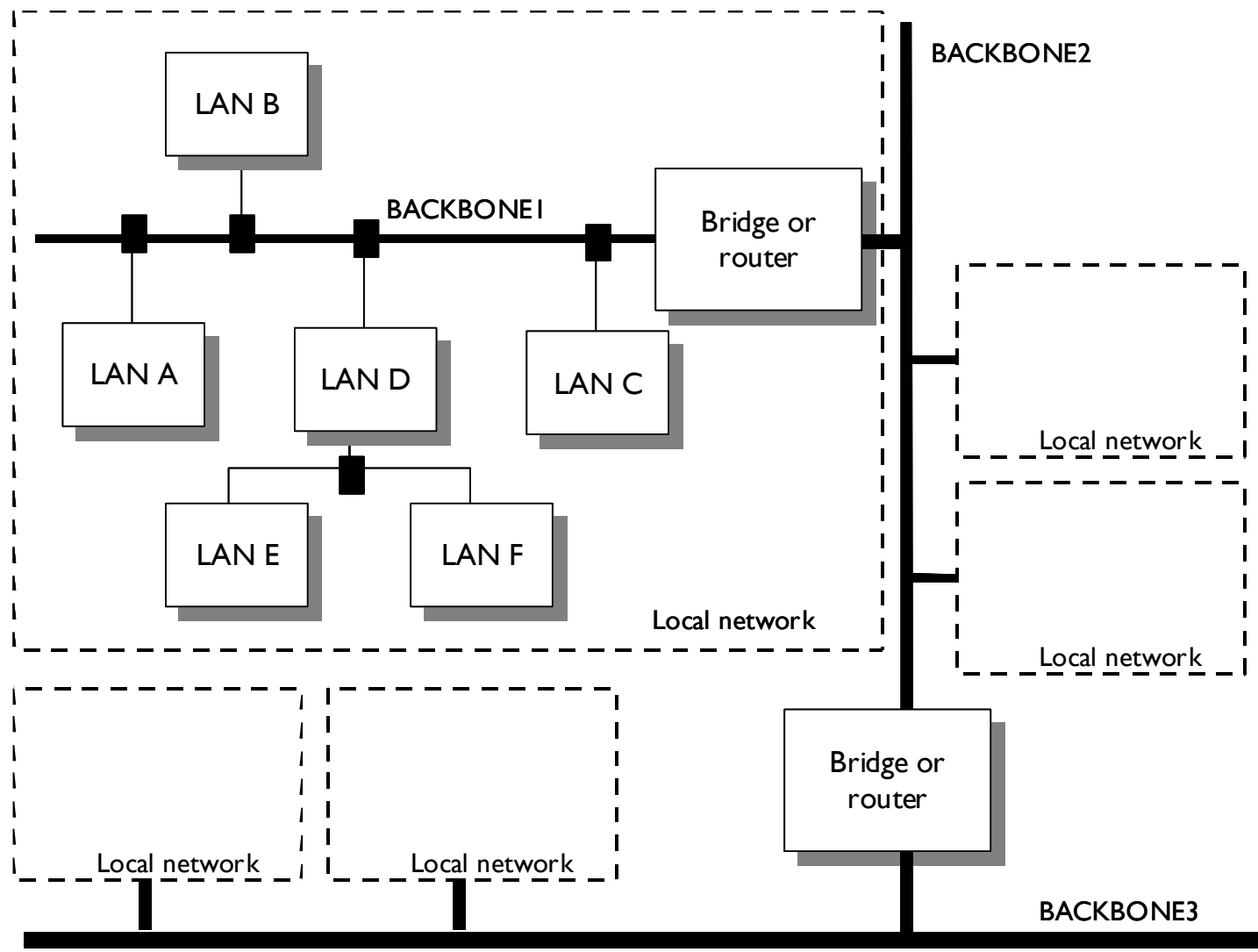


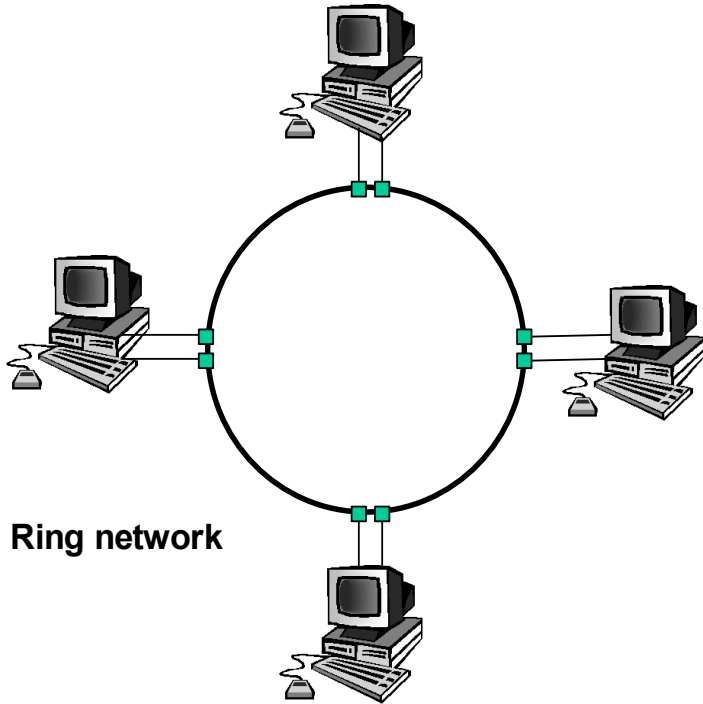
# Chapter 10 – Networking Types

## Aims:

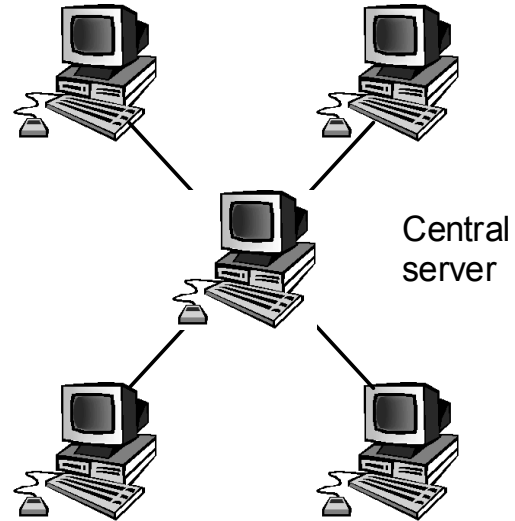
- ▶ Define the infrastructure of networks.
- ▶ Outline the differing networking topologies.
- ▶ Outline the main networking technologies.





