COMPUTER SYSTEMS FUNDAMENTALS
(4COSC004W)

Lecture: Week 12. Part 1

Contact details

- Module Leader:

This week's lecture

- Network topologies
  - *Physical & Logical*
- Types of network
- Network components
- IP Addressing
  - *Calculations*
  - *Masking*
  - *Classless & Classful systems*
- Subnetting calculations
- Ethernet
- Network Collisions
  - *Avoidance*
- Network Infrastructure

NETWORKS

Networked computers

- Computers connected to each other
  - *Wired connections using cables*
  - *Wireless using WIFI, 3/4G*
- We will concentrate on wired arrangement

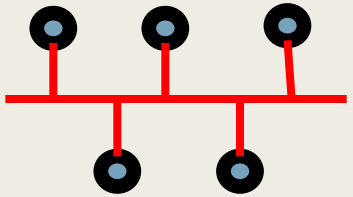
NETWORK TOPOLOGIES

Physical & Logical Topologies

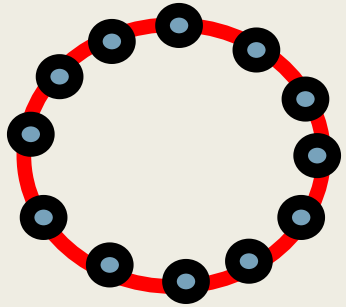
Physical & Logical Topologies

- **Physical Topologies** define the actual layout of the wire (media)
  - *Eg. The wiring in the computer labs are laid out in an extended star arrangement*
  - *UTP, STP, NIC*
- **Logical Topology** defines how the media is accessed by the hosts
  - *Eg. In the computer labs, hosts access the media on a first come, first served basis*

