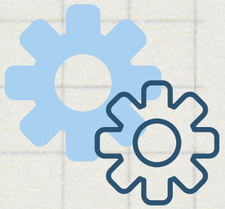
Subjects

PTIK

Pengantar Teknologi
Informasi dan Komunikasi



Arranged by :
Muhammad Amar Primus Firdaus
(11230940000067)

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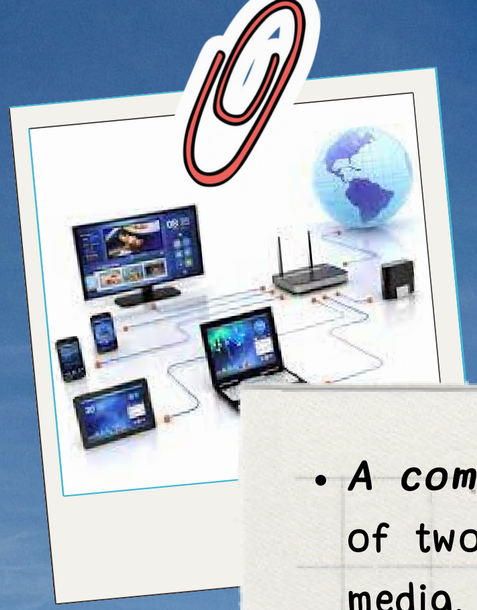
What is a computer network?



Definition of Computer Network

- ***A computer network*** is a telecommunication network system consisting of two or more devices connected to each other through transmission media. The existence of a computer network allows devices to exchange data or information, store media, and share resources such as data in the form of text files.
- ***A computer network*** is an interconnection of two or more computer systems located at the same or different places. It is a network that can connect two computers as shown in fig 1.4.

Fig 1.4 Computers in network

- ***So, a computer network*** is a telecommunication system connecting devices through transmission media, enabling data exchange, storage, and resource sharing. It connects two or more computer systems, either located at the same or different locations.

What is the history of computer network?

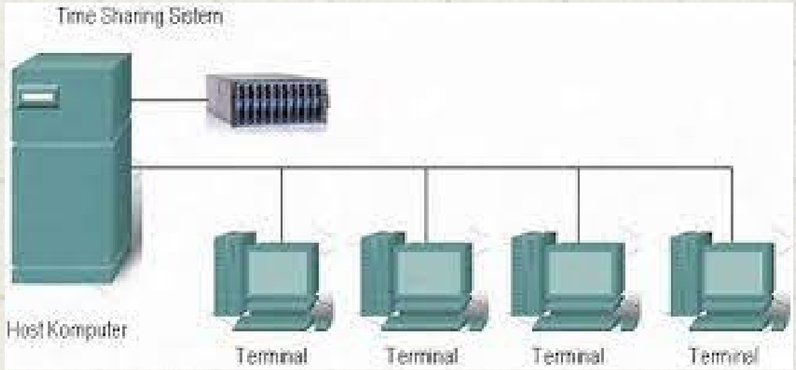
History of Computer Network

- **In the U.S. in 1940s**

  in a MODEL I computer development project at the Bell Laboratory and Harvard University research team headed by Professor H. Aiken. The idea originally only intended to use a single computer component that required pairing. A sequential process (Batch Processing) was developed so that multiple applications could be run on a computer utilizing queuing rules in order to complete multiple tasks without wasting a lot of time.

- **In the 1950s**

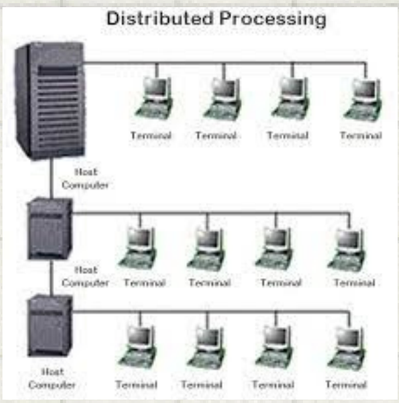
  Advancements in computer technology led to supercomputers, enabling the development of Time Sharing System (TSS) for time-based process distribution, allowing computer networks and integrating previously independent computer and telephone technology.



https://bit.ly/Gambar-TSS

- **In the 1970s**

  The distributed processing principle involves parallel computer hosts managing terminals spliced into each host computer, necessitating a cross-disciplinary approach between computer and telecommunications technology, as each host must install terminals separately.



https://bit.ly/48Kh1G8

What are
the benefits of
computer networks?

Benefits of Computer Network

- **Resource Sharing**

a) Data sharing, or the exchange of data with colleagues who are present in distant locations or even in other countries, is made possible by the presence of computer networks.
b) Hardware sharing allows a single printer to be used by a number of computers simultaneously if there is only one computer and one printer initially. Not just the printer, but also plenty of other devices can be shared.
c) Internet Access Sharing, which enables a few computers to share a single internet connection, is possible with small computer networks.

- **Connectivity and Communication**

Each individual in a particular office or workgroup may connect to a LAN. A few LANs with berjauhan locations are connected to WAN networks.

- **Data Security and Management**

When important data is transferred securely via a shared server, it will be easier and more secure to do so.

Benefits of Computer Network

- **Performance Enchancement and Balancing**

In the current situation, a network of computers can be used to distribute computing tasks among them to increase the productivity of a number of applications.

- **Entertainment**

Computer networks, particularly the internet, typically offer a wide variety of games and other content. Similar to a multiplayer game that several players can play at the same time or specifically video streaming.

Computer networks for general use provide different services to residents of individual homes as compared to services provided by businesses. There are three factors that make a person's computer a day-to-day task, namely:

1. Access to information located in another location (such as current news access, e-government information, e-commerce, or e-business).
2. Interpersonal communication (person to person, such as email, chat, video conferences, etc.)
3. Interactive media (such as streaming radio, watching TV shows online, and downloading movies or music).

(Sourece : *https://bit.ly/Pengantarjaringankomputer-byMelwinSyafrizal* Halaman-14)

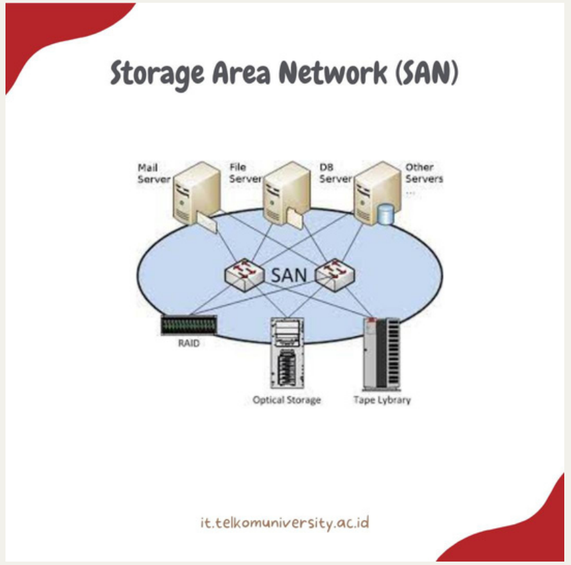
What are the types of computer networks?

TYPES OF COMPUTER NETWORKS

(A) SAN (Storage Area Network)

Storage Area Network (SAN) is a specialized computer network designed to connect servers with external data or storage. SAN allows servers to access data storage remotely, thus allowing companies to manage and store data centrally. The main benefits of a SAN are improving the performance and efficiency of data storage, as well as providing better security.

