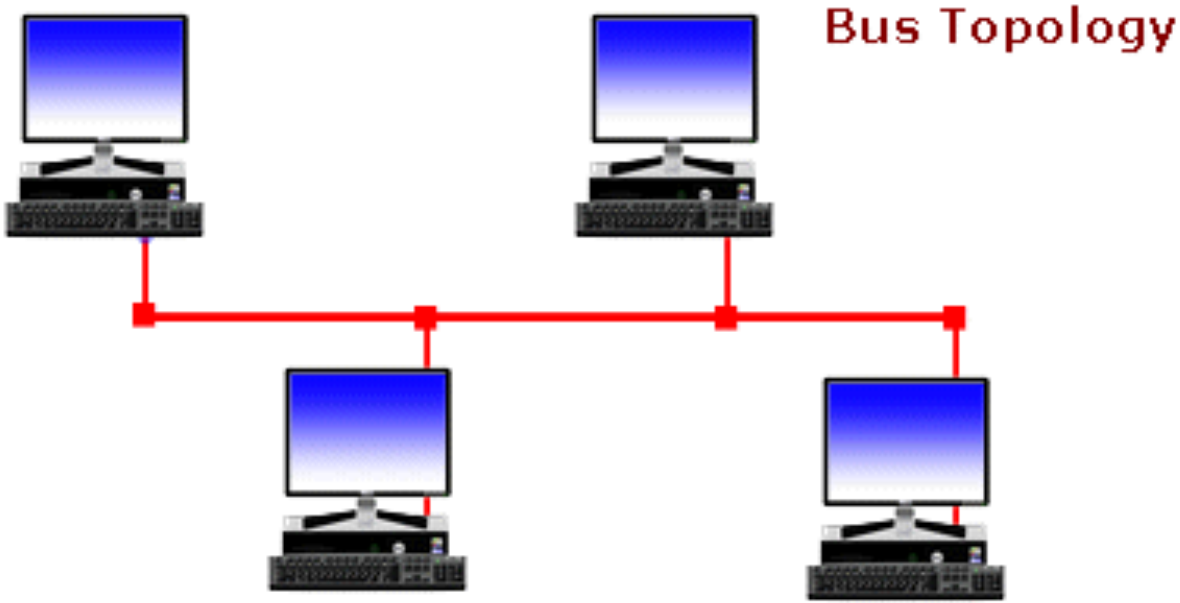
A generic point-to-point communications configuration consists of two endpoints connected by a communications link. In a generic configuration, an **endpoint** system could be a computer or terminal, either in an isolated location or physically connected to a network



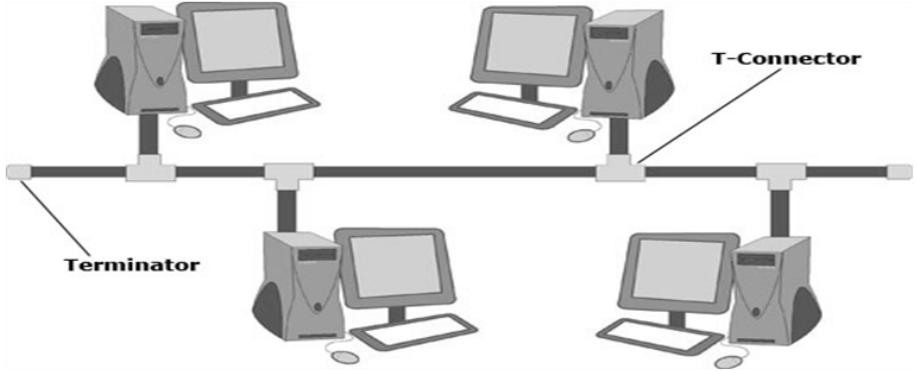
BUS network

Bus topology

Bus networks use a common backbone to connect all devices. **A single cable**, the backbone functions as a shared communication medium that devices attach or tap into with an interface connector. A device wanting to communicate with another device on the network sends a broadcast message onto the wire that all other devices see, but only the intended recipient actually accepts and processes the message