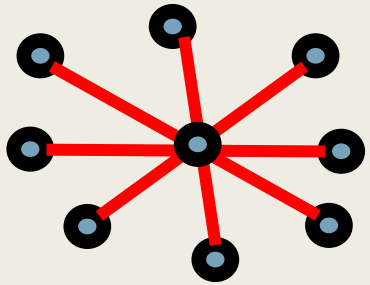
Physical Topologies



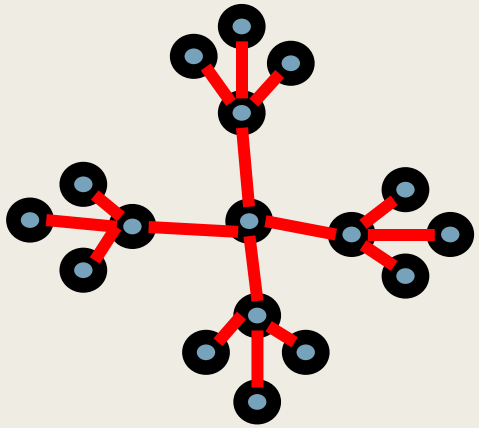
Bus



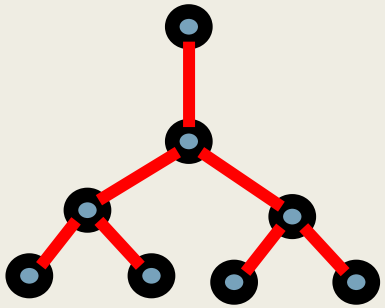
Ring



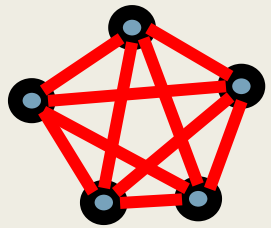
Star



Extended Star



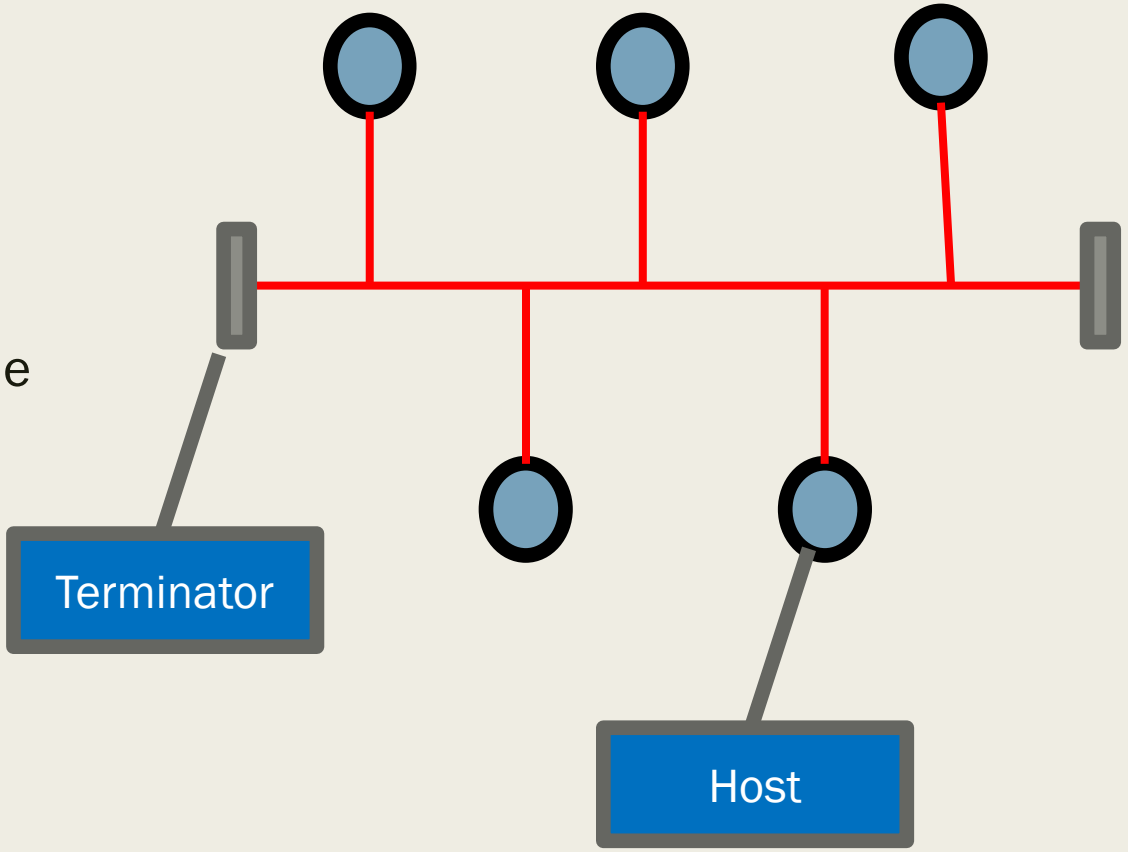
Hierarchical



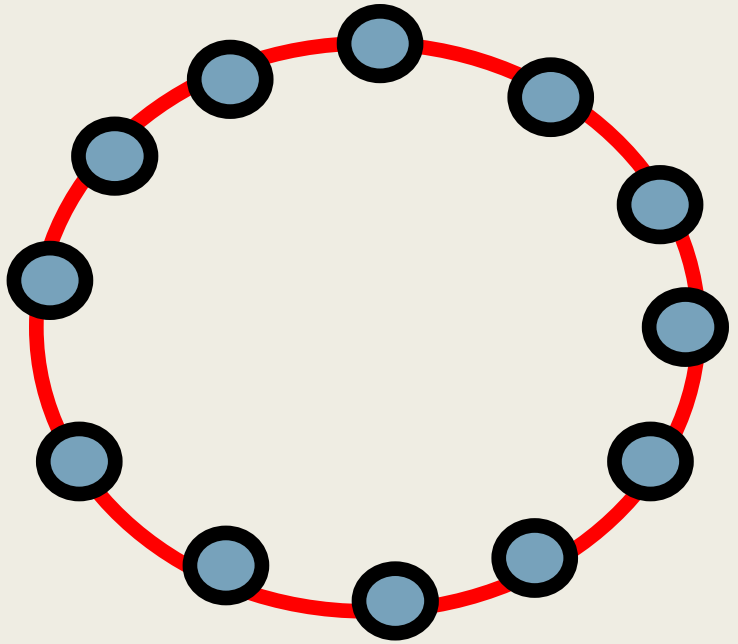
Mesh

Bus topology

- Single backbone
- All hosts connected to the backbone
- Each end must be terminated
- Susceptible to collisions

