


# ● **High Speed LANs**



Dr. Abdulaziz Almulhem  
Computer Eng. Dept.  
King Fahd University of Petroleum and  
Minerals

## **Recap**

- Data networks
- Routing
- Congestion
- X.25
- Frame relay

## **This lecture**

- LANs
- HS LANs
- ATM LANs

## **LAN Protocols**

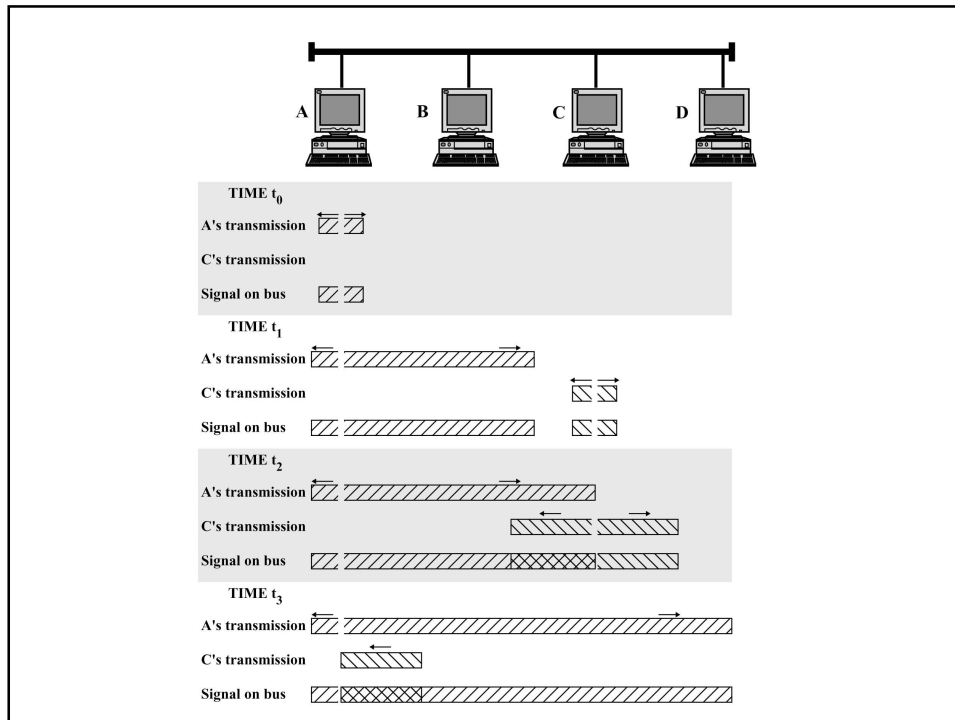
- We mainly mean: LAN/MAC Protocols
  - Ethernet
  - Token Ring
  - Token Bus

## **IEEE LAN Protocols**

- IEEE 802 LAN Standard
- IEEE 802.2 describes LLC
- IEEE 802.3 describes Ethernet
- IEEE 802.4 describes Token Bus
- IEEE 802.5 describes Token Ring

## **Ethernet**

- Very popular LAN technology
  - 100+ million Ethernet nodes
  - 50+ million cards are sold annually
- It uses Carrier Sense Multiple Access/  
Collision Detection (CSMA/CD)  
technology

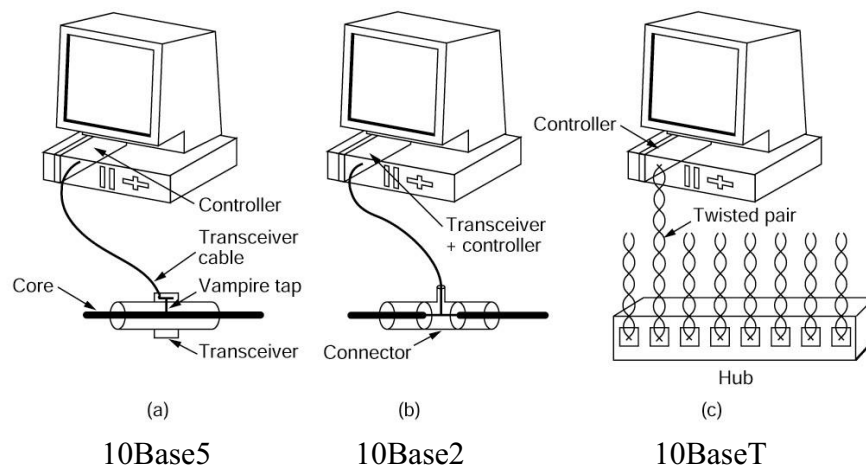


## Ethernet Cabling

- It is important to look into the physical component or medium that will carry data/frames.

