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TCP/IP Protocol Suite and Network Devices

Design Goals of TCP/IP

- The TCP/IP reference model was developed prior to OSI model. The major design goals-

1. To connect multiple networks together so that they appear as a single network.

2. To survive after partial subnet hardware failures.

3. To provide a flexible architecture

Protocol and Its Elements

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- It is a set of rules that govern data communication.
- Define What, How and When in terms of data communication

- **Syntax**
  - **Structure or format of the data**
  - **Indicates how to read the bits - field delineation**
- **Semantics**
  - **Interprets the meaning of the bits**
  - **Knows which fields define what action**
- **Timing**
  - **When data should be sent**
  - **Speed at which data should be sent or speed at which it is being received.**

TCP/IP Protocol Suite

- The **Internet Protocol Suite** (commonly known as **TCP/IP**) is the set of communications protocols used for the Internet and other similar networks.

- Named from two of the most important protocols
  - Transmission Control Protocol (TCP) and
  - Internet Protocol (IP)

TCP/IP PROTOCOL SUITE

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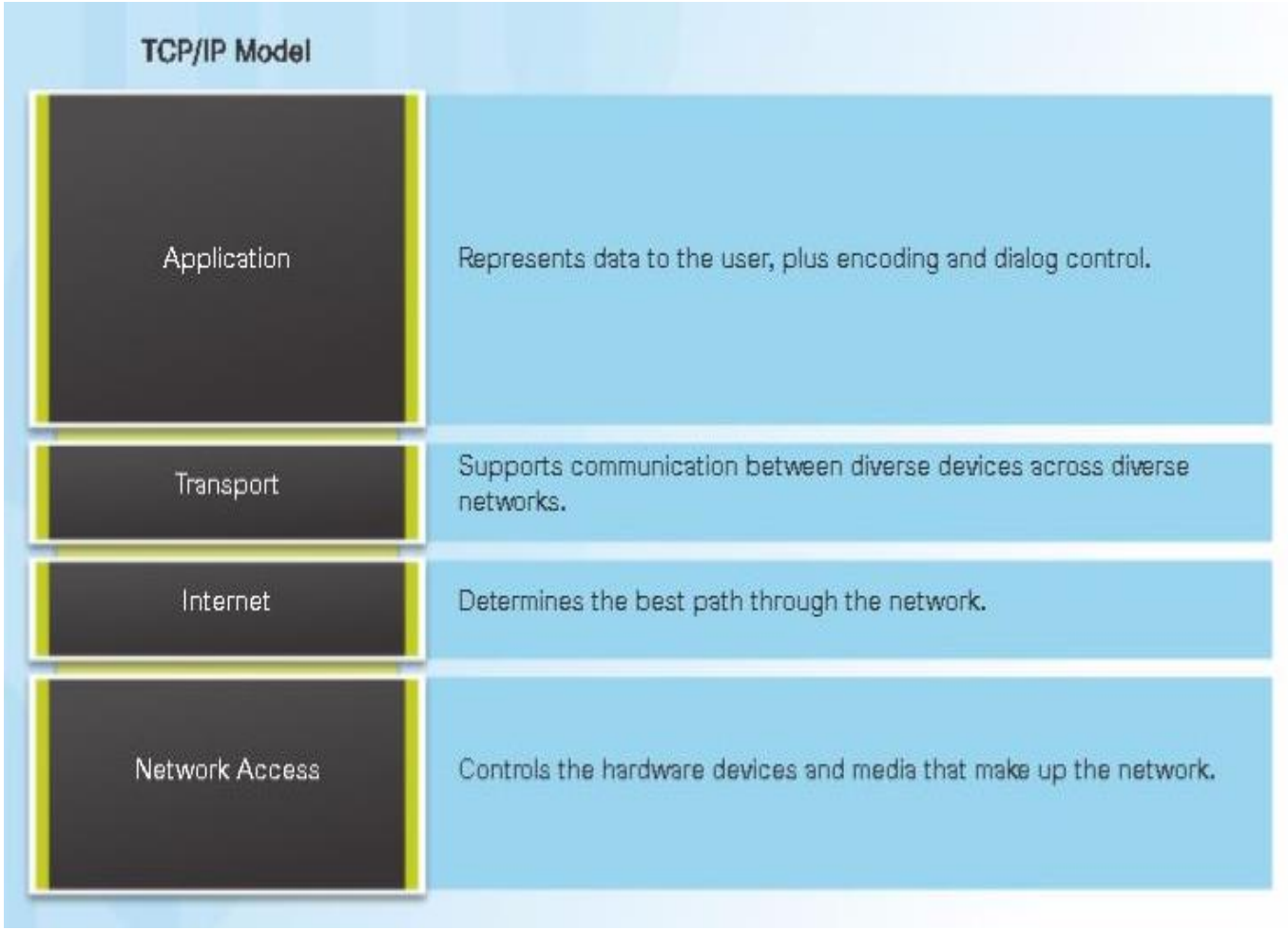
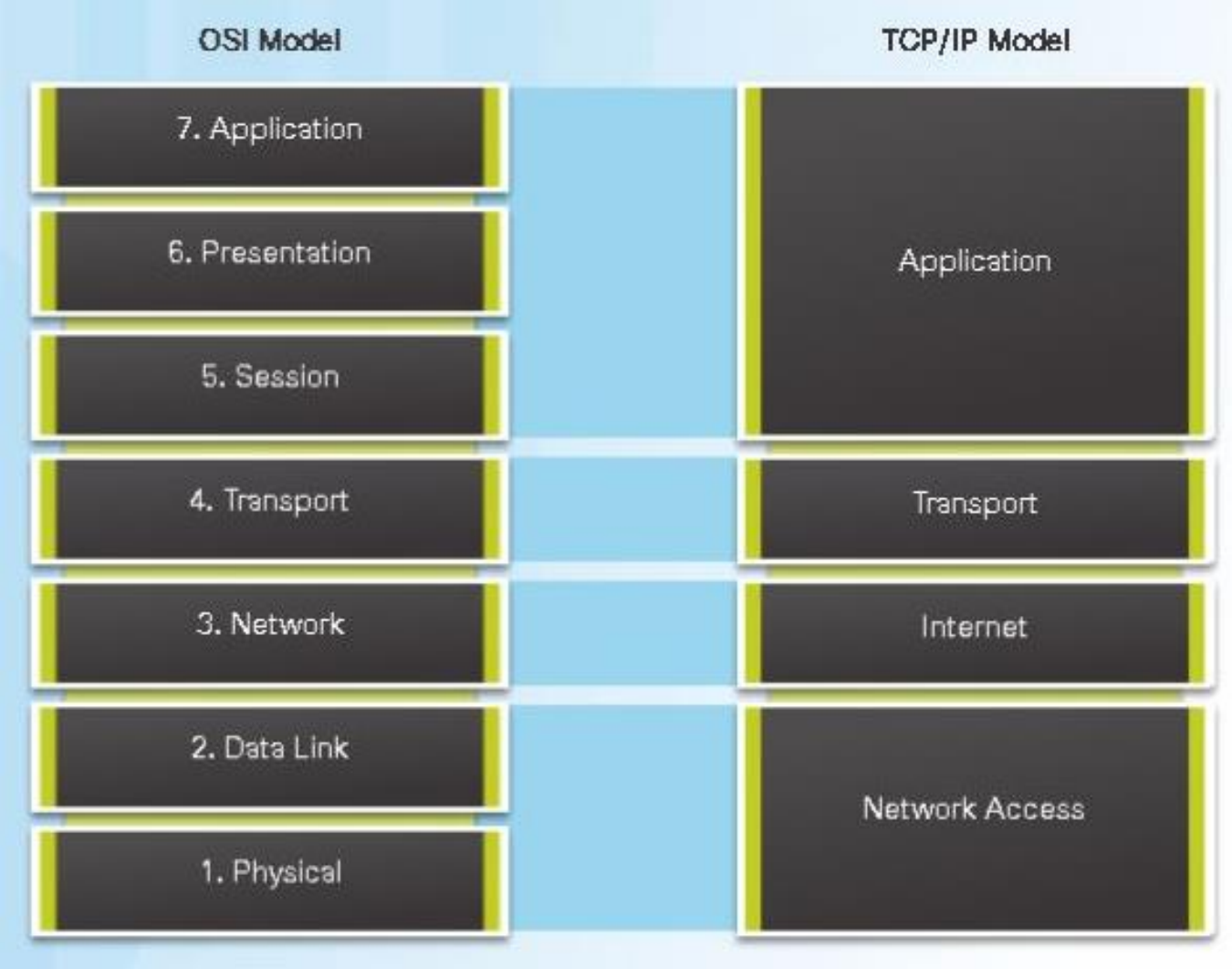
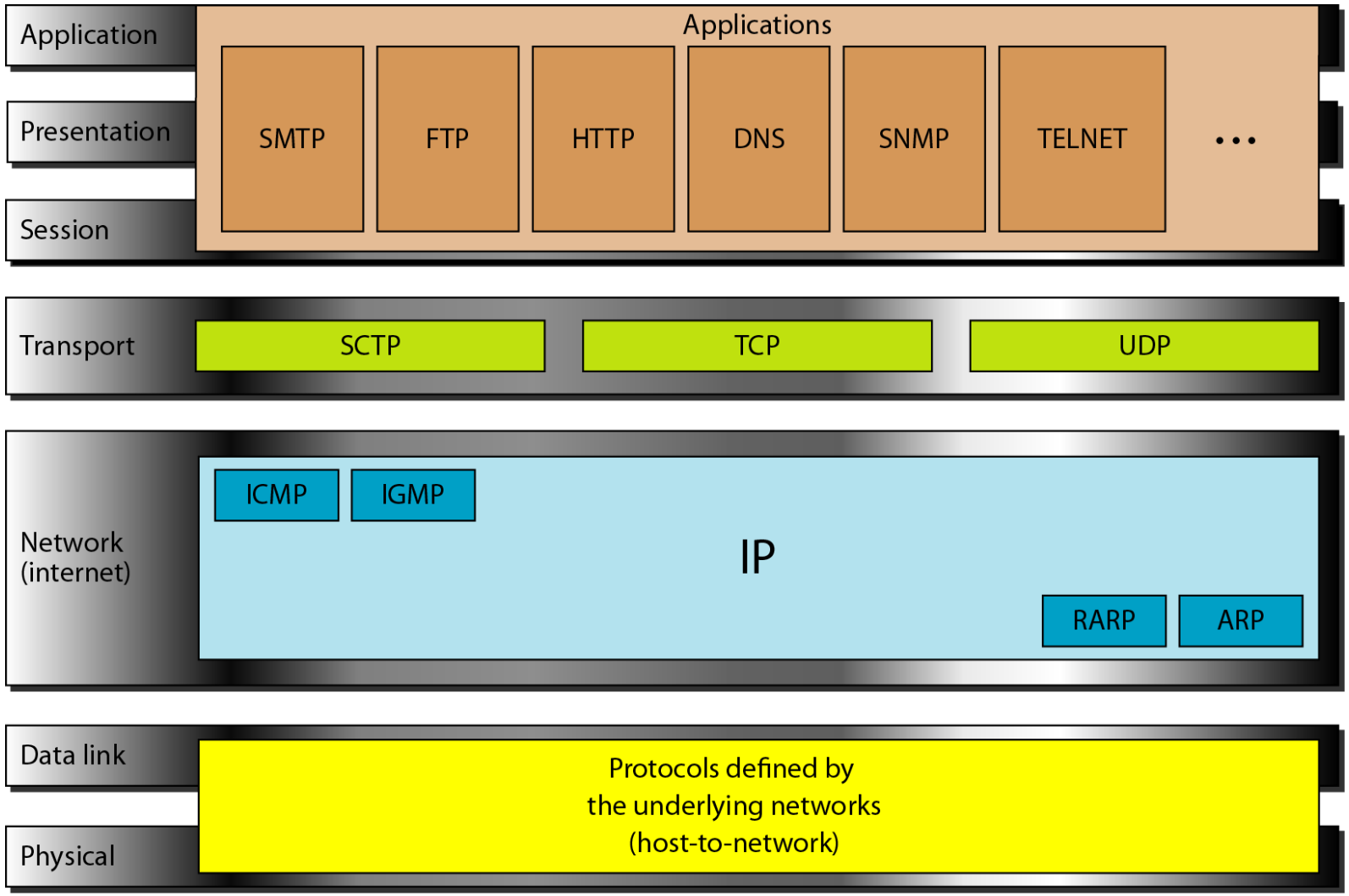
- The layers in the TCP/IP protocol suite do not exactly match those in the OSI model.
- The original TCP/IP protocol suite was defined as having four layers:
  - Host-to-network/Network access
  - Internet
  - Transport
  - Application.