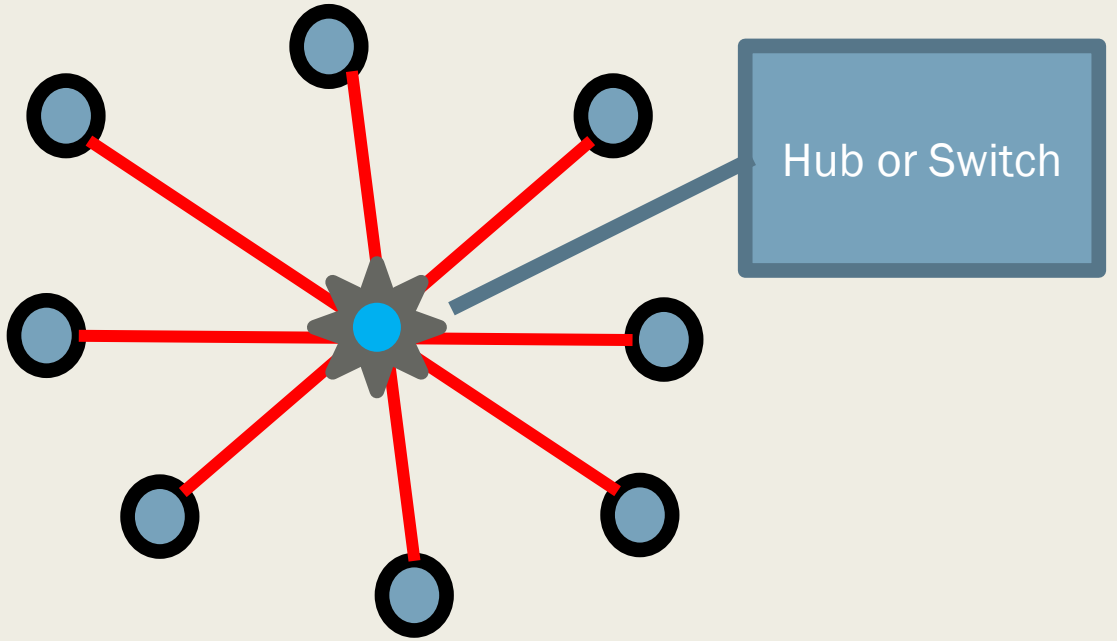


Ring Topology



- No Backbone
- A host is directly connected to each of its neighbours
- Used for Token Passing logical topologies

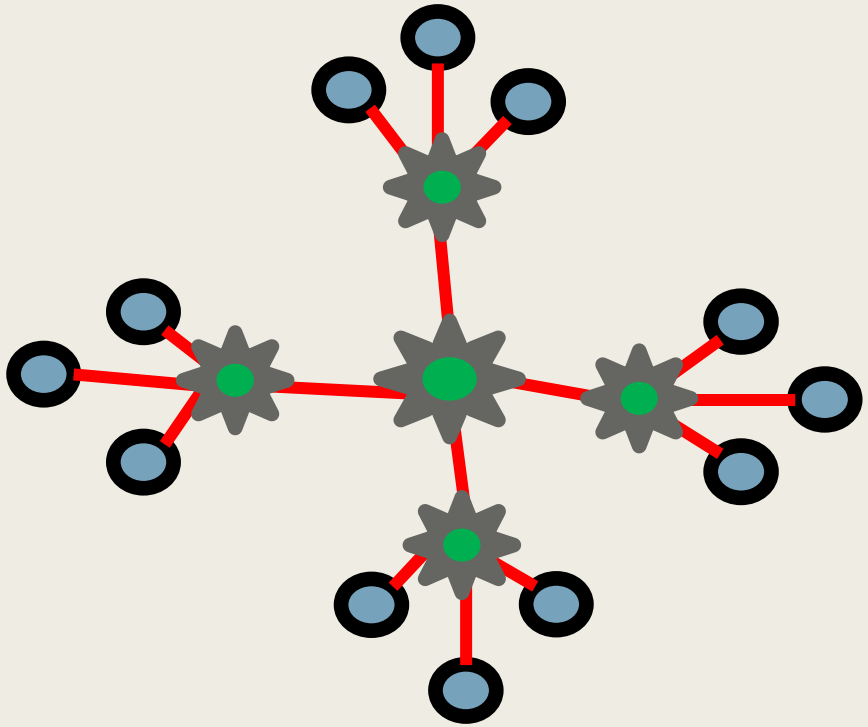
Star Topology



- All devices connected to a central point
  - *Hub*
  - *Switch*
- Used for Ethernet technologies