(Source : https://bit.ly/StorageAreaNetwoks)

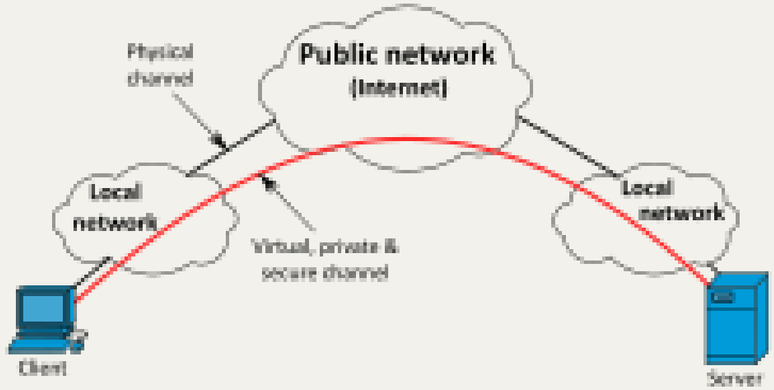


(Source : https://bit.ly/StorageAreaNetwoks)

(B) VPN (Virtual Private Network)

A virtual private network or virtual private network (English: virtual private network, often abbreviated as VPN) extends private networks across public networks and allows users to send and receive data across shared or public networks as if their computing devices were directly connected to the private network. Applications running across a VPN can utilize the functionality, security, and management of the private network.

(Source : https://bit.ly/VirtualPrivateNetworks)



(Source : https://bit.ly/VirtualPrivateNetworks)

TYPES OF COMPUTER NETWORKS

(C) Intranet

It refers to a private network that companies use for ensuring secure collaboration and communication among all the employees. The intranet is very useful when we want to store some useful, crucial information. An intranet is used for establishing communication among internal employees, used in telephone directories, and many more.

(Source : https://bit.ly/IntranetdanEkstranet)

(D)

The extranet is also very similar to the intranet. It is a private network existing within an organization. But the difference is that the extranet makes use of the internet for connecting to all the outsiders (it happens in a controlled manner). Thus, the extranet helps an organisation connect with its suppliers and customers. It thus helps a team in an organisation work in collaboration.

(Source : https://bit.ly/IntranetdanEkstranet)

https://bit.ly/GambarIntranetdanEkstranet

TYPES OF COMPUTER NETWORKS

Based on the role of the computer in data processing

(E) Client-Server Network

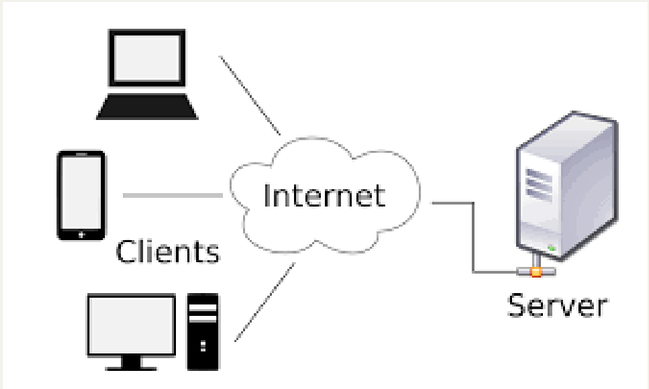
In this network there are 1 or more server computers and client computer. Computers that will become server computers or become client computer and changed through network software on the protocol. The client computer as an intermediary to be able to access data on the server computer while the server computer provides the information needed by the client. server computer while the server computer provides the information needed by the client computer.

(Source : https://bit.ly/Jaringankomputerdanpengertiannya-byMJafarNoorYudianto Halaman 3)

(F) Peer-to-peer network

In this network there are no client computers or server computers because all computers can send and receive information so that all computers function as clients as well as server

(Source : https://bit.ly/Jaringankomputerdanpengertiannya-byMJafarNoorYudianto Halaman 3)



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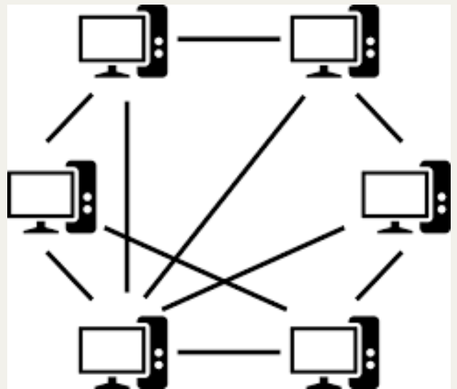

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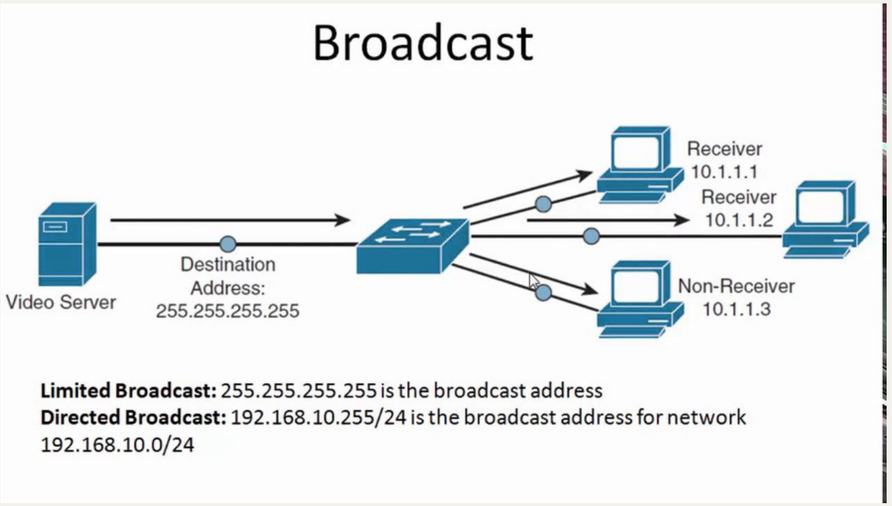
TYPES OF COMPUTER NETWORKS

G) Based on the transmission type
Two types of computer networking are available that are based on transmission and reception, namely broadcast and point-to-point networking.

a) Broadcasting networks use a shared channel for real-time communication, with smaller packages delivered by different mesins. Each package has an address field with a message for the recipient. Mesins review the address field and disperse packages accordingly.

b) Unicast networks consist of individual pair connections, which help the intermediary machines and help route algorithms play an important role in point to point networks.



https://bit.ly/Gambarjaringanbroadcast

https://bit.ly/Gambarjaringanpointtopoint

TYPES OF COMPUTER NETWORKS

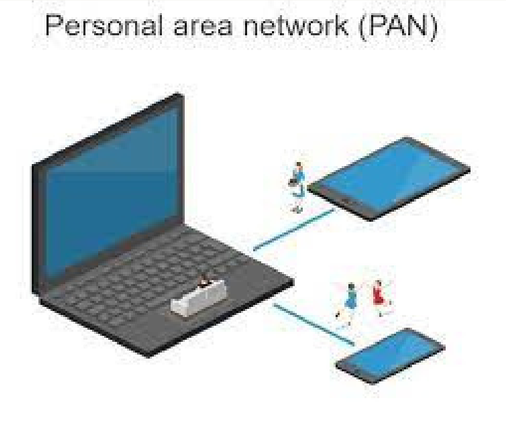
H) Based on geography

(a) PAN

To connect a computer or other device, such as a phone, PDA, keyboard, wireless headset, camera, or other device that can be reached within a close range of four to six meters, then you have already created a Personal Area Network (PAN).

(b) LAN

LAN (Local Area Network) Local Area Network or LAN, is a type of network computers with a local area covered. By using various network devices that are quite simple and popular, such as using UTP (Unshielded Twisted-Pair) cables, Hubs, Switches, Routers, and so on.