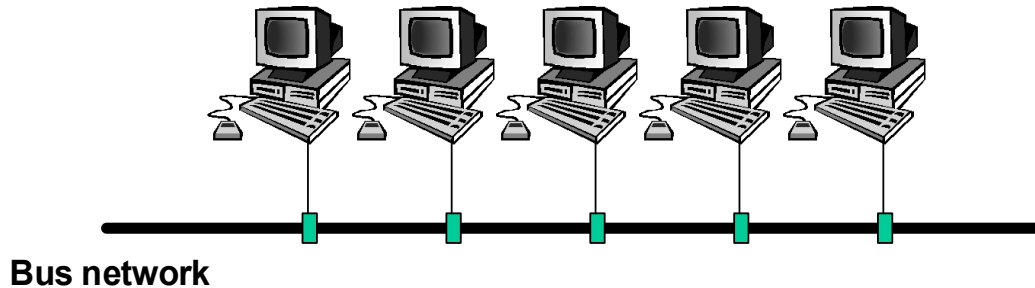


Ring network

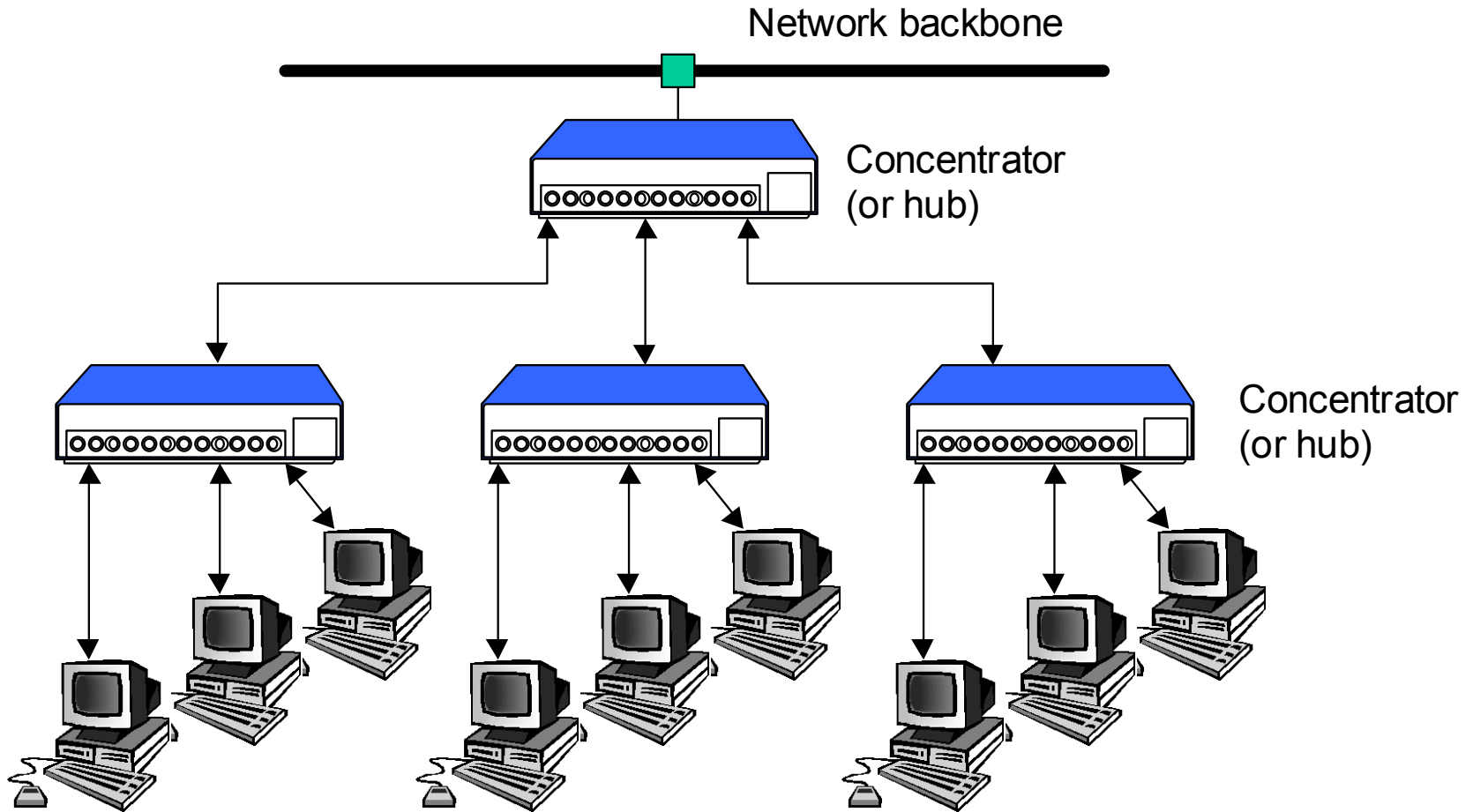


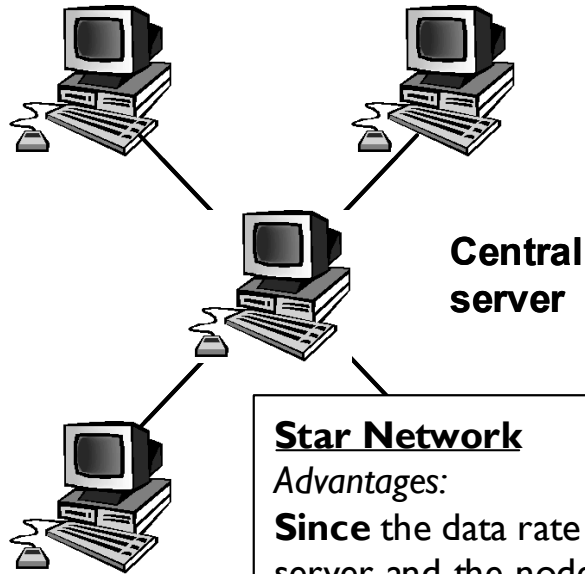
Central server

Star network



Bus network





## Star Network

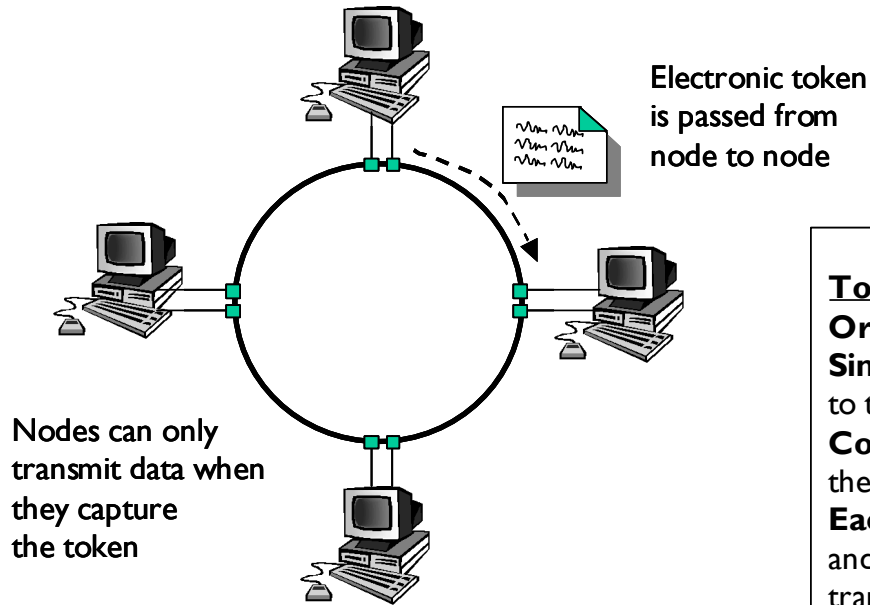
### *Advantages:*

**Since** the data rate is relatively low between central server and the node, a low-specification twisted-pair cable can be used to connect the nodes to the server.

**A fault** on one of the nodes will not affect the rest of the network. Typically, mainframe computers use a central server with terminals connected to it.

### *Disadvantages:*

**Network** is highly dependent upon the operation of the central server. If it were to slow significantly then the network becomes slow. In addition, if it were to become un-operational then the complete network would shut down.



## **Token Ring**

**Orderly** access to ring.

**Single** electronic token passes from one computer to the next around the ring.

**Computer** can only transmit data when it captures the token.

**Each link** between nodes is a point-to-point link and allows the usage of almost any type of transmission medium.

### *Advantages:*

**All nodes** on the network have an equal chance of transmitting data.

### *Disadvantages:*

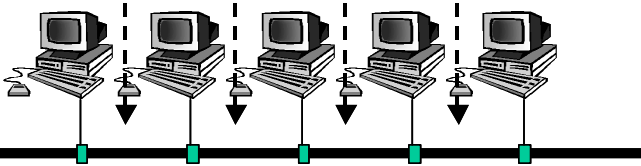