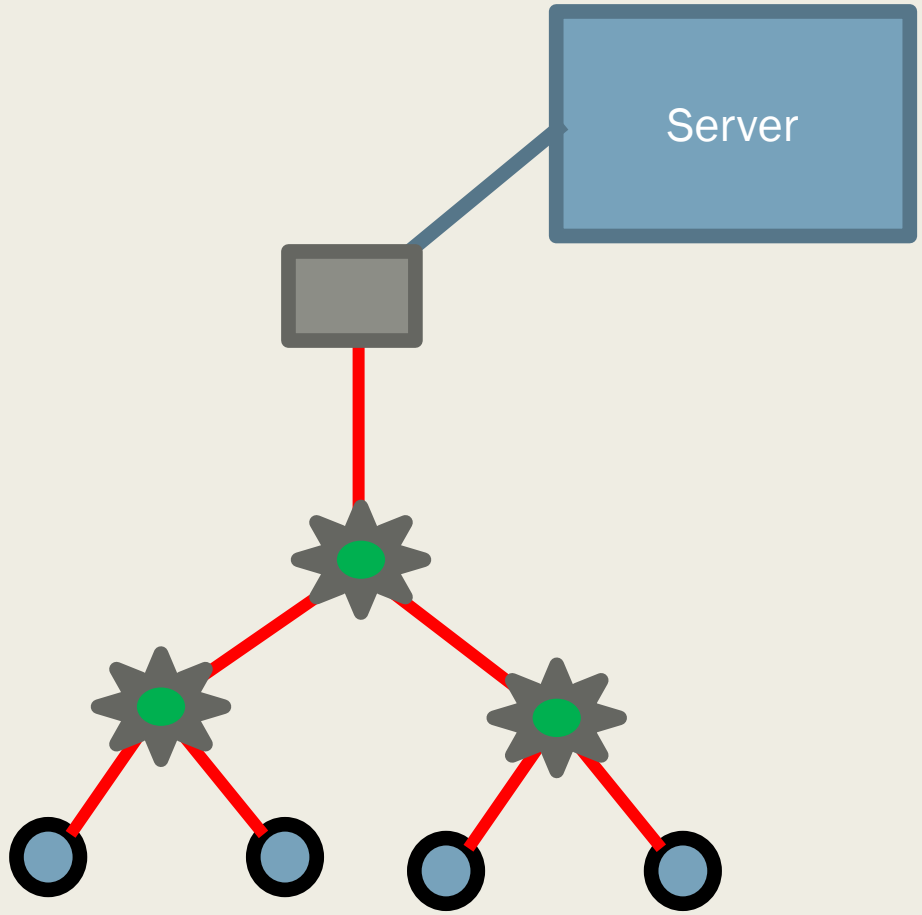
Extended Star Topology

- Connects Star topologies together
- Fractal pattern
- At the centre of Star is a Hub or Switch
- Extends the size of the network
- Computer labs

