Computer Networks

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Physical Topology

It tells how systems are physically connected through links. It is a geometric representation of the network.

Bus Topology

Only one connection.

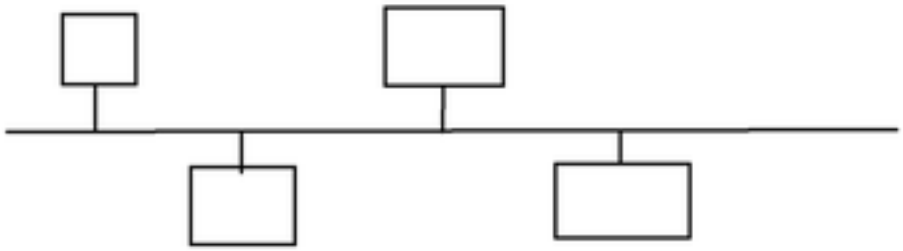


Figure 1: Bus Toplogy

Advantages

- Easy to install
- Cheap
- Easy to expand

Disadvantages

- Only one device can transmit at a time, which makes it low speed.
- Single point of failure - faulty cable can bring down the whole system.

Ring Topology

Tokens are used to transfer data. Only one system can hold the token at a time. Token passing is done.

***Advantages**

- Cheap

Disadvantages

- Not easy to install.
- Not easy to expand.
- If one system/one link goes down the entire ring will go down.

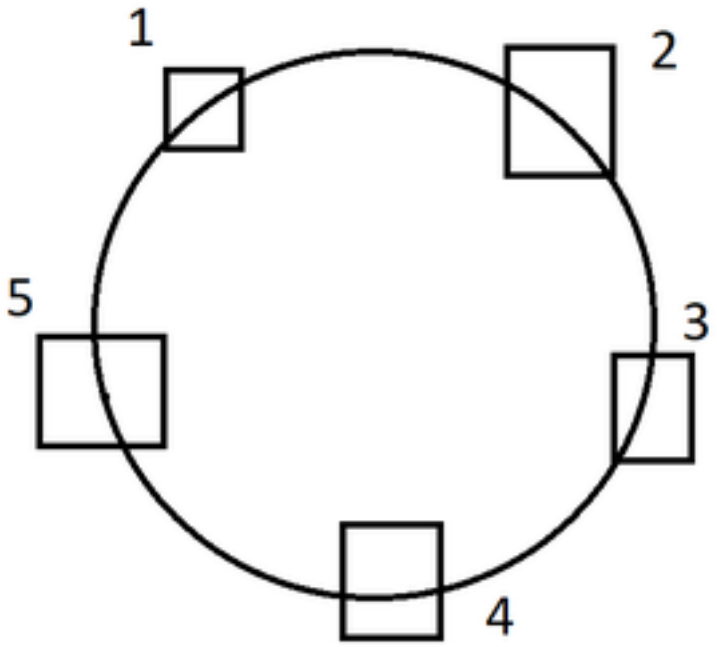
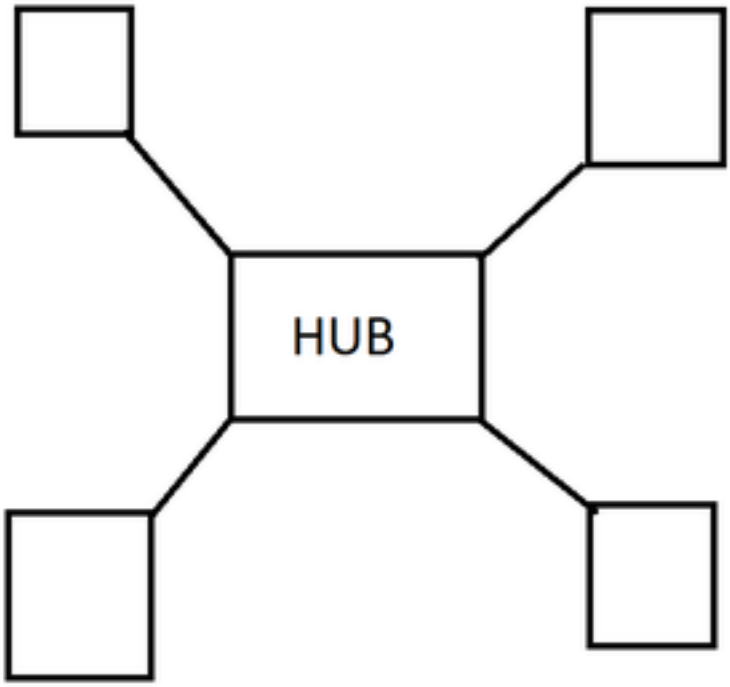