TCP/IP vs OSI


OSI Model
TCP/IP Model
7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical
Application
Transport
Internet
Network Access

Protocols in TCP/IP Model



IP- Internet Protocol

ARP- Address Resolution Protocol

RARP- Reverse Address Resolution Protocol

ICMP- Internet Control Management Protocol

IGMP- Internet Group Management Protocol

SCTP- Stream Control Transmission Protocol

TCP- Transmission Control Protocol

UDP- User Datagram Protocol

SMTP- Simple Mail Transfer Protocol

FTP- File Transfer Protocol

HTTP- Hyper Text Transfer Protocol

DNS- Domain Name System

SNMP- Simple Network Management Protocol

Network Devices

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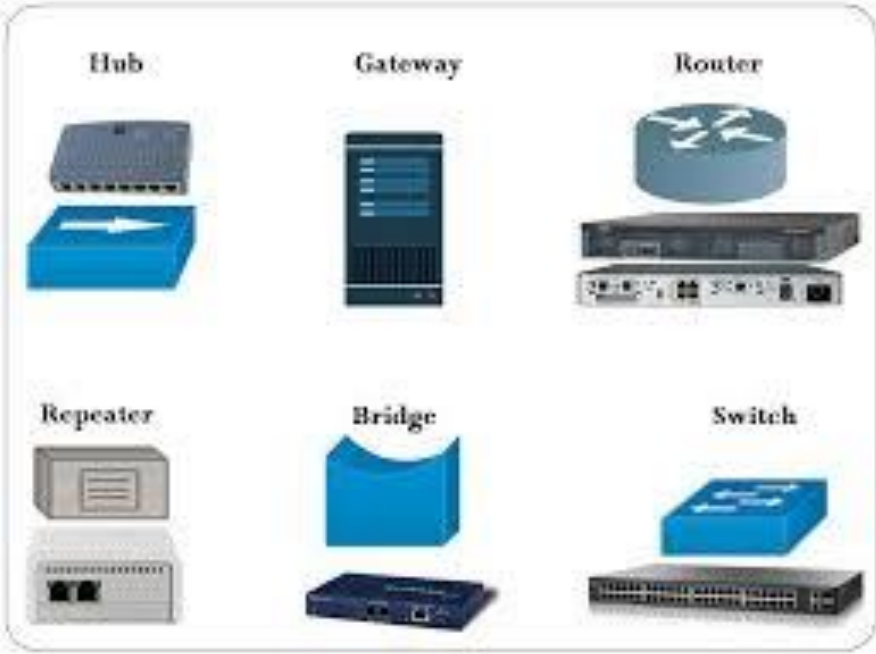
1. **Hub**- A distributor that has many ports which connected to computers.
2. **Switches**- Like a hub but it transmit packets to it destination
3. **Bridge- I**t is used to connect two similar LANs.
4. **Routers**- Choose the best path to transmit the packet.
5. **Gateway-** It is used to connect two deferent LANs and connect different application protocols.
6. **Firewall-** A s/w program or h/w device (or combination of both) protects the device or network from unauthorized access by blocking unsolicited traffic.
7. **Repeaters**- Repeats signals that travels via long distance



Network Devices (Repeater)

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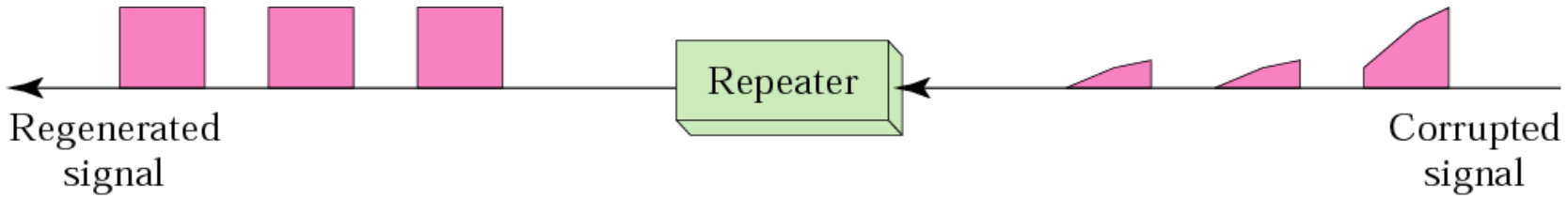
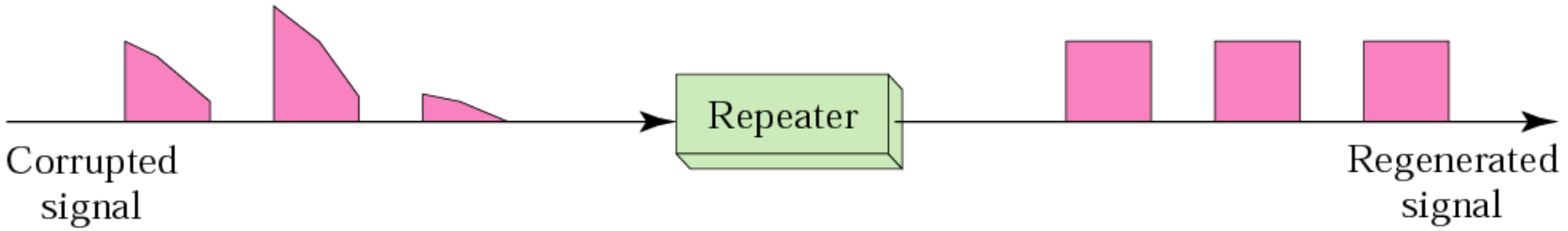
- Repeater: Re-generates the signal again.