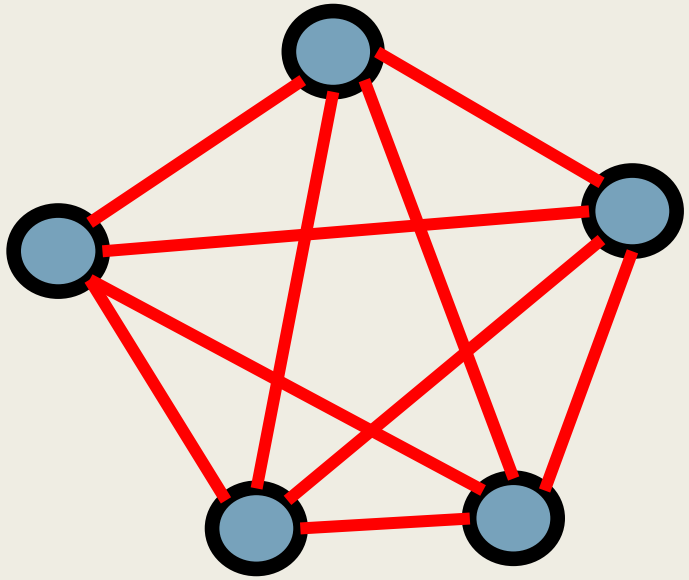


Hierarchical topology

- Like the extended star
- Except a computer controls traffic
  - *NOT a Hub or Switch*



Mesh Topology



- Maximally connected:
  - *Each host has its own connection to every other host*
  - *Use for critical systems*
- Non-maximally connected:
  - *Not every host is connected to every other host*
  - *The Internet*
  - *Alternate routes if there are problems*

Terminology: Physical Topology

- NIC
  - *Network Interface Card or Network Interface Connector*
- UTP
  - *Unshielded Twisted Pair*
- STP
  - *Shielded Twisted Pair*
- Hub
- Switch

Logical Topologies:

- Broadcast topology:
  - *Each host on the LAN sends (or broadcasts) its data to every other host.*
  - *Access to media is based on "First come, first served"*
  - *Ethernet works this way*
- Token Passing Topology:
  - *Access to media is controlled by an electronic token*
  - *Possession of the token gives the host the right to pass data onto the media.*