Figure 2: Ring Topology

Star Topology

Uses a central hub.



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__ **Advantages and disadvantages same as of any centralized system**__ Hub can also be expensive.

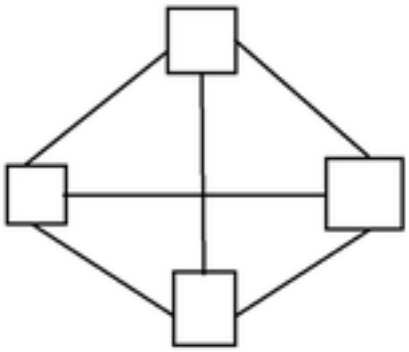


Figure 3: Mesh

Mesh Topology

Advantages

- Less traffic
- No single point of failure
- Messages can be sent directly without any routing

Disadvantages

- Cabling cost will be higher
- Maintenance cost will be higher.

Tree Topology

Tree strucure.

Networks Based on Geographical Area

- LAN - Local Area Network
- MAN - Metropolitan Area Network
- WAN - Wide Area Network

Differentiate based on cables, cost, etc.

OSI Model - Open Systems Interconnection

Given by ISO.

The OSI model is a layered framework for the design of network systems that allows communication btw all types of computer systems.The purpose of OSI model is to facilitate communication btw different systems without requiring changes to the logic of underlaying hardware and software.

Physical Layer

It is responsible for moving physical bits. It defines:

- a transmission medium (wireless/wired)
- types of encoding to be used
- data rate
- synchronization of bits
- physical topology