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https://bit.ly/3F4WYEu

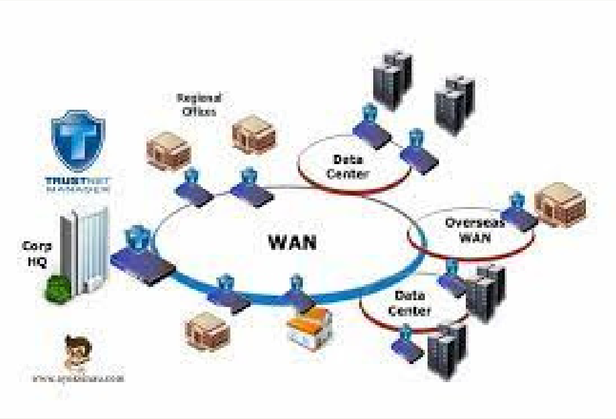
TYPES OF COMPUTER NETWORKS

(C) WAN (Wide Area Network)

WAN network technology is commonly used to connect a network with other countries or from one continent to another. continent to another. WAN networks can consist of various types of types of LAN and WAN computer networks due to the wide coverage area of the types of WAN computer networks. WAN networks, usually using fiber optic cables and embedding them in thethe ground or through underwater lines.

(D) MAN (Metropolitan Area Network)

Metropolitan Area Network (MAN), is a type of computer network that is more extensive and computer network that is broader and more sophisticated than a LAN computer network. LAN computer network. This type of MAN computer network is commonly used to connect computer networks from one city to other cities. To be able to create a MAN network, usually telecommunications operators are needed to connect between computer networks.



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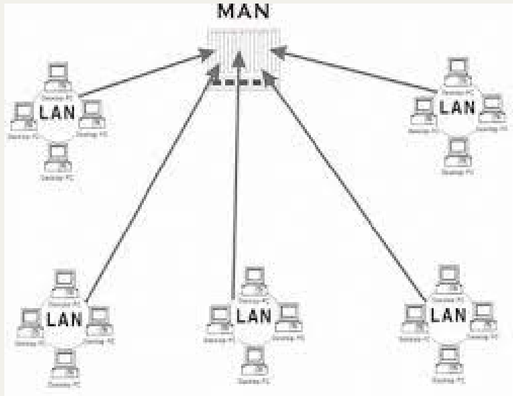

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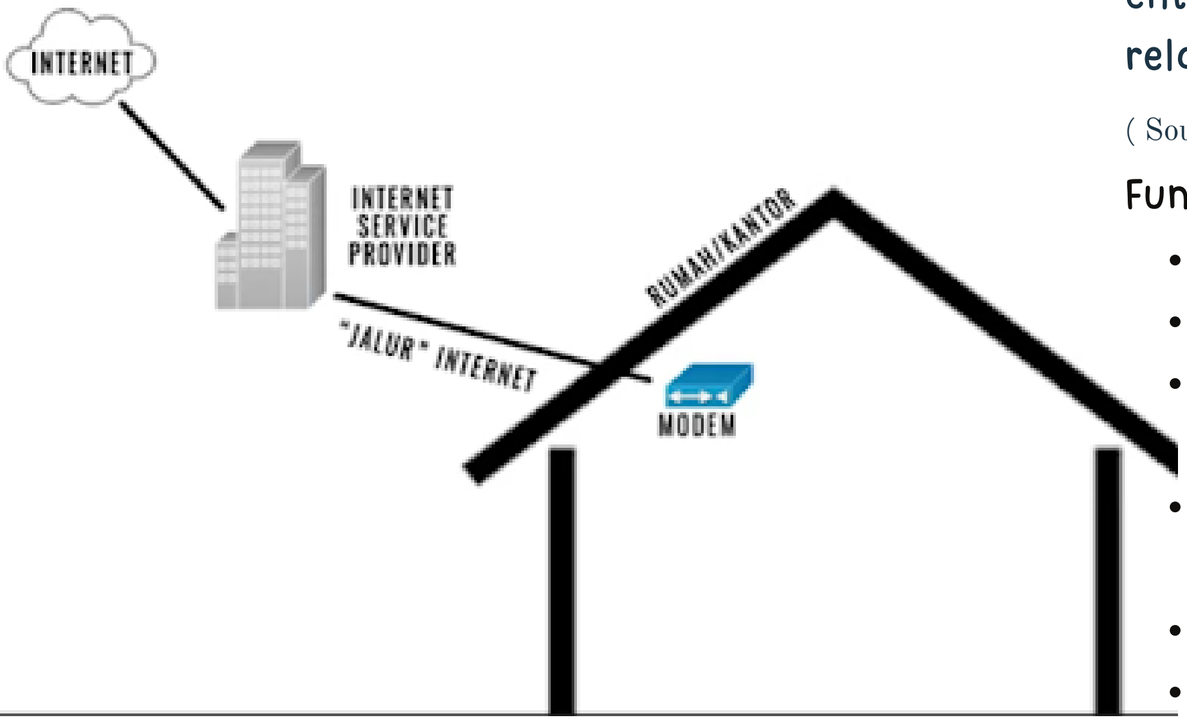
What are the network hardware devices?

ISP
(INTERNET SERVICE PROVIDR)



ILUSTRATION

https://bit.ly/3rHpclO

Definition : Internet service provider (ISP) is a company or entity that provides Internet connection services and other related services.

(Source: *https://id.wikipedia.org/wiki/Penyedia_jasa_Internet*)

Function

- As an internet connection service provider company
- Connecting internet users to the nearest internet gateaway
- As a modem device provider company for dial-up internet connection
- As a medium to connect internet service users with information services on the World Wide Web (WWW).
- On the World Wide Web (WWW)
- Provider of a place for homepage
- As a medium that helps service users to download and upload data from the internet.

(Source : *https://bit.ly/PerancanganJaringanInternetServiceProviderUntukDesa-DesaDiKabupatenSumedang-ByAdeAmaludin*)

ROUTER

DEFINITION

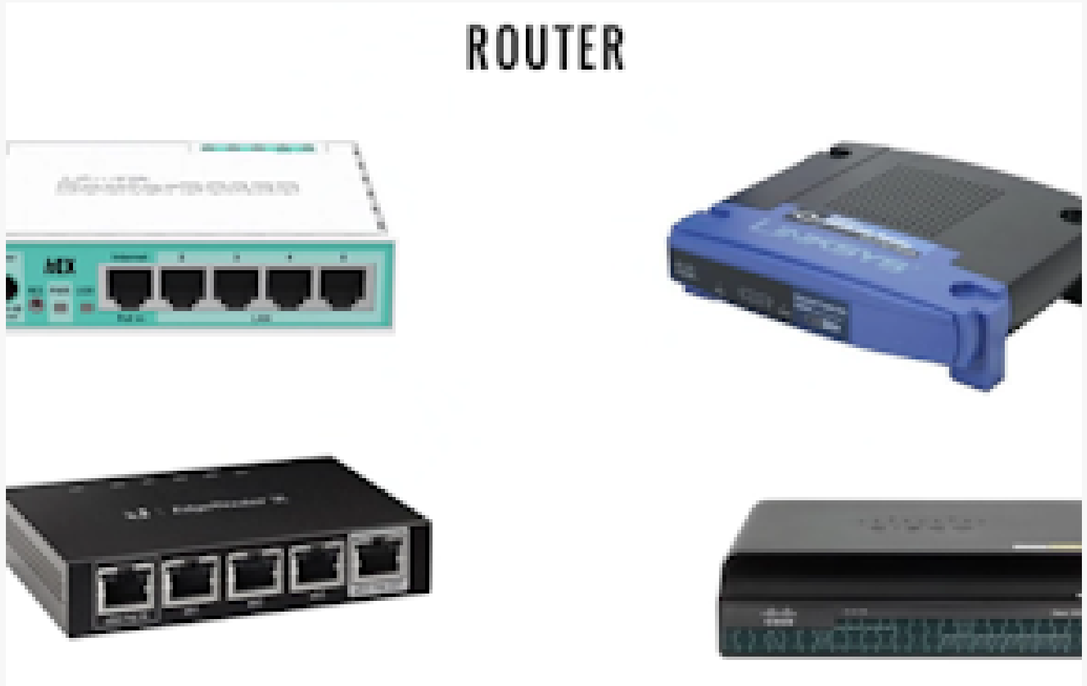
A router is a device that sends data packets through a network or the Internet to their destination, through a process known as routing or tunneling. The routing process occurs at the third layer (the network layer such as the Internet Protocol) of the seven-layer OSI protocol stack.