TYPES OF NETWORK

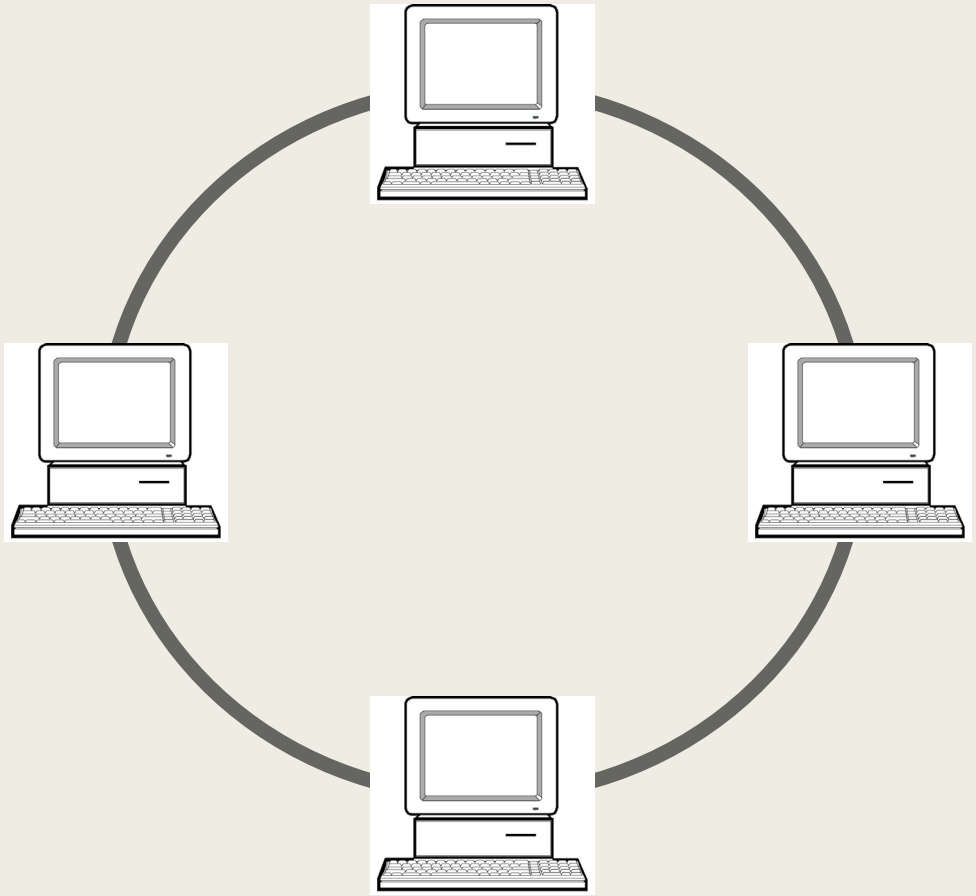
Peer-to-peer

Client-Server

Sizes of networks

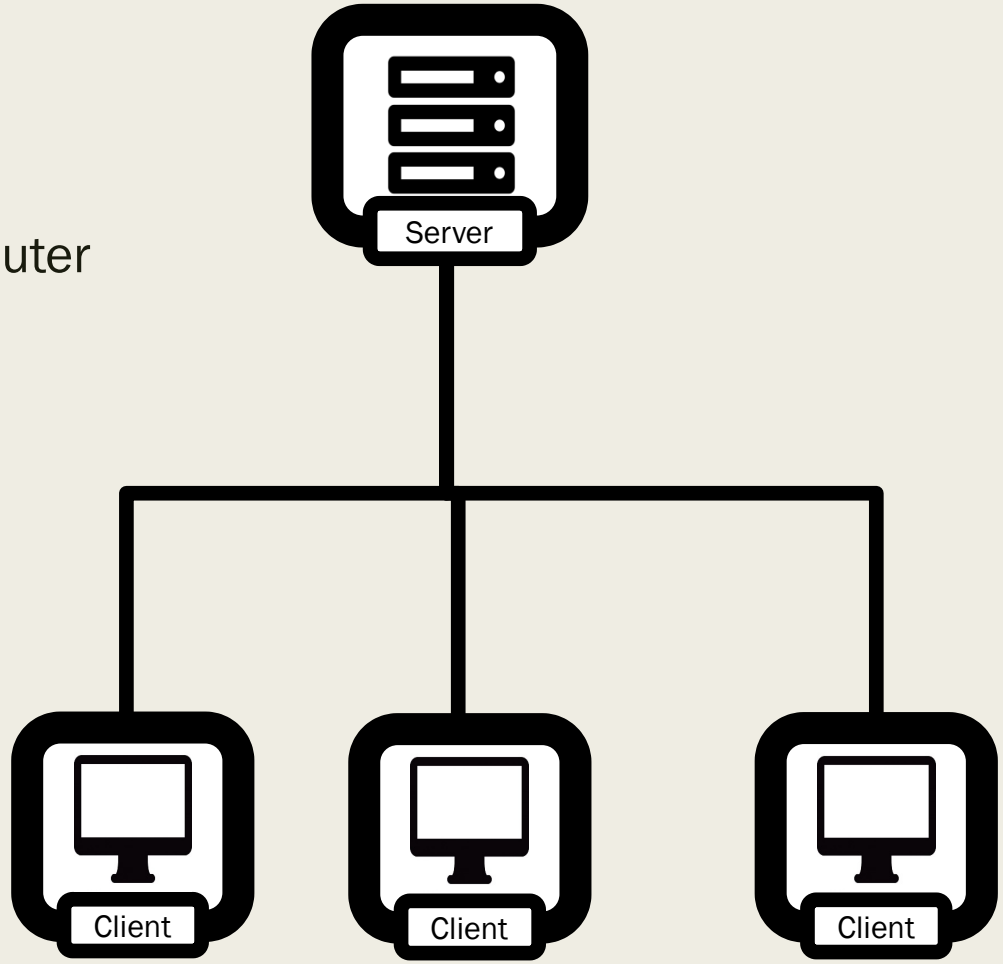
Peer-to-Peer Network

- Networked computers are equal partners
- Each computer can be a Server or Client
- Each component controls its own resources
- Resources can be shared
- Suitable for small networks



Client/Server network

- Network services are located on a dedicated computer
  - *The Server*
- Server responds to requests from **Clients**
- Resources are shared
- Server can serve many Clients simultaneously
- Needs an administrator



Terminology: Sizes of networks

- LAN
  - *Local Area Network*
- WAN
  - *Wide Area Network*
- MAN
  - *Metropolitan Area Network*
- SAN
  - *Storage Area Network*

What we have covered in this video:

- Network topologies:
  - *Physical*
  - *Logical*
- Terminology
- Types of networks
- Sizes of networks

In the next video we will cover:

- Network components
- Network Collisions
  - *Avoidance*
- Network Infrastructure