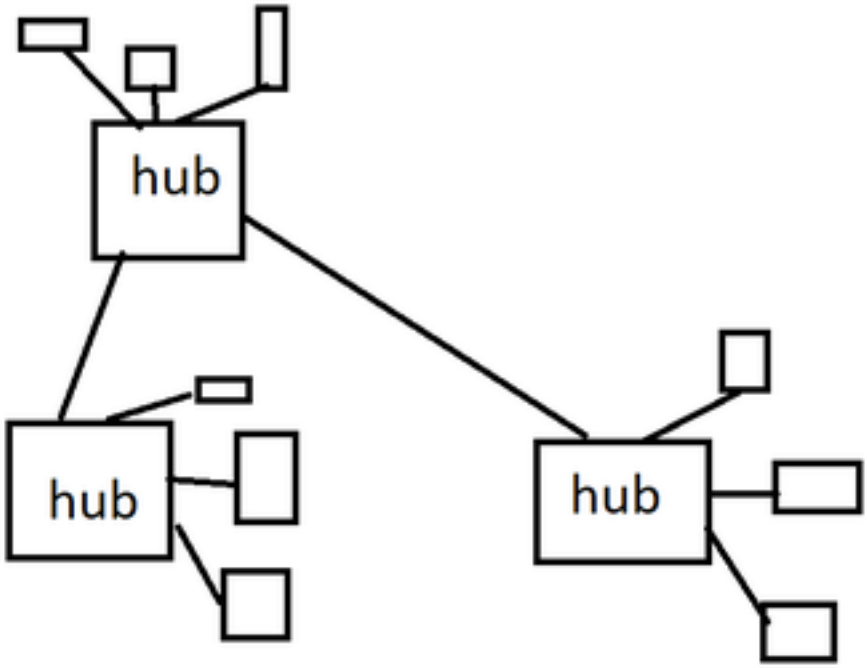
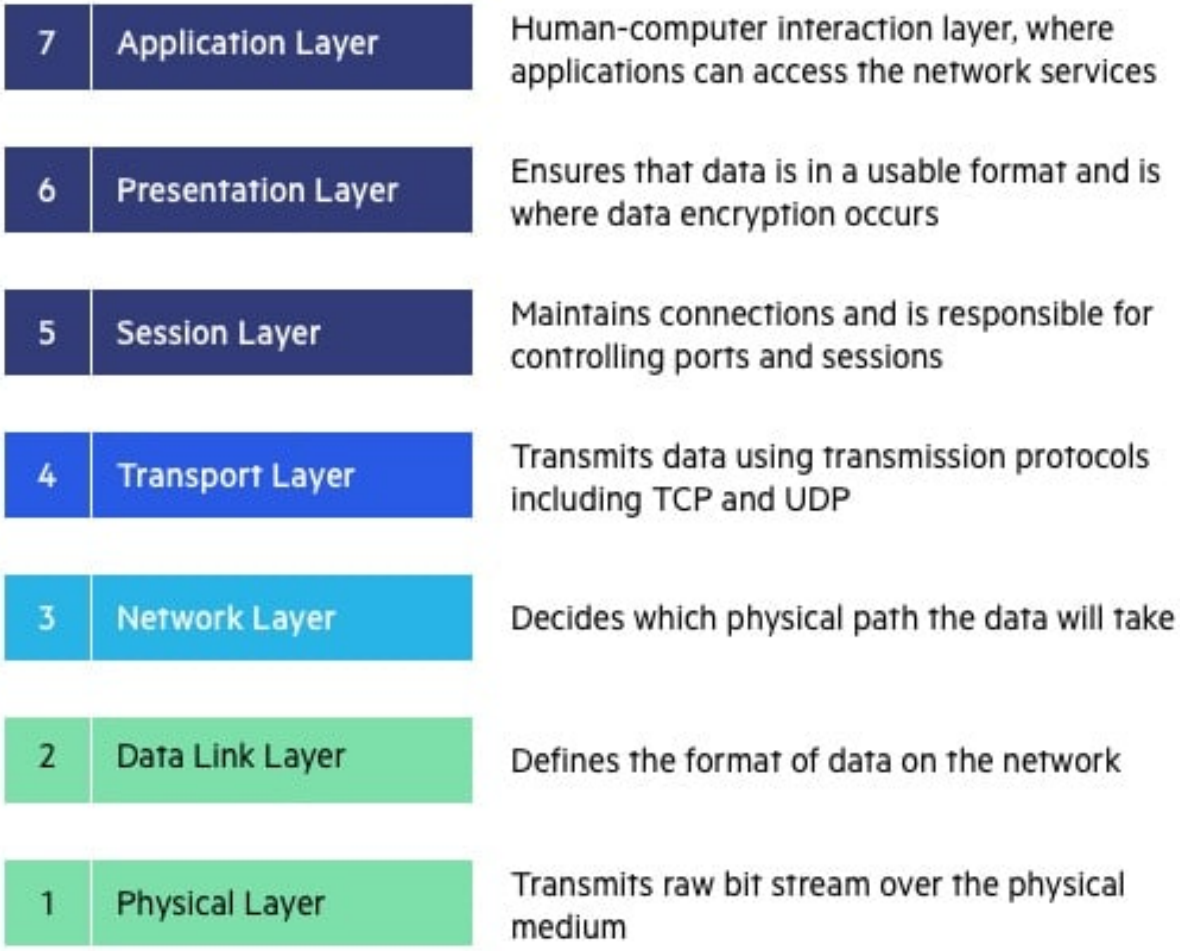


Figure 4: Tree Topology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Application Layer
Human-computer interaction layer, where applications can access the network services
6
Presentation Layer
Ensures that data is in a usable format and is where data encryption occurs
5
Session Layer
Maintains connections and is responsible for controlling ports and sessions
4
Transport Layer
Transmits data using transmission protocols including TCP and UDP
3
Network Layer
Decides which physical path the data will take
2
Data Link Layer
Defines the format of data on the network
1
Physical Layer
Transmits raw bit stream over the physical medium

Figure 5: OSI