Seneca

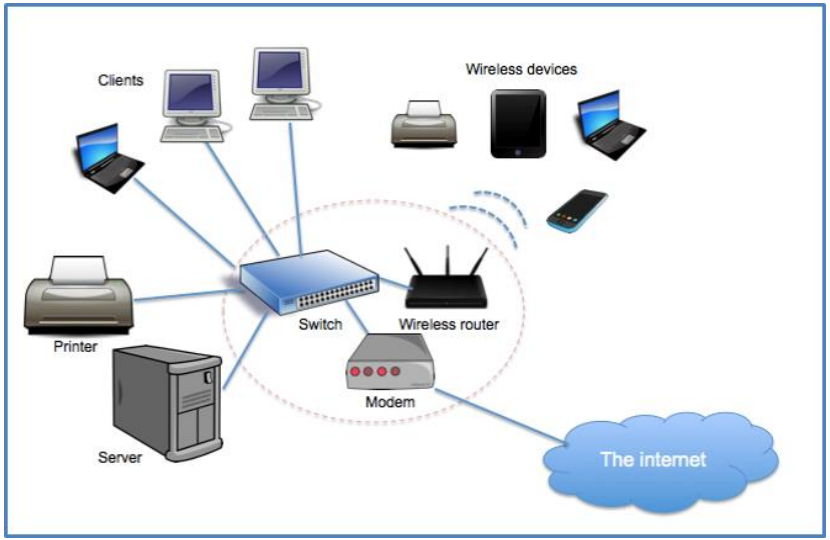
Introduction to Computer Networks

Agenda

- Computer Network
- Network Topologies
- Data Transmission
- Network Protocols
- OSI Model