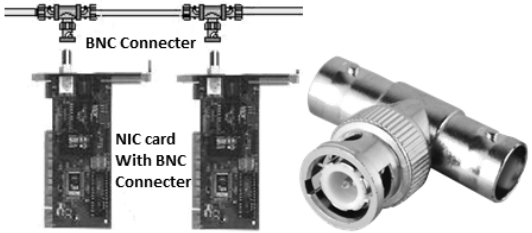


Bus topology



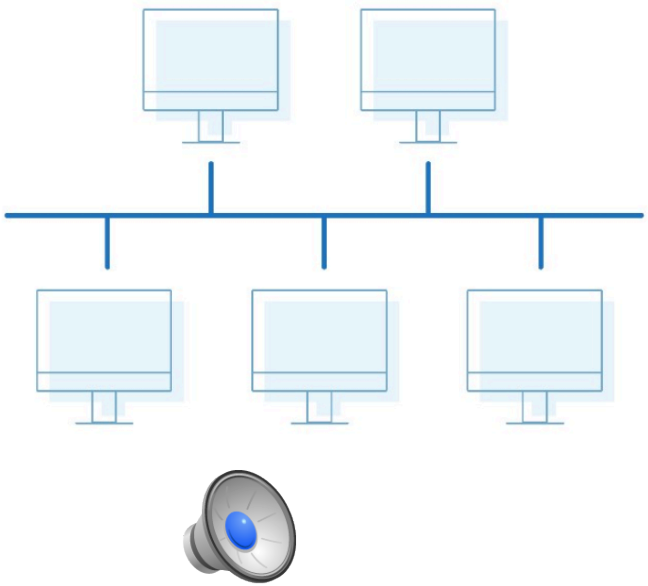
Bus Topology

Terminator



T Connecter

Bus topology



Advantages

Very easy to setup, extend

Simple to maintain

Easy to connect new devices

Require less cable

Disadvantages

Limited **cable length**

Limited number of nodes

Dependency on central cable

Troubleshooting is difficult

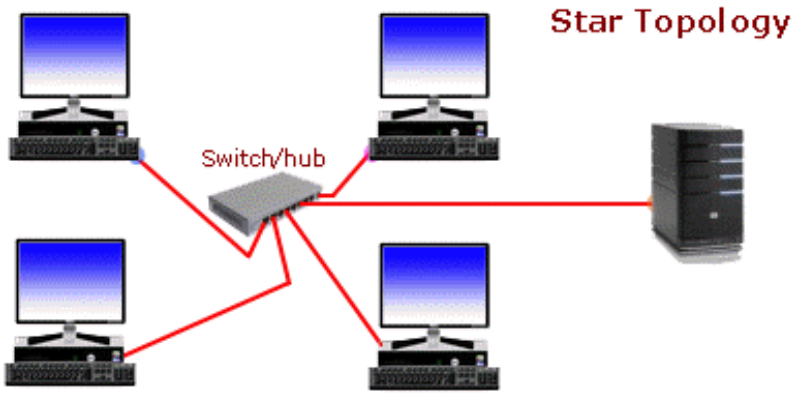
The performance is low with many devices

Low security

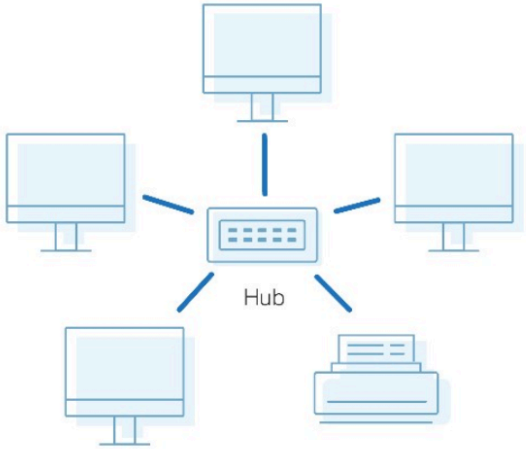
STAR network

STAR topology

A star network is often combined with a bus topology. The **central hub** is then connected to the backbone of the bus. This combination is called a tree.



STAR topology



Advantages

Easy to install and manage.