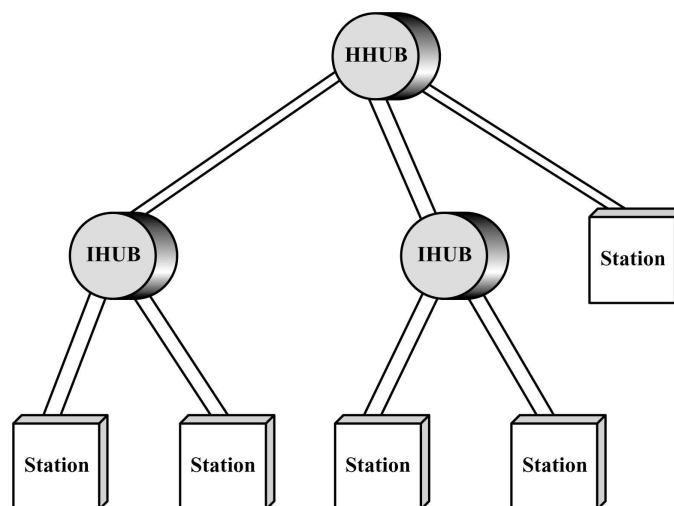
# LAN Cabling

Name	Cable	Segment Length	Nodes/Seg	Adv.
10Base5	Thick coax	500 m	100	Good for backbones
10Base2	Thin coax	200 m	30	Cheapest System
10BaseT	Twisted pair	100 m	1024	Easy maintenance
10BaseF	Fiber optic	2000 m	1024	Best between bldg



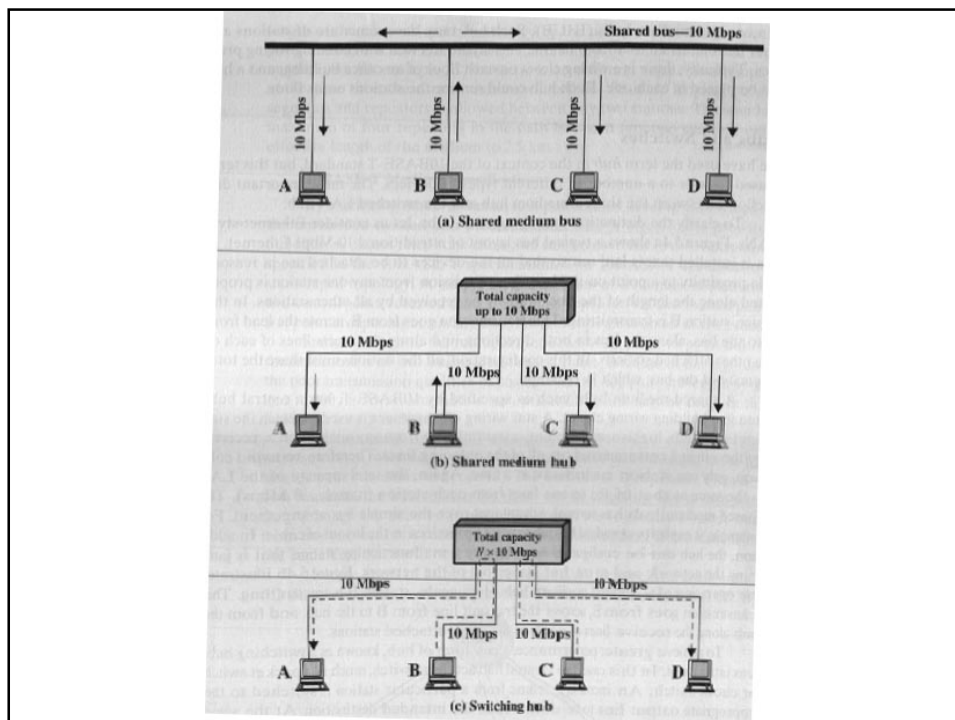
# 10BaseT

- Defines a star-shaped topology
- Operates at 10Mbps
- Uses CAT 3 unshielded twisted pairs (UTP) like the ones for telephones
- Central element is called a HUB