**If one** of the nodes goes down then the whole network may go down.

**Token** may get lost, or many tokens are generated.  
Difficult to add and delete nodes to/from the ring.

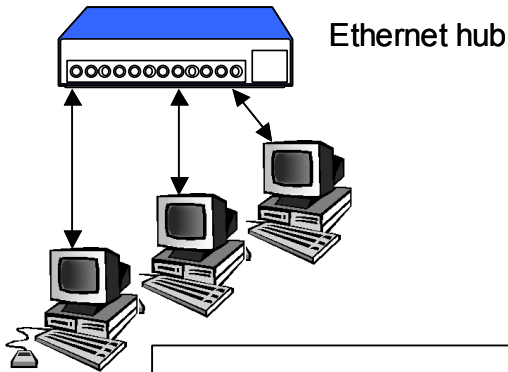
Typically, twisted-pair cables allow a bit rate of up to 16 Mbps, but coaxial and fibre-optic cables are normally used for extra reliability and higher data rates.

A typical ring network is **IBM Token Ring** and **FDDI**.

All computers have access to a common bus at the same time



Common bus



Ethernet hub

## **Bus network**

**Uses** a multi-drop transmission medium.

**All nodes** on the network share a common bus and all share communications. This allows only one device to communicate at a time.

**A distributed** medium access protocol determines which station is to transmit. Data frames contain source and destination addresses, where each station monitors the bus and copies frames addressed to itself.

Twisted-pair cables give data rates up to 100 Mbps, whereas, coaxial and fibre-optic cables give higher bit rates and longer transmission distances. Gigabit Ethernet is now available (1 Gbps).

A typical bus network is Ethernet 2.0.