Easy to troubleshoot

Data transfer faster than BUS topology

Data is more safe

Any problem in one node doesn't hamper the performance of other nodes in the network

Disadvantages

Dependency on **central hub**

Dependency on central cable

The size is depend the hub

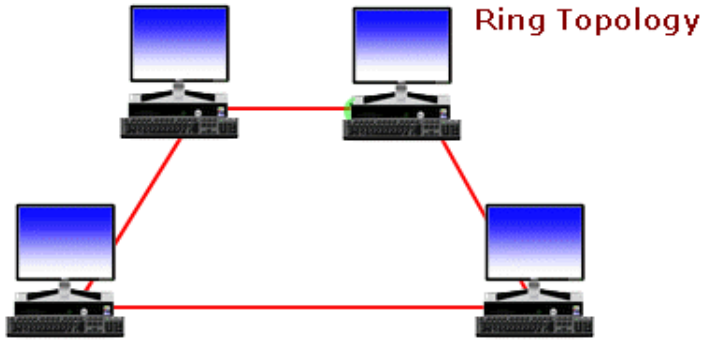
The performance depends on the hub performance

Requires more cables

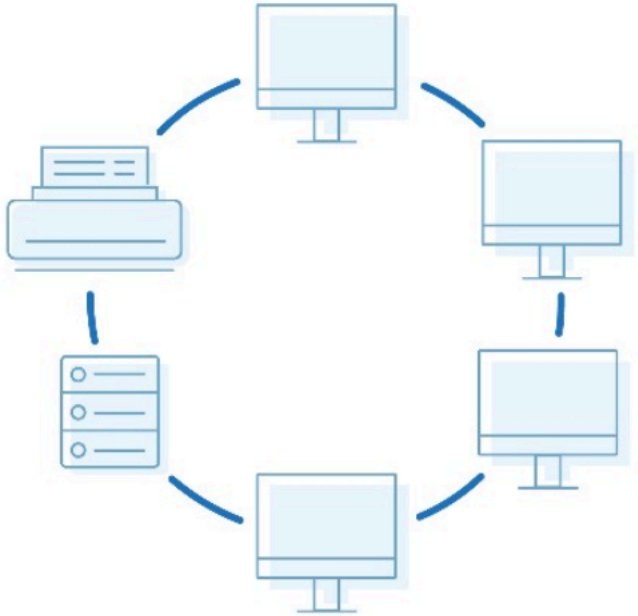
RING network

RING topology

A ring network is a local area network (LAN) in which the nodes (workstations or other devices) are connected in a **closed loop configuration**. Adjacent pairs of nodes are directly connected. Other pairs of nodes are indirectly connected, the data passing through one or more intermediate nodes



RING topology



Advantages

Very orderly network

Data is quickly transferred

The transmission of data is relatively

Additional nodes has very little impact on bandwidth, not affect network performance