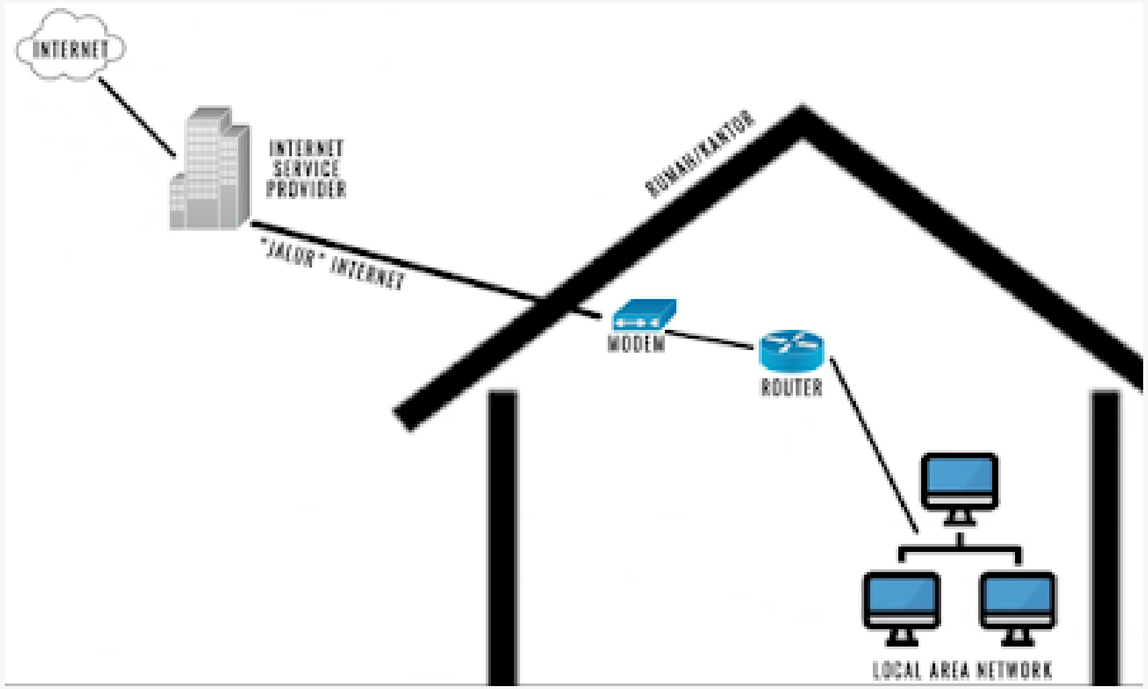
FUNCTION

A router functions as a connector for two or more networks to forward data from one network to another.

(Source : **https://id.wikipedia.org/wiki/Perute**)

ILUSTRATION





https://bit.ly/3rHpcl0

SWITCH

*Definition : **A network switcher*** is a network device that performs invisible bridging (blocking bridging) of multiple networks with MAC address-based redirection. (Source: https://bit.ly/48FvCCH)

FUNCTION

1. Filtering and Forwarding Data Packets

The first switch function is to filter and forward received data packets to the destination address. The address in question is the port and MAC address of the device.

2. Recording Addresses

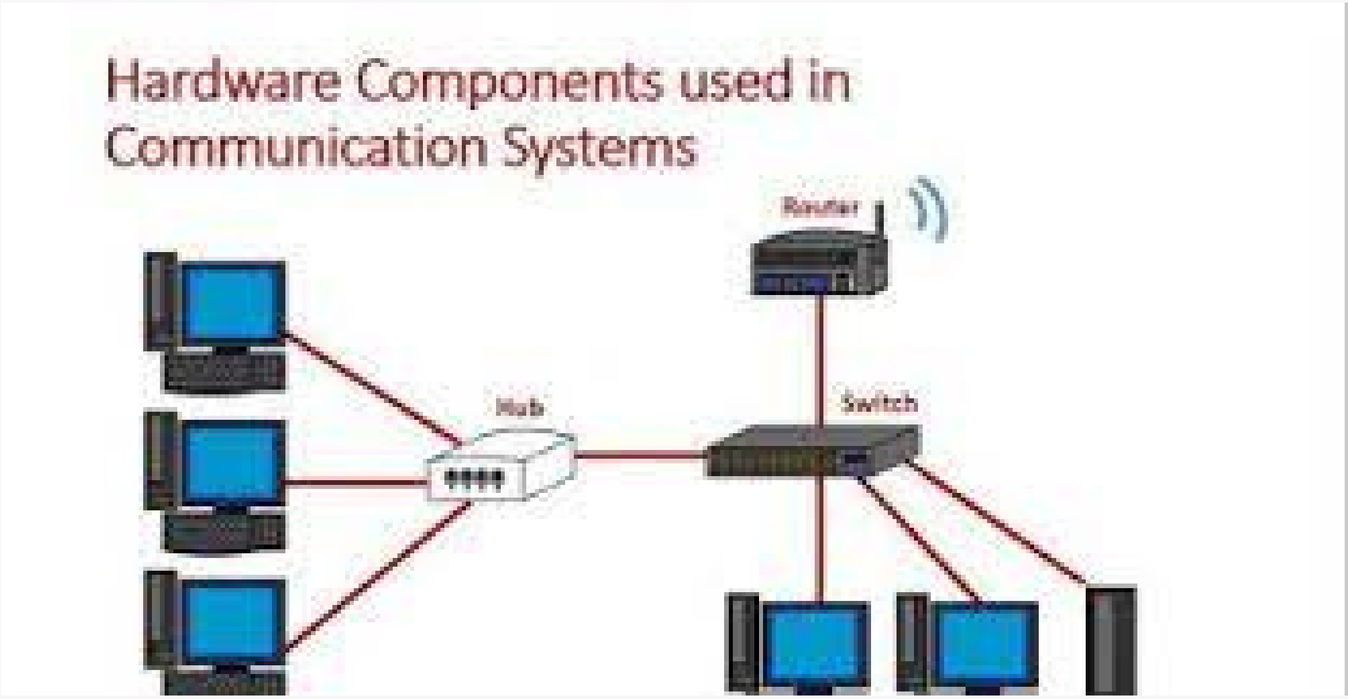
Switches have address learning capabilities where all MAC addresses that have been connected will be stored and learned. When receiving data, the sender's MAC address is automatically recorded and then the switch learns all the shipping processes, including which direction the data should be sent.

3. Looping Avoidance

Another switch function is to prevent data looping. This obstacle is a condition where the data received is stuck or just spinning around in the port section.

(Source : **https://bit.ly/fungsiswitch**)

ILUSTRATION OF SWITCH



(Source : https://bit.ly/46Eh18J)

ACCESS POINT

DEFINITION

An Access Point is a device that allows wireless devices to connect to a network using Wi-Fi, Bluetooth, or other standards. WAP is usually connected to a router (via cable) so that it can pass data between various wireless devices (such as computers or printers) and wired networks on a network.