### *Advantages:*

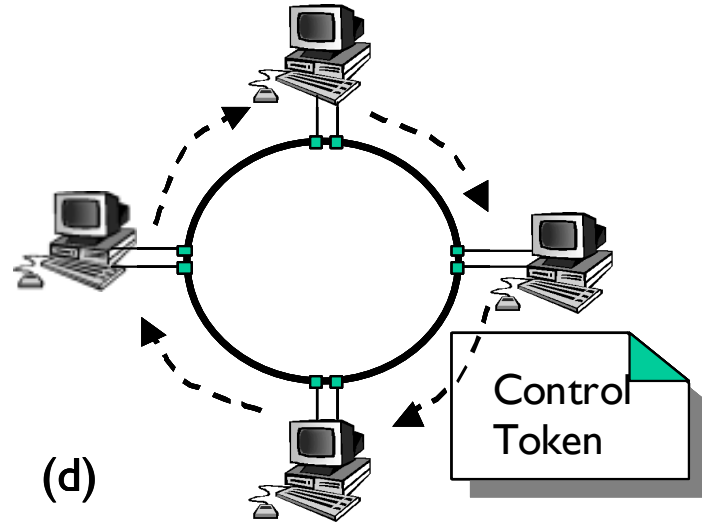
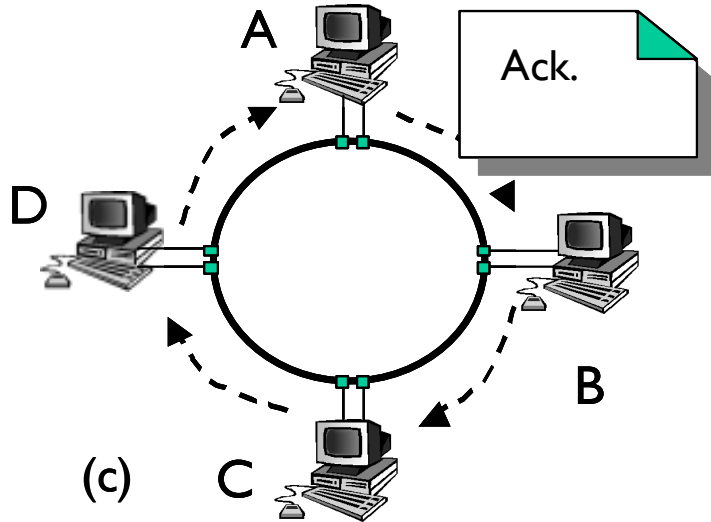
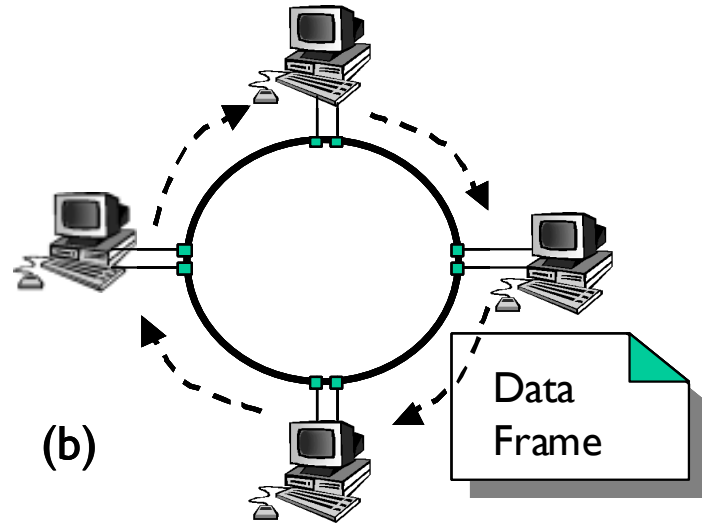
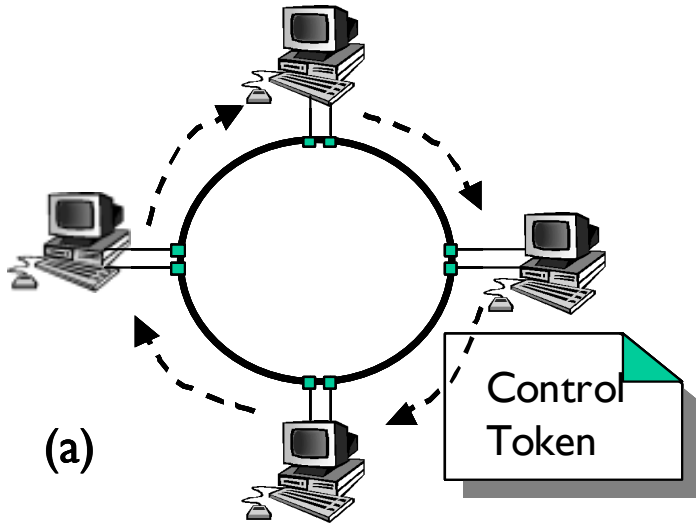
**Good** compromise over the other two topologies as it allows relatively high data rates.