Disadvantages

Dependency on each **workstation functionality**

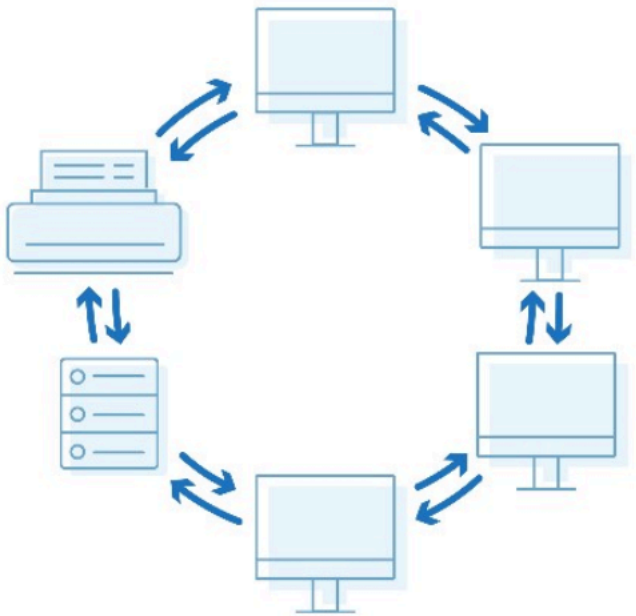
Changing devices affect whole network

Slower than an Ethernet

Difficult to troubleshoot

All computers must be turned on

DUAL RING topology



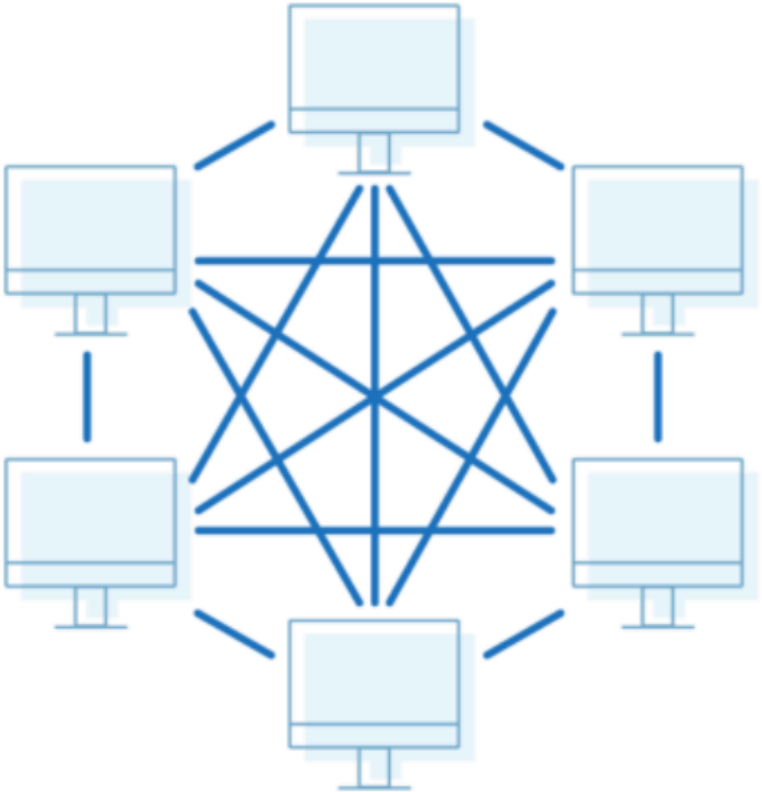
Advantages of Dual-Ring Topology

The primary advantage of dual ring topology is its efficiency: because each node has two connections on either side, information can be sent both clockwise and counter clockwise along the network.

The secondary ring included in a dual-ring topology setup can act as a redundant layer and backup, which helps solve for many of the disadvantages of traditional ring topology. Dual ring topologies offer a little extra security, too: if one ring fails within a node, the other ring is still able to send data.