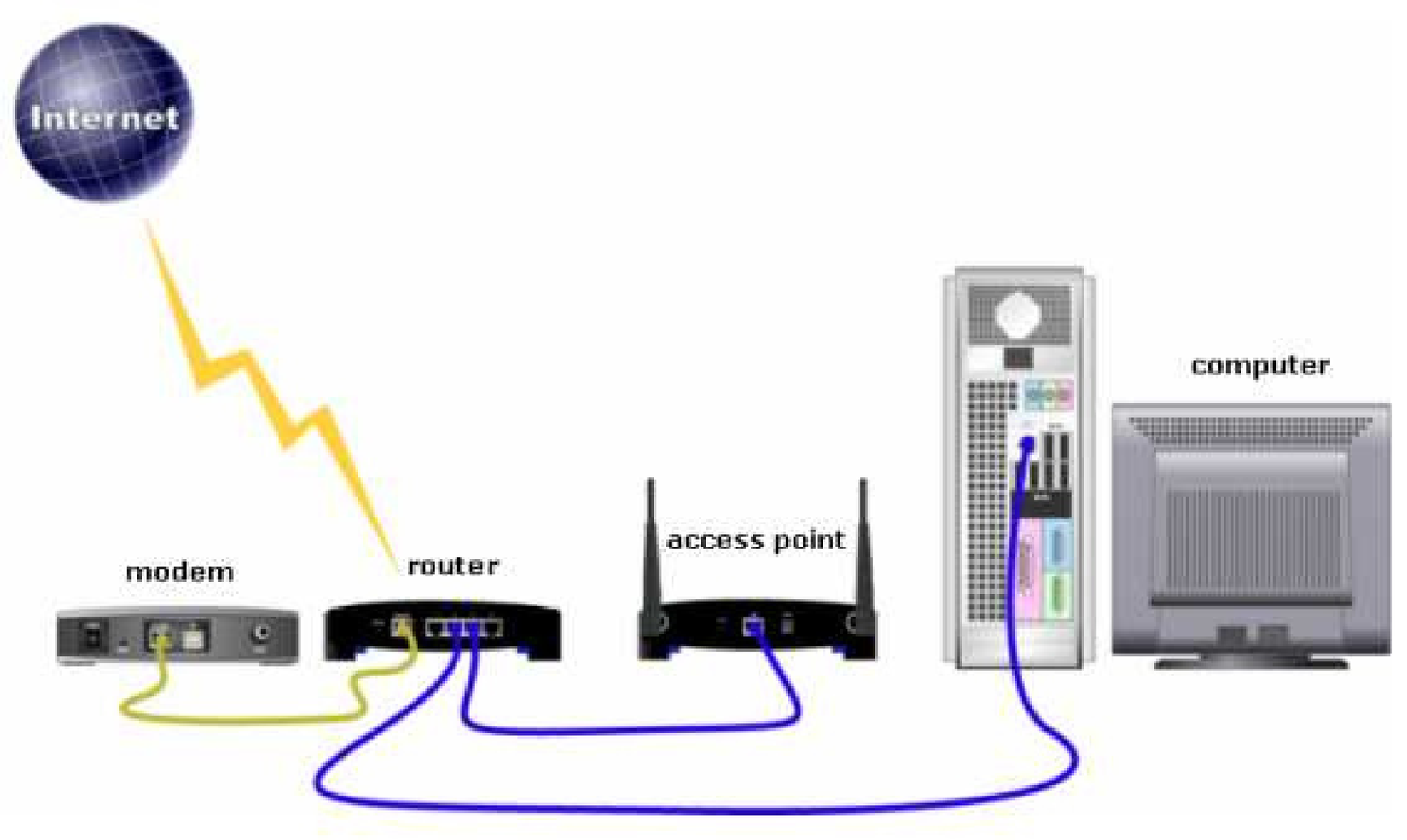
(Source : **https://id.wikipedia.org/wiki/Titik_akses_nirkabel**)

FUNCTION

1. The function of an access point is to spread internet signal to connected devices through radio waves.
2. Access point is a link between networks, namely local networks that use cables with wireless networks such as wifi, wireless, Bluetooth and so on.
3. Access points can also be used to set the IP address automatically to connected devices.
4. With the security features of WEP or WAP security feature which is commonly called shared key autenthication, the access point can be used as security

(Source : https://bit.ly/ANALISISPENERAPANACCESSPOINTDALAMRENTANGFREKUENSI2400—2500MHzDIBALMONKELASIIPONTIANAK-ByTomyAswin Halaman 2)

ILUSTRATION



(Source : https://bit.ly/3ZNxBkr)

FIREWALL

Definition : In computing, a firewall is a network security system that monitors and controls incoming and outgoing network traffic based on predefined security rules. Firewalls typically form a barrier between trusted networks and untrusted networks, such as the Internet. (Source: https://en.wikipedia.org/wiki/Firewall_(computing)_)