a. Right-to-left transmission.



b. Left-to-right transmission.

Network Devices (Hub and Bridge)

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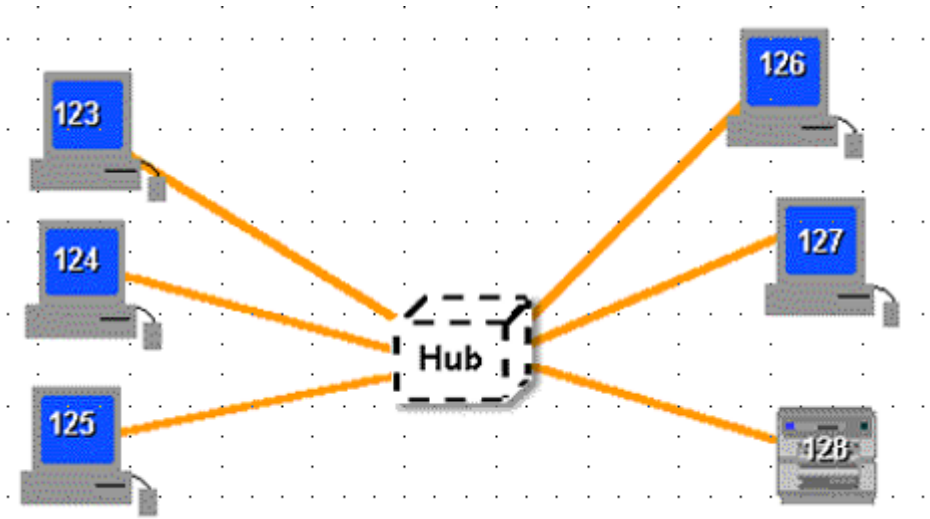

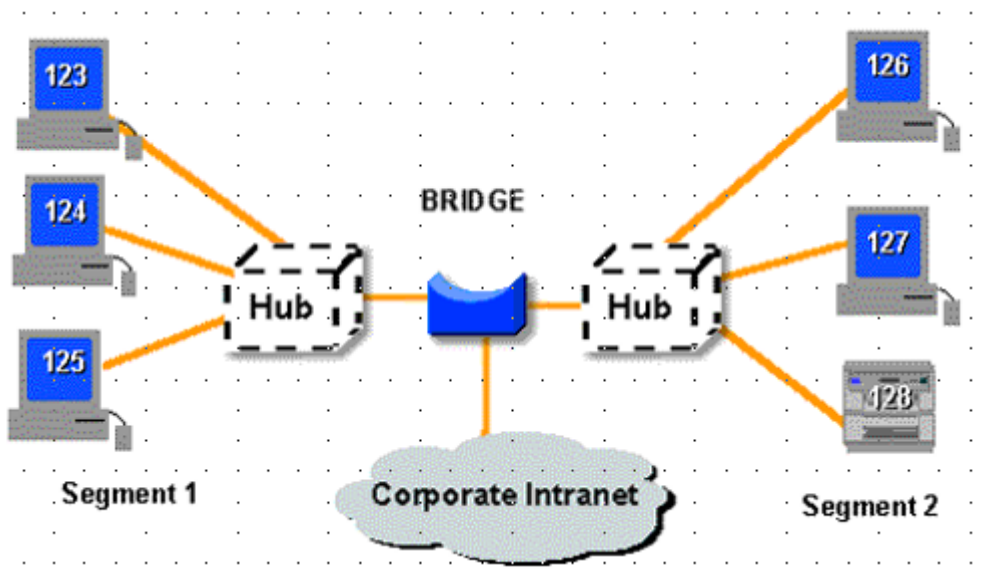

Network Devices (Bridge)

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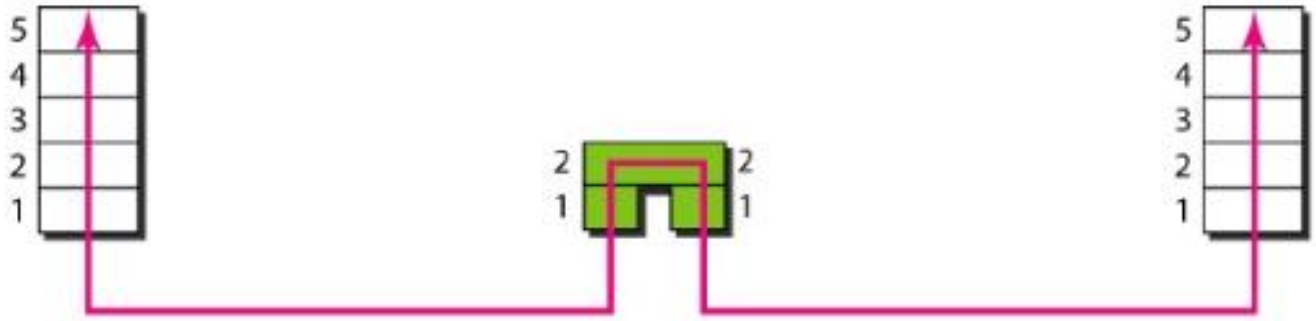
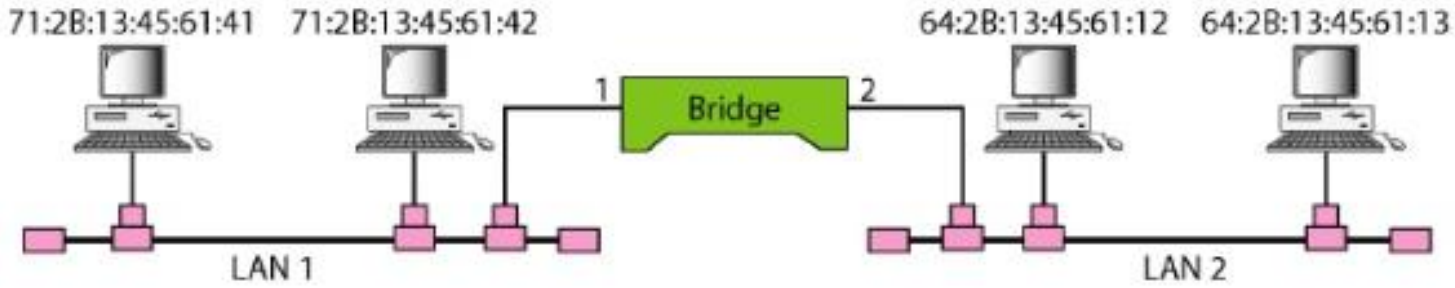
A bridge connecting two LANs

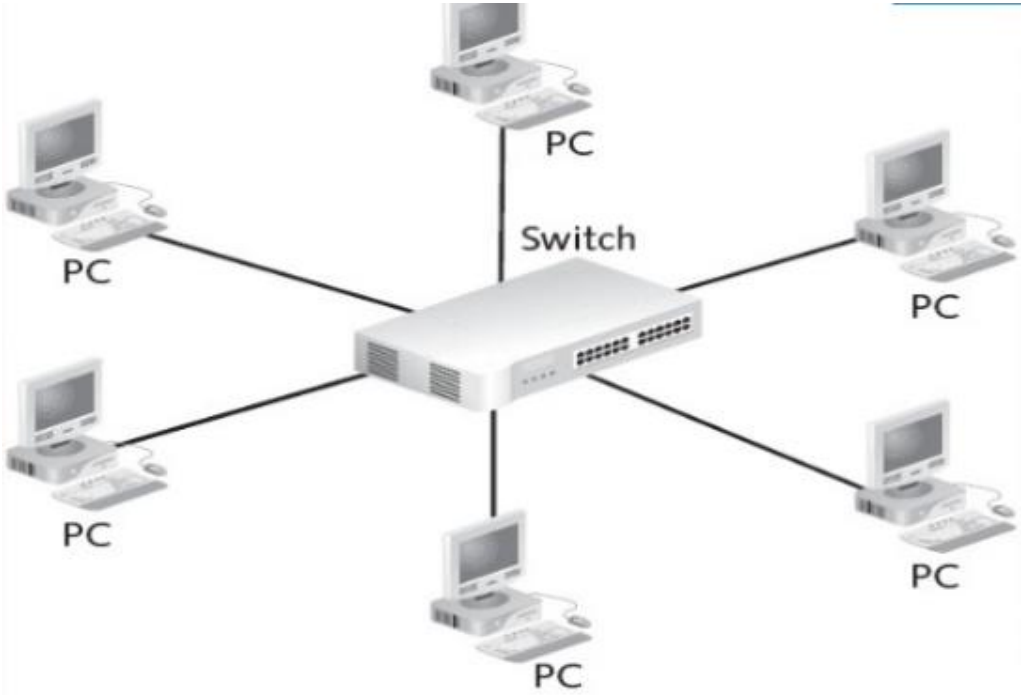


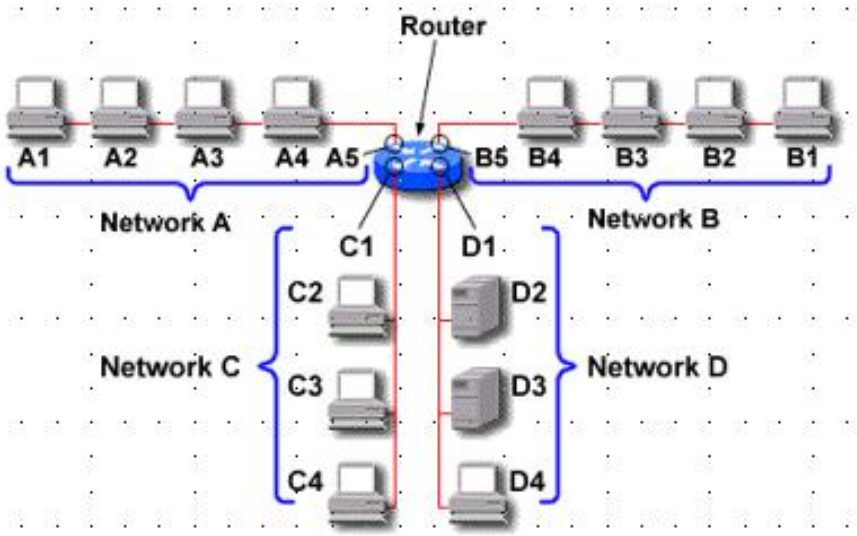
Address	Port
71:2B:13:45:61:41	1
71:2B:13:45:61:42	1
64:2B:13:45:61:12	2
64:2B:13:45:61:13	2

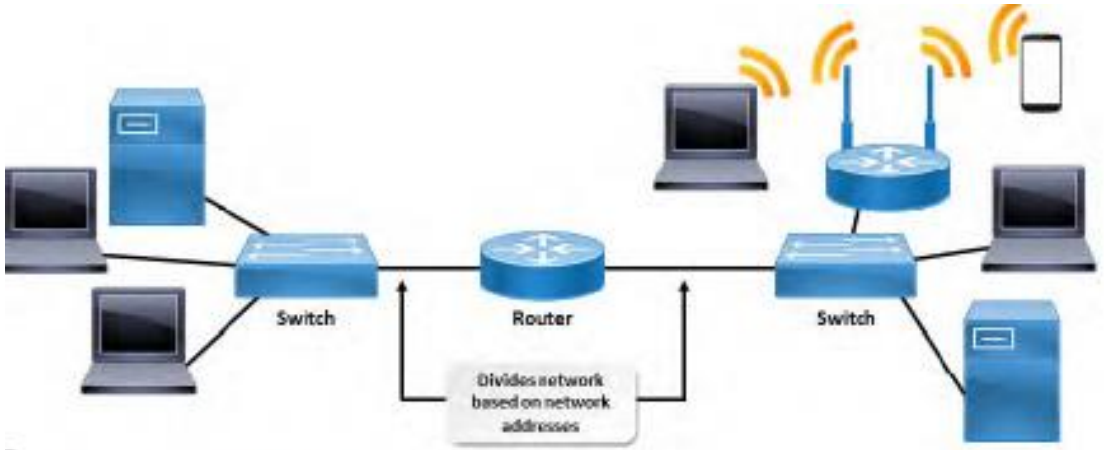
Bridge Table



Network Devices (Switch and Router)

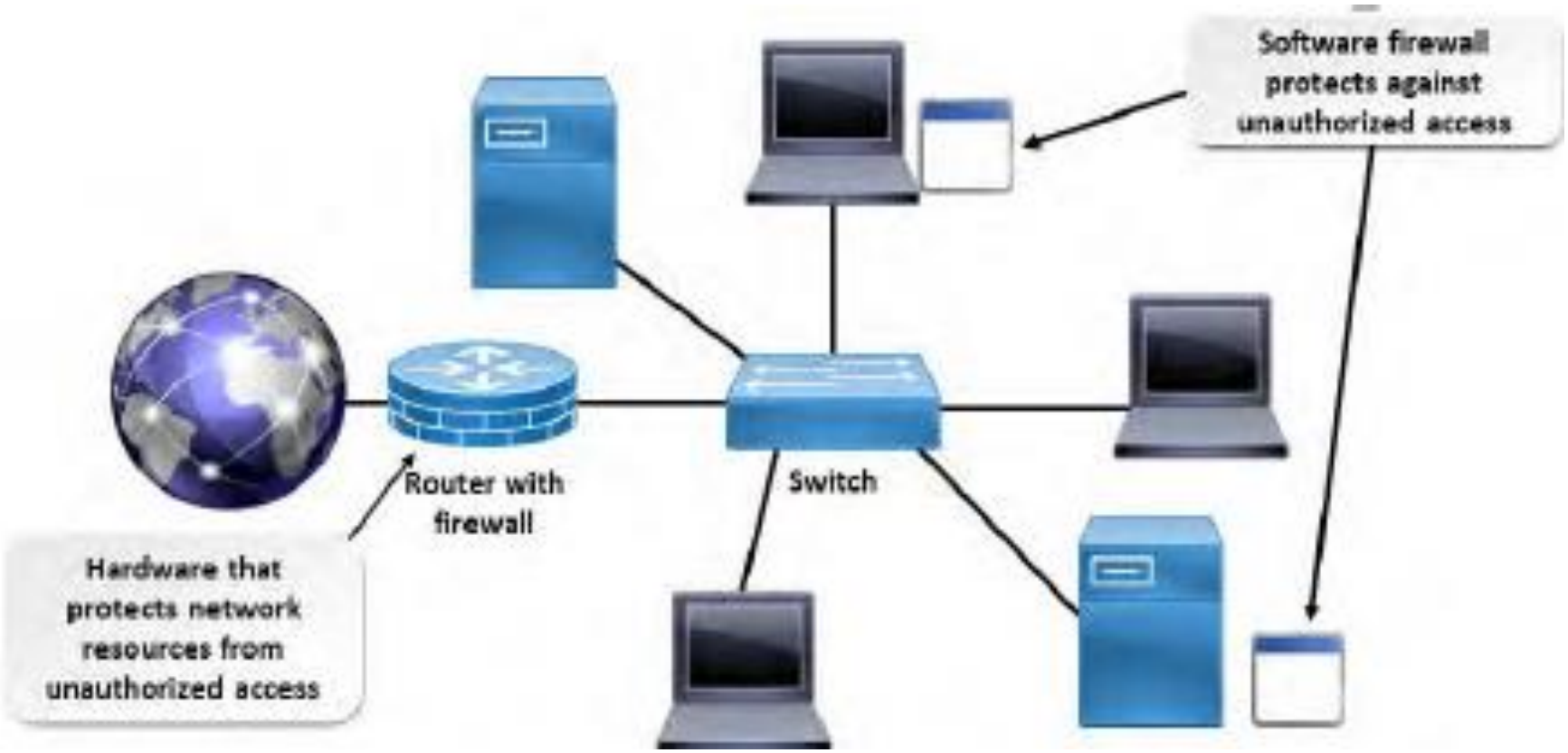






igure 4–15: Router on a network.

Network Devices (Firewall)



Network devices at different Layer

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Layers	Network Devices
Application Layer	Application gateway
Transport Layer	Transport gateway
Network Layer	Router and gateway
Data link layer	Bridge and Switch
Physical Layer	Repeater and Hub