MESH network

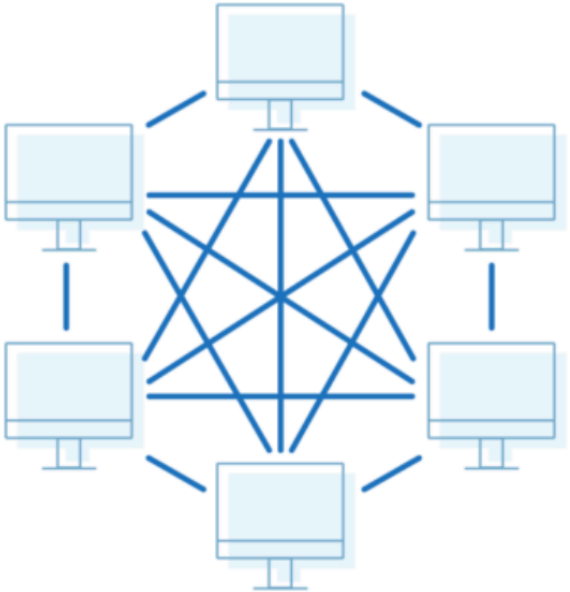
MESH topology

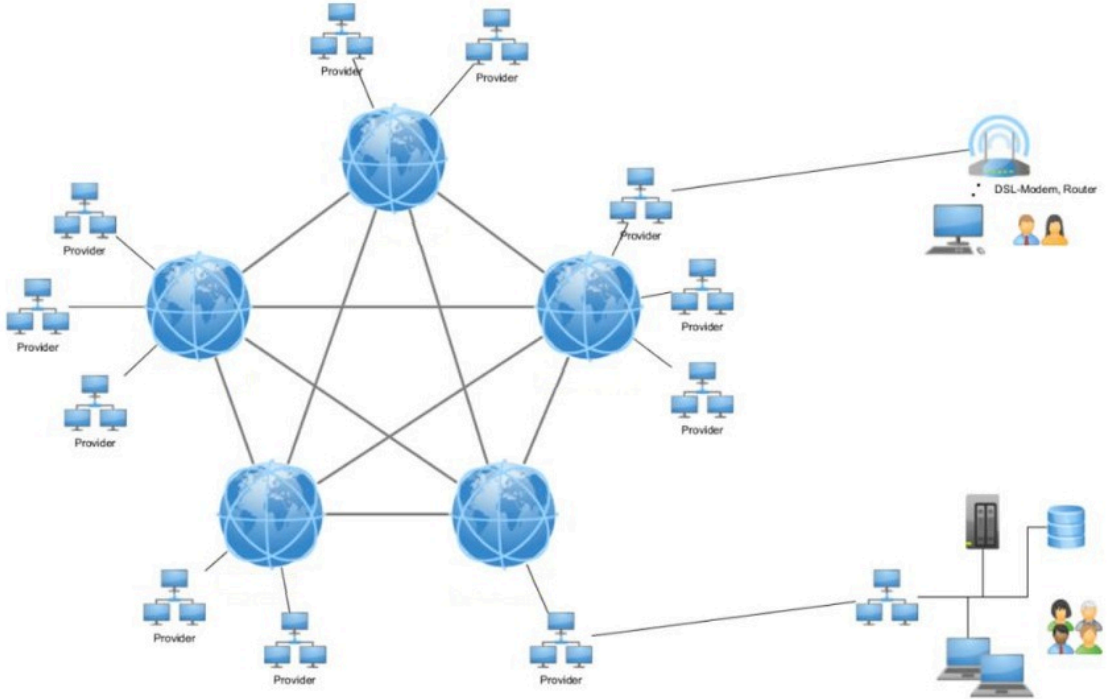


A mesh network is reliable and offers redundancy. If one node can no longer operate, all the rest can still communicate with each other, directly or through one or more intermediate nodes.

The chief drawback of the mesh topology is expense, because of the large number of cables and connections required. In some scenarios, a ring network or star network may prove more cost effective than a mesh network. If all the nodes lie near a common line, the bus network topology is often the best alternative in terms of cost.

Internet




Provider
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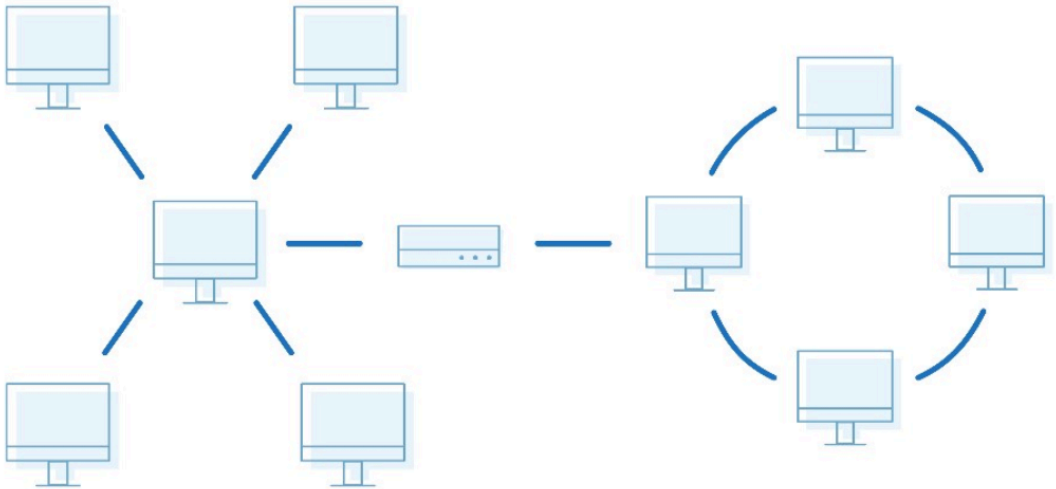
DSL-Modem, Router

HYBRID networks

HYBRID topology



Hybrid topologies combine two or more different topology structures—the tree topology is a good example, integrating the bus and star layouts. Hybrid structures are most commonly found in larger companies where individual departments have personalized network topologies adapted to suit their needs and network usage.