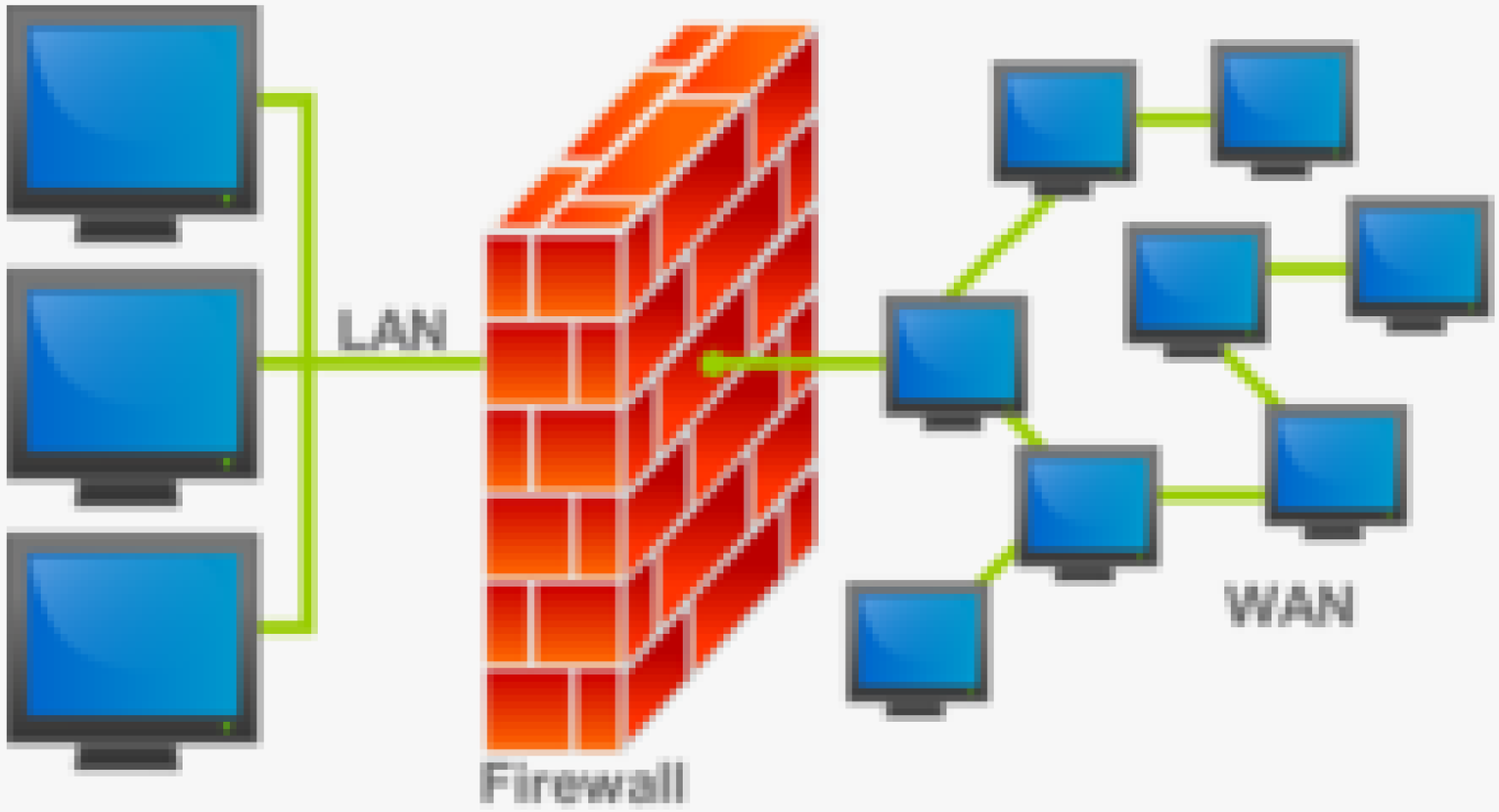
FUNCTION

Their basic function is to control the flow of data between connected networks. They can be software tools running on general-purpose hardware, hardware tools running on special-purpose hardware, or virtual tools running on virtual hosts controlled by a hypervisor (Source: https://en.wikipedia.org/wiki/Firewall_(computing)_)

It protects networks and computers from threats coming from outside. Firewalls work by analyzing the data traffic entering and leaving the network, and filtering the information coming into the network.

(Source: https://bit.ly/fungsifirewall)

ILUSTRATION OF FIREWALL

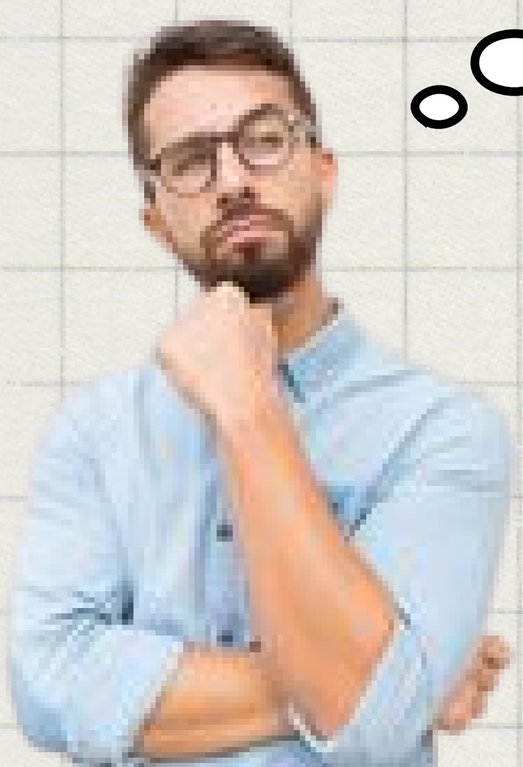


(Source: https://en.wikipedia.org/wiki/Firewall_(computing)_)

So the conclusion is:

1. ISP: Internet provider (IndiHome, First Media, etc.)
2. Modem : Connection to ISP
3. Router: Manage the connection between the modem and the LAN network
4. Switch/Hub: Connection to LAN network via cable
5. Access Point: allows wireless devices to connect to a network
6. Firewall: protects the network and computers from threats coming from outside.

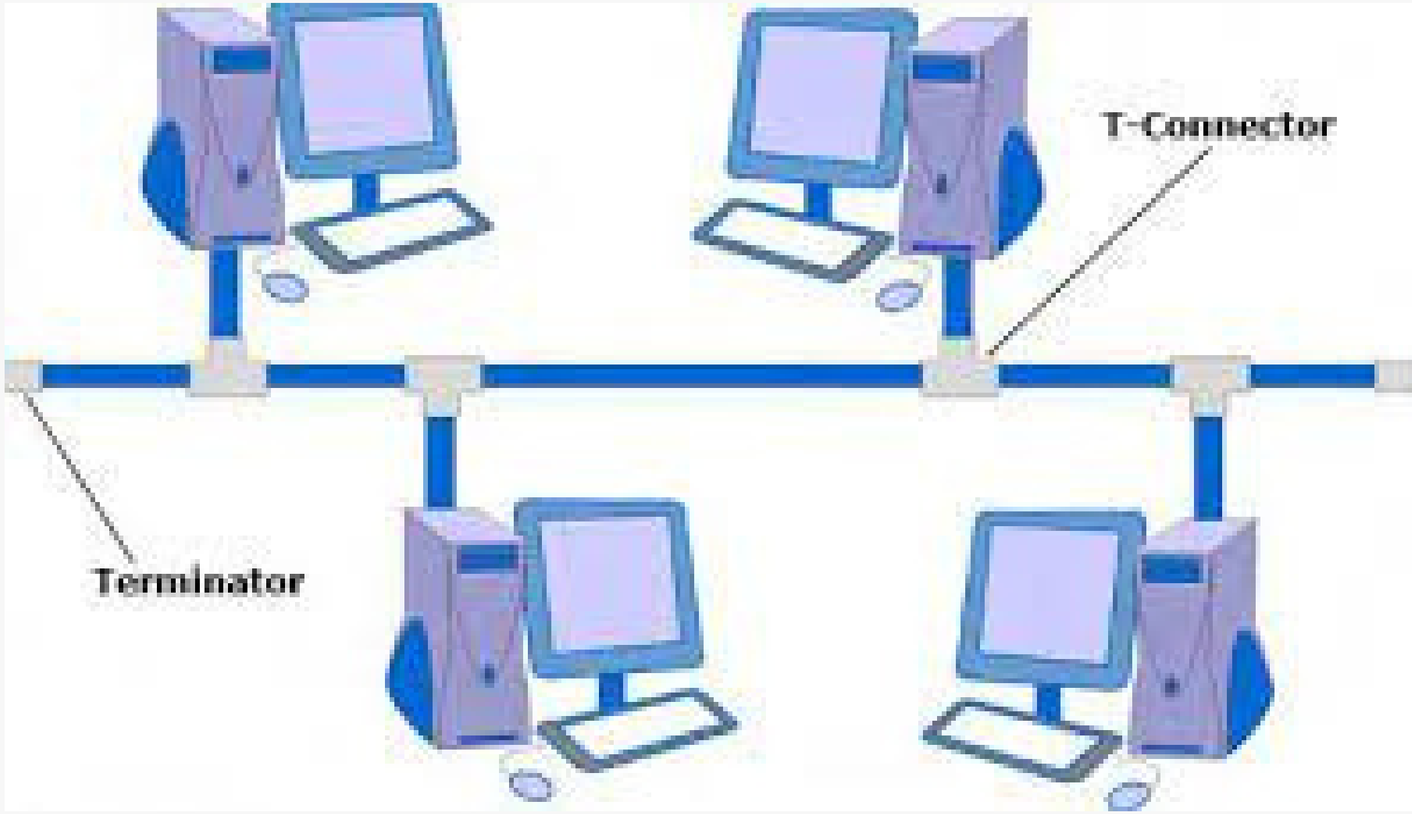
What are the basic network topologies on a computer?



BUS TOPOLOGY

Bus topology is a topology that connects all terminals to one communication line whose two ends are closed with a terminator. Terminator is a device that provides electrical resistance to absorb the signal at the end of the transmission connection so that the signal is not ejected and received by the network station by the network station.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-124)



(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-124)

ADVANTAGES & DISADVANTAGES BUS TOPOLOGY

Advantages

a. Simple topology.
b. Few cables are used to connect computers or other equipment.
c. The cost is lower compared with other wiring arrangements.
d. It is quite easy if you want to expand the network on the bus topology.