## Switches and Hubs

- On a shared bus, all stations share the total capacity
- Shared-medium hub just like the above, but with differences (?)
- Switching hub
  - No change is required to the software or hardware
  - Each device has a dedicated LAN capacity
  - Scalability: additional devices can be added



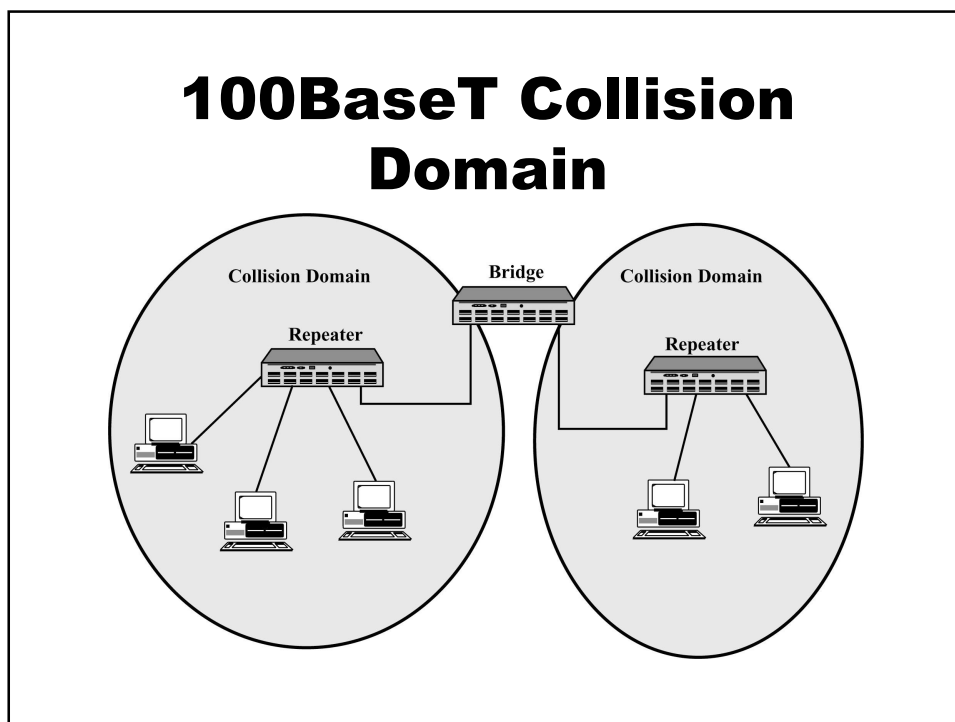
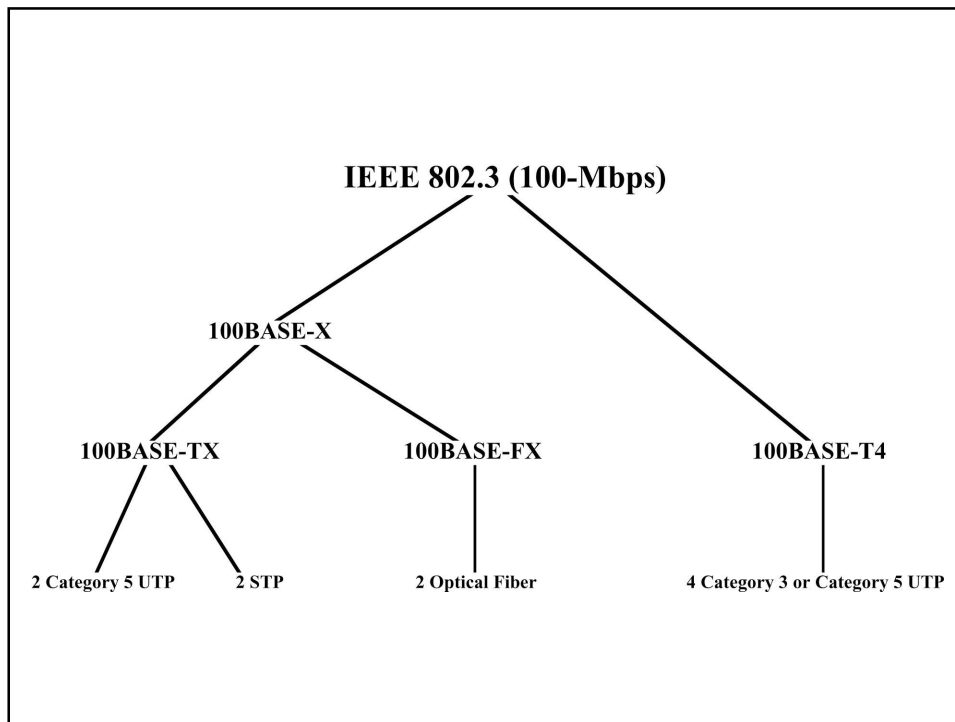
## **Switching Hubs**