**If a** node goes down, it does not affect the rest of the network.

### *Disadvantages:*

**Requires** a network protocol to detect when two nodes are transmitting at the same time.

**Does** not cope well with heavy traffic rates.



## CSMA/CD

**Ethernet** uses carrier sense, multiple access with collision detection (CSMA/CD).

**Nodes** monitor the bus (or Ether) to determine if it is busy. A node wishing to send data waits for an idle condition then transmits its message.

**Collisions** can occur when two nodes transmit at the same time, thus nodes must monitor the cable when they transmit.

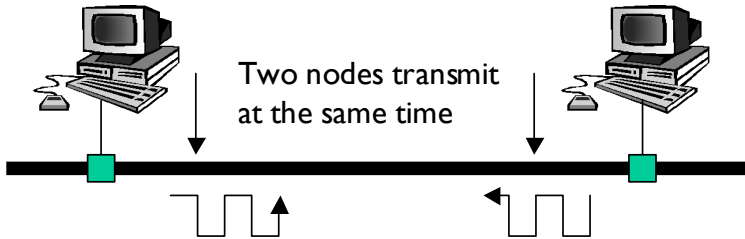
**When** a collision occurs, both nodes stop transmitting frames and transmit a jamming signal.

**This** informs all nodes on the network that a collision has occurred.

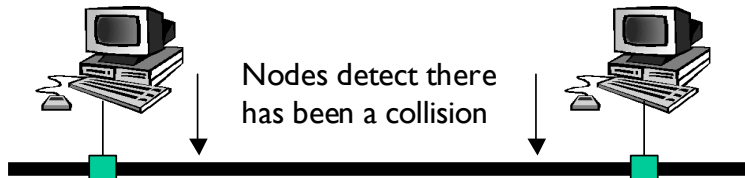
**Each** of the nodes involved in the collision then waits a random period of time before attempting a retransmission.

**As each** node has a random delay time then there can be a prioritization of the nodes on the network.

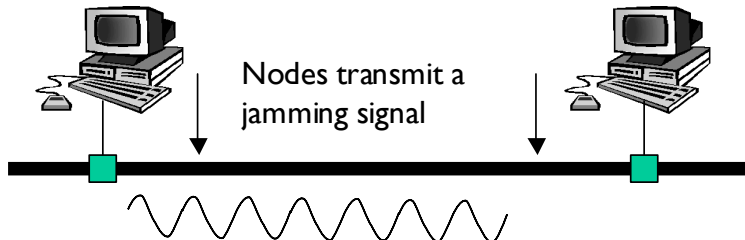
1



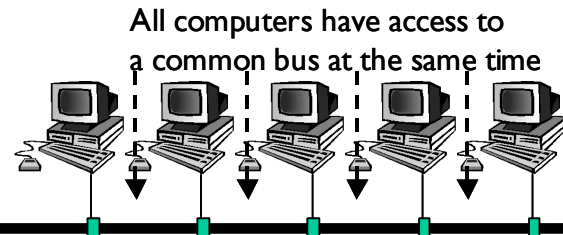
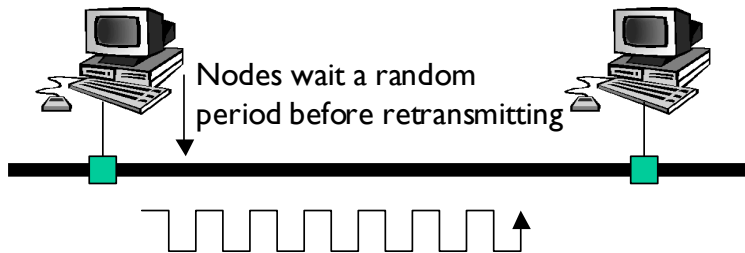
2



3



4



Common bus