Disadvantages

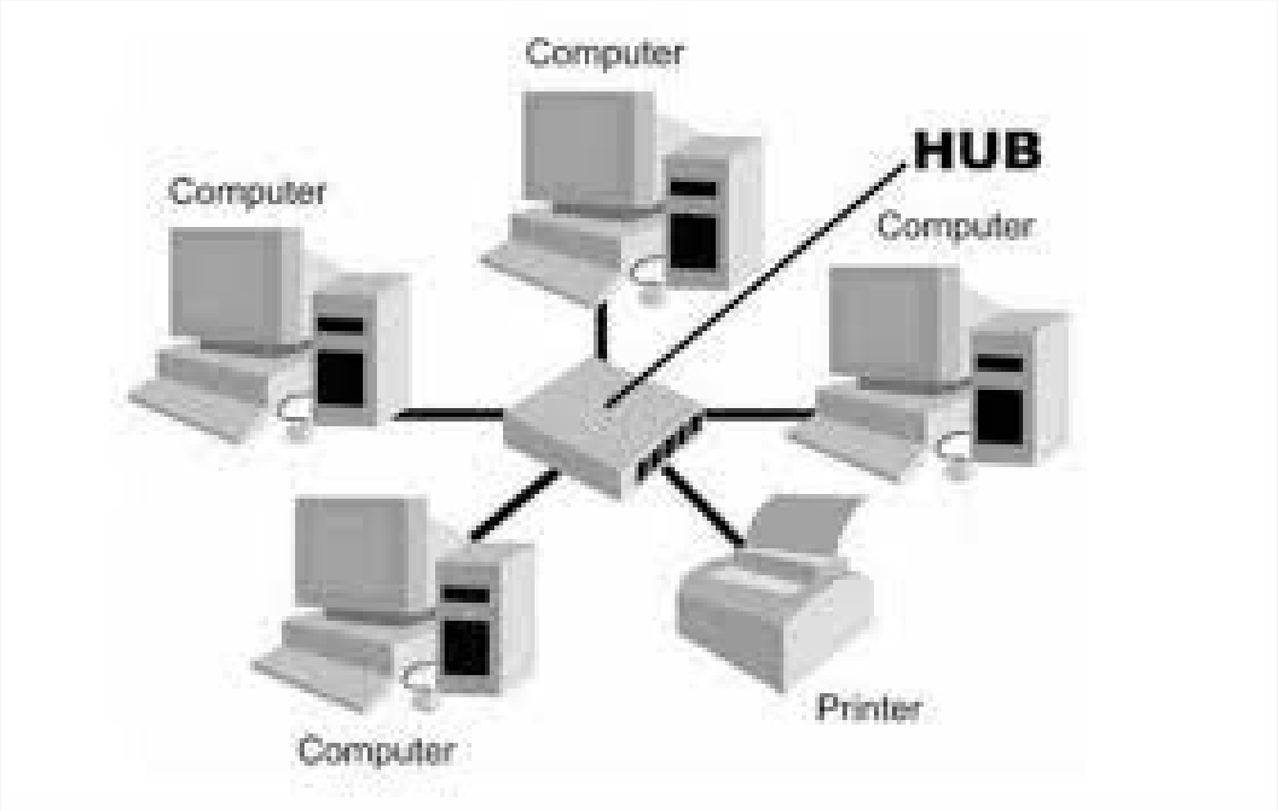
a. Heavy traffic will slow down the bus lane.
b. The entire network shuts down in case of damage to the main cable.
c. Requires terminators on both sides of the main cable.
d. Very difficult to identify the problem if the network is down.
e. The slowest when compared to other network topologies.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-125)

STAR TOPOLOGY

The star topology is designed where each node (file servers, workstations, and other devices) is connected to the network through a Hub or connected to the network through a Hub or Concentrator.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-125)



(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-125)

ADVANTAGES & DISADVANTAGES STAR TOPOLOGY

Advantages

a. Easy installation and wiring.
b. Does not cause interference when repairs occur.
c. Easy to detect faults and move other devices.

Disadvantages

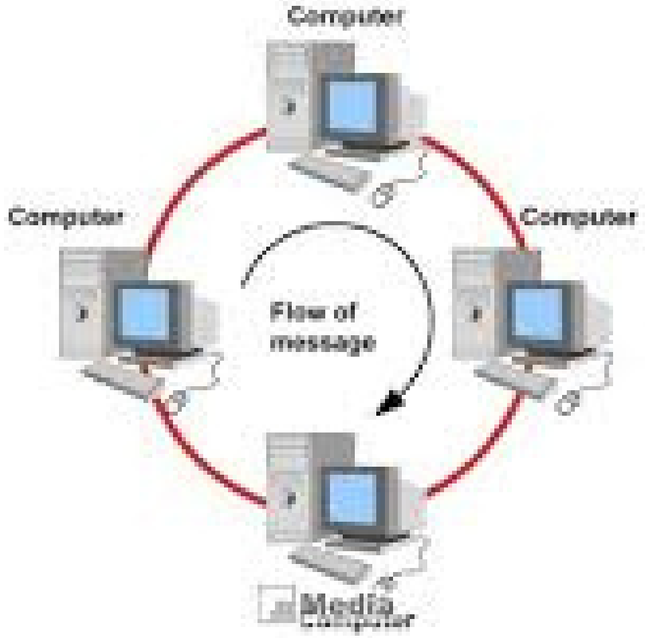
a. Has a single point of fault, located at the hub. If the central hub fails, then the entire network will fail to operate. fail to operate.
b. Requires more cables because all network cables must be pulled to one central point, so more requires more cables than other network topologies. other network topologies.
c. The number of terminals is limited, depending from the ports on the hub.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-125)

RING TOPOLOGY

In the Ring topology all workstations and servers are connected so that they form a circle or ring pattern. Each workstation or server will receive and pass information from one computer to another, if the addresses match then the information is received and if not the information will be passed.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-125)



(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-126)

ADVANTAGES & DISADVANTAGES RING TOPOLOGY

Advantages

a. Data flows in one direction so that collision can be avoided.
b. Data flows faster because can serve data from the left or right of the server.
c. Can serve the flow of data traffic traffic, because data can move left or right.

Disadvantages

a. If there is one computer in the ring that fails to function, it will affect the entire network.
b. Adding or removing computers will disrupt the network.
c. Difficult to reconfigure reconfiguration.