- Store and forward switches:
  - Buffering incoming frames before being forwarded to the appropriate output
- Cut-through switches:
  - Once the MAC destination address is resolved the frame is handed to the output (no buffering)
  - Bad frames will be propagated with no CRC checking

## **100BaseT**

- Defines a star-shaped topology
- Operates at 100 Mbps over 2 pairs of Cat 3 UTP
- Cat5 UTP can also be used





## **1000BaseX**

- Operates at 1 Gbps
- Transmission is unidirectional
- 1000BaseLX: single or multimode fiber
- 1000BaseSE-SX: multimode fiber
- 1000BaseCS: shielded copper wires
- 1000BaseT: UTP

## **Ethernet Based High-Speed LANs**

- Fast Ethernet (100BaseT)
- Gigabit Ethernet (1000BaseX)
  - Uses Ethernet switches

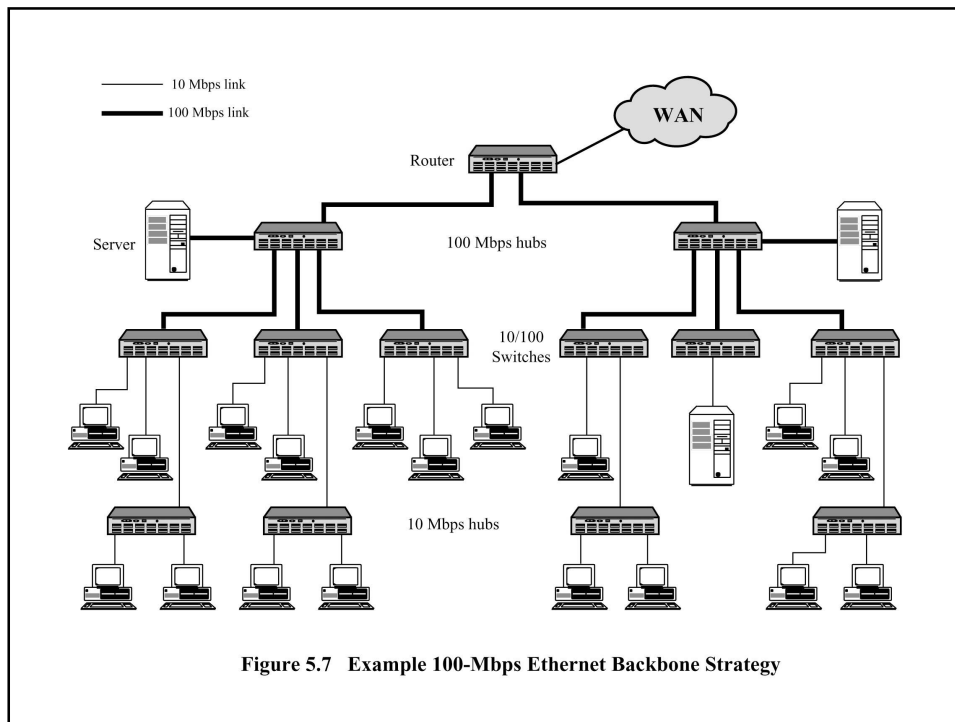


Figure 5.7 Example 100-Mbps Ethernet Backbone Strategy

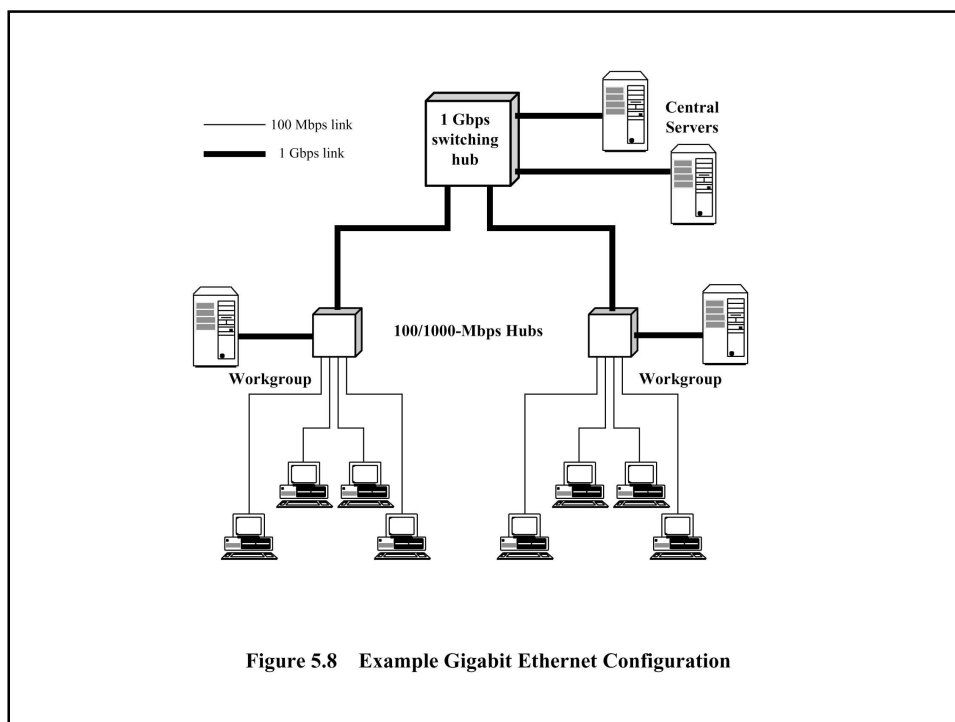


Figure 5.8 Example Gigabit Ethernet Configuration

# Generations of LANs

- First Generation: Ethernet/TR
  - Terminal-to-host connectivity
  - Client server architecture
- Second Generation: FDDI
  - Backbone LANs
  - High performance workstations
- Third Generation: Using ATM
  - Real-time transport guarantees

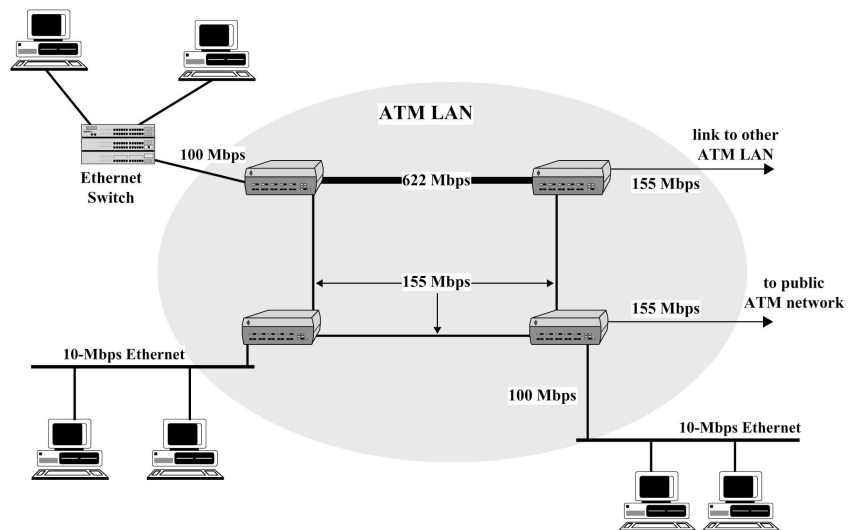


Figure 5.9 Example ATM LAN Configuration