

CT 1502

Planning and Design of Communication Networks

# Network Topologies

## Chapter 8

### Lecture 5

Edit by:

Nada Al Dosary

[Aldosary.na@gmail.com](mailto:Aldosary.na@gmail.com)

<http://ct1502.edublogs.org>

## Objectives

- Describe the basic and hybrid LAN physical topologies, and their uses, advantages and disadvantages
- Describe the backbone structures that form the foundation for most LANs

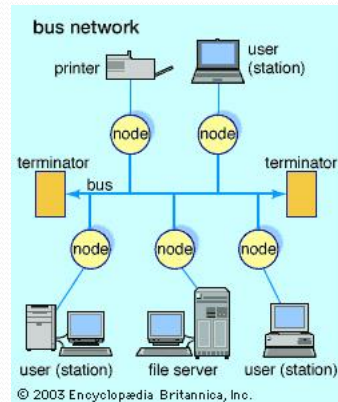
# Simple Physical Topologies

## Simple Physical Topologies

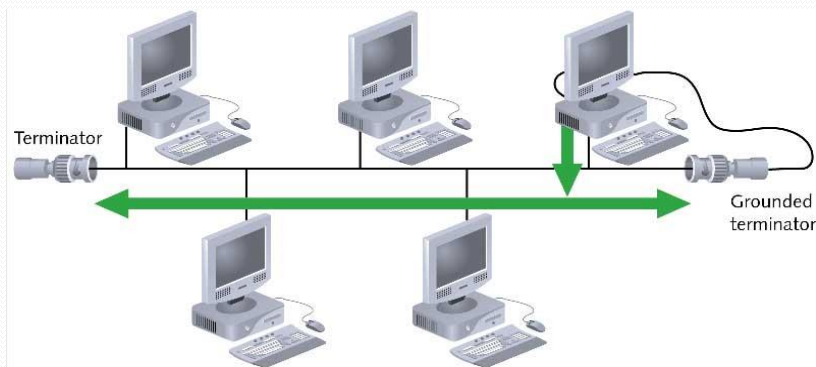
- **Physical topology:** physical layout (التصميم الشكلي) of nodes on a network
- Three fundamental shapes:
  - Bus
  - Ring
  - Star
- May create hybrid (هجين) topologies
- Topology integral to type of network, cabling infrastructure, and transmission media used

## Bus

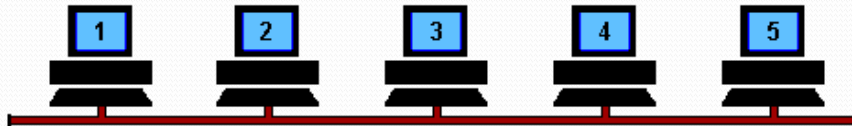
- Single cable connects all network nodes without intervening (تدخل) connectivity devices (switches, routers, etc)
- Devices share responsibility for getting data from one point to another
- **Terminators** stop signals after reaching end of wire
  - Prevent signal bounce
- Inexpensive, not very scalable



## Bus (continued)



## Bus (continued)



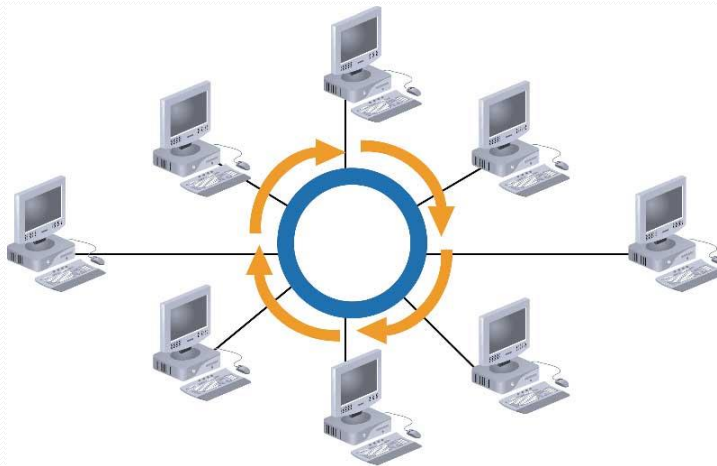
## Advantages of Bus Topology

- Works well for small networks
- Relatively inexpensive to implement
- Easy to add to it

## Disadvantages of Bus Topology

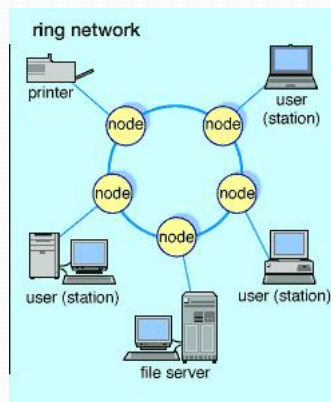
- Management costs can be high
- Difficult to troubleshoot(اصلاح الأخطاء), not fault-tolerant(لا يقبل الأخطاء)
- Potential(يتحمل) for congestion with network traffic

## Ring



## Simple Physical Topologies

- **Ring topology**
  - Each node is connected to the two nearest nodes so the entire network forms a circle
  - One method for passing data on ring networks is **token passing**
- **Active topology**
  - Each workstation transmits data



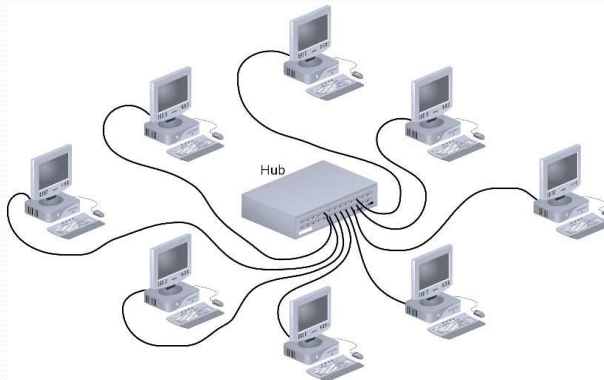
## Advantages of Ring Topology

- Easier to manage; easier to locate a defective node or cable problem
- Well-suited for transmitting signals over long distances on a LAN
- Handles high-volume network traffic
- Enables reliable communication

## Disadvantages of Ring Topology

- Expensive
- Requires more cable and network equipment at the start
- Not used as widely as bus topology
  - Fewer equipment options
  - Fewer options for expansion (توسيع) to high-speed communication

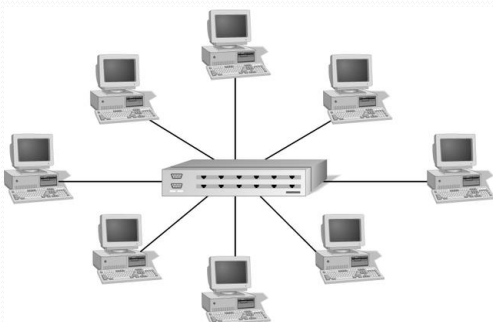
## Star



## Simple Physical Topologies

- **Star topology**

- Every node on the network is connected through a central (مركزي) device



## Star (continued)

- Any single cable connects only two devices
  - Cabling problems affect two nodes at most
- Requires more cabling than ring or bus networks
  - More fault-tolerant (أكثر تسامح مع الأخطاء)
- Easily moved, isolated, or interconnected with other networks
  - Scalable
- Supports max of 1024 addressable nodes on logical network

## Advantages of Star Topology

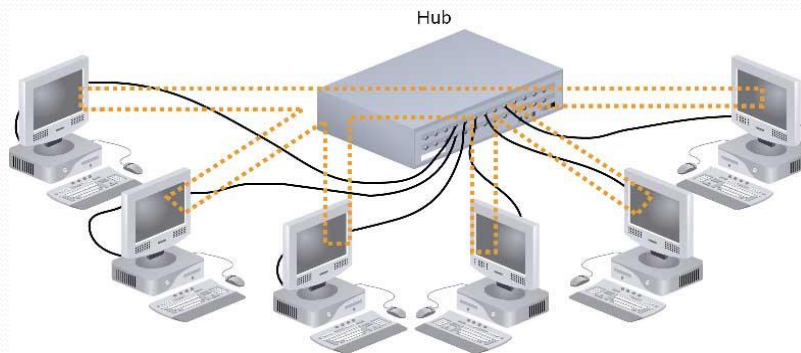
- Good option for modern networks
- Low startup costs (تكاليف بدء التشغيل منخفضة)
- Easy to manage
- Offers opportunities for expansion (فرص اكبر للتوسعة)
- Most popular topology in use; wide variety of equipment available

## Disadvantages of Star Topology

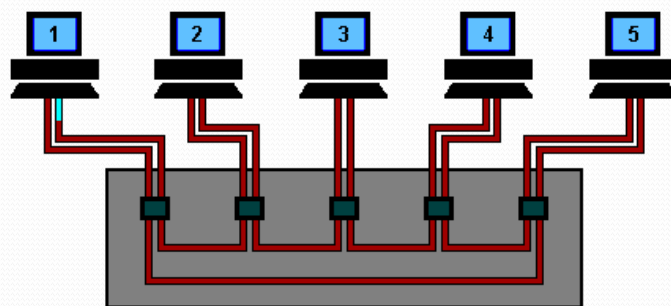
- Hub is a single point of failure
- Requires more cable than the bus

# Hybrid Physical Topologies

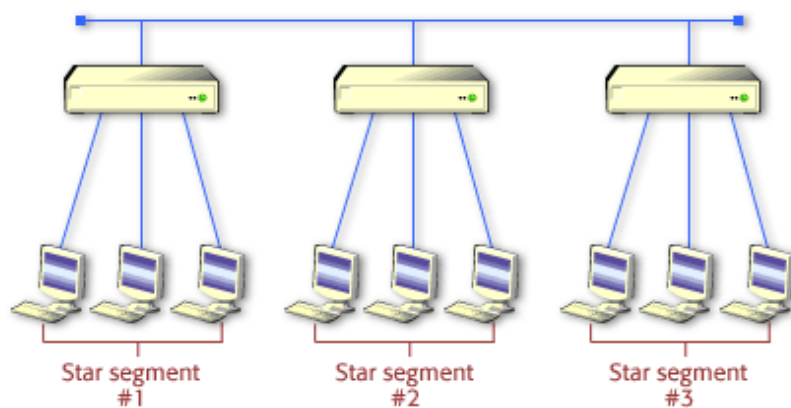
## Hybrid Physical Topologies: Star-Wired Ring



## Star-Wired Ring



## Star-Wired Bus

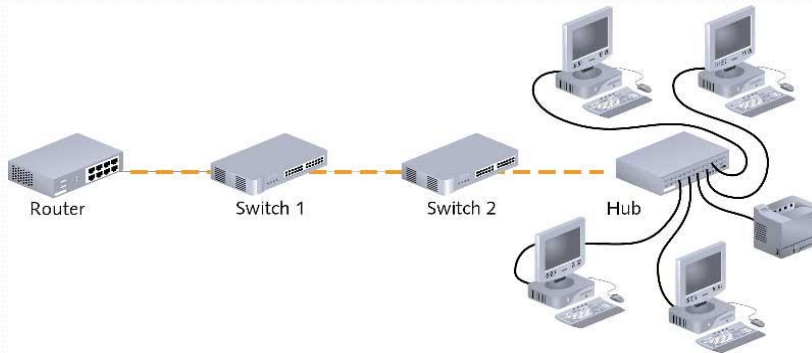


# Backbone Networks

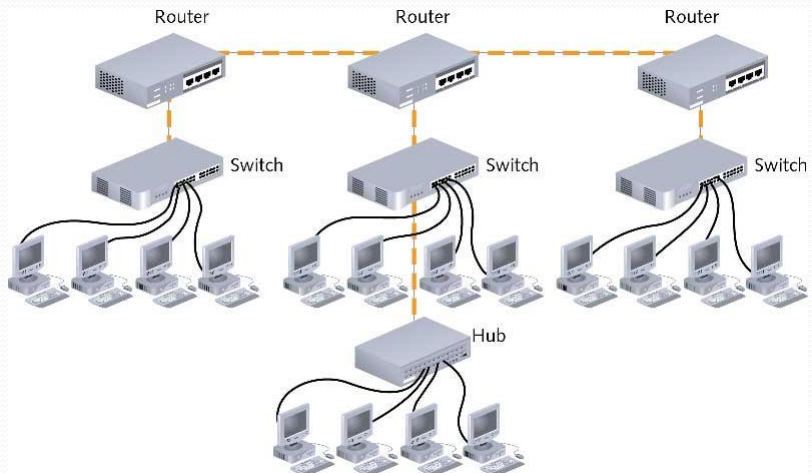
## Backbone Networks: Serial Backbone

- Daisy chain: linked series of devices
  - Hubs and switches often connected in daisy chain to extend a network
- Hubs, gateways, routers, switches, and bridges can form part of backbone
- Extent to which hubs can be connected is limited

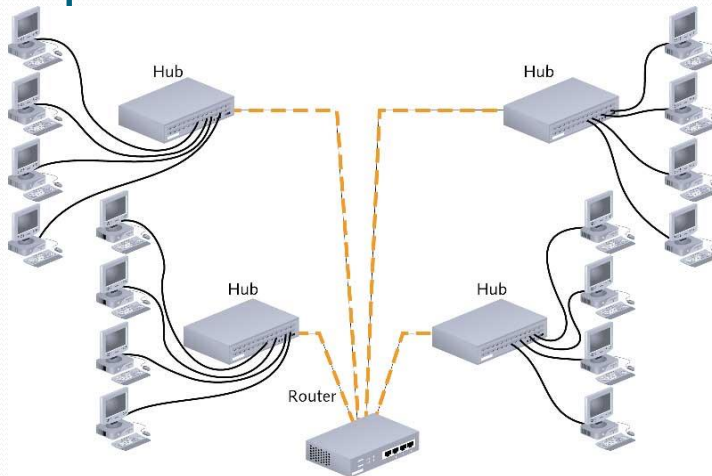
## Backbone Networks: Serial Backbone (continued)



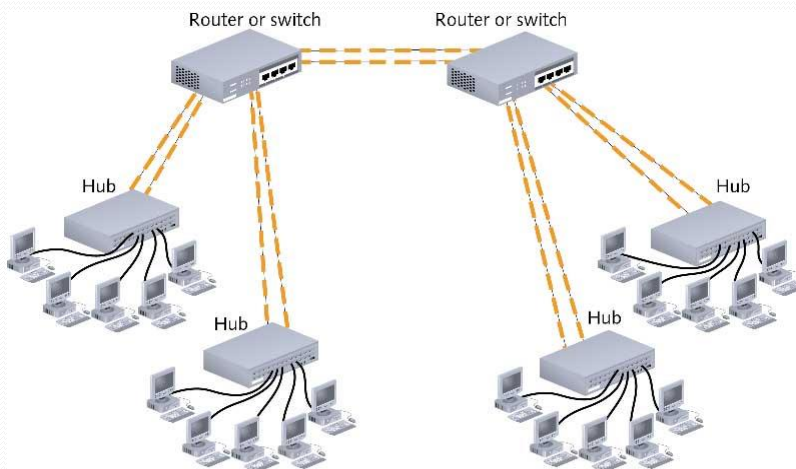
## Distributed Backbone



## Collapsed Backbone



## Parallel Backbone



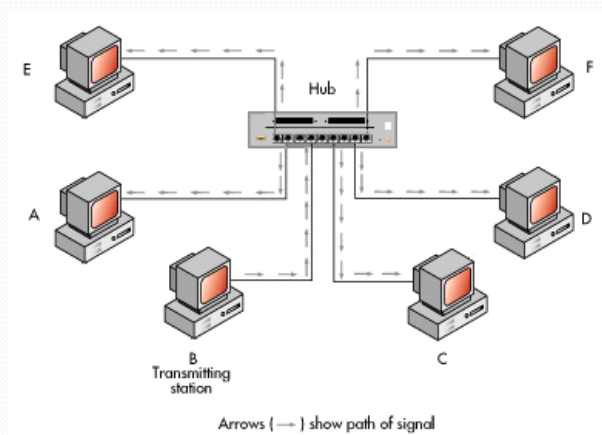
## Logical Topologies

- **Logical topology**: how data is transmitted between nodes
  - May not match physical topology

## Bus logical topology

- Bus logical topology: signals travel from one network device to all other devices on network
  - Required by bus, star, star-wired physical topologies

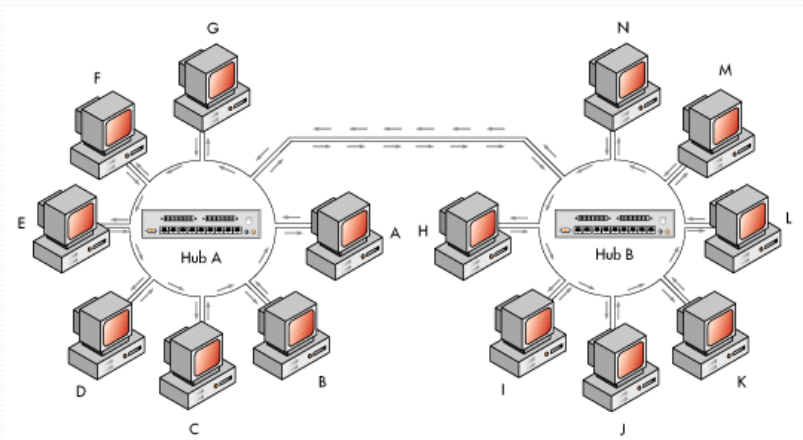
## Bus logical topology



**physical star, logical bus**

## Ring logical topology

- Ring logical topology: signals follow circular path between sender and receiver
  - Required by ring, star-wired ring topologies



Logical ring topology



**THIS IS  
THE END  
OF OUR  
PRESENTATION  
THANK YOU**