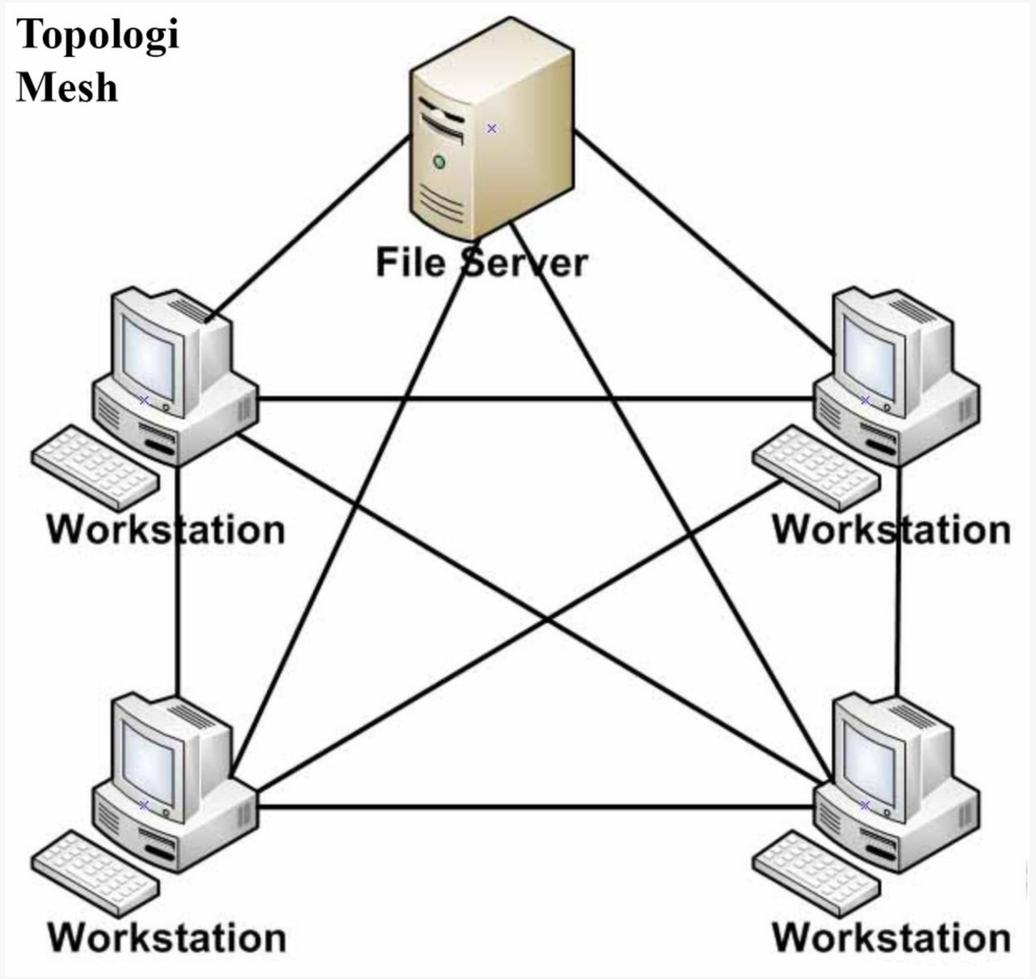
(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-126)

MESH TOPOLOGY

Mesh topology has a redundant relationship between existing equipment Arrangements in a network are interconnected with other equipment.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-126)

Mesh topology is a form of network topology where each node is directly connected to other nodes on the network. Until form a series resembling a mesh / net. Because each node is directly connected to other nodes then when going to communicate each node does not need an intermediary or commonly called dedicated links.



(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-126)

ADVANTAGES & DISADVANTAGES MESH TOPOLOGY

Advantages

a. The main advantage of using mesh topology is fault tolerance.
b. Guaranteed channel capacity communication channel capacity, because it has that are redundant.
c. Relatively easier to do troubleshoot

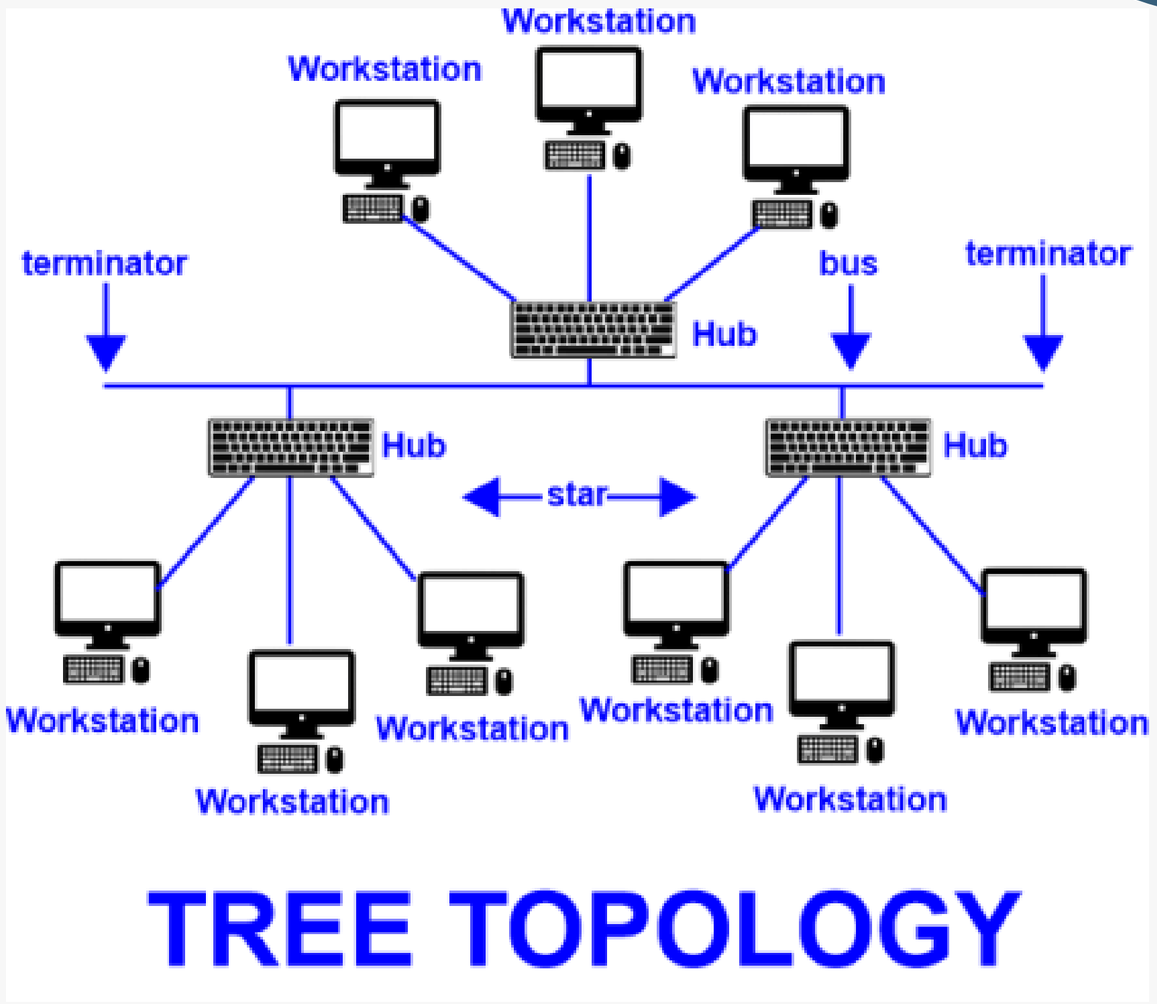
Disadvantages

a.Difficulty when installing and reconfiguring when the number of computers and equipment number.
b. High cost of maintaining redundant relationships.

(Source : https://bit.ly/ImplementasiNetworksTools-ByPramaWiraGinta Halaman-127)

TREE TOPOLOGY

Tree computer network topology is a combination of several star topology that is connected to a bus topology, so each star topology will be connected to another star topology using a bus topology. star topology will be connected to other star topologies using a bus topology. bus topology.



(Source : https://bit.ly/gambartreetopology)

ADVANTAGES & DISADVANTAGES TREE TOPOLOGY

Advantages

a) Network groups under the Central HUB can expand or add clients easily, Scalable.
b) Communication occurs point to point.
c) Overcoming the limitations of the star network topology which has limitations on HUB connection points and traffic limitations induced on the Bus Topology.

Disadvantages

a) The overall performance of the network depends on the Central HUB, if the HUB is damaged, the network will be disrupted. (star topology properties).
b) Communication cannot be done directly between computers, but must go through the HUB first.
c) Because through a main cable, the data traffic is very dense.

THANK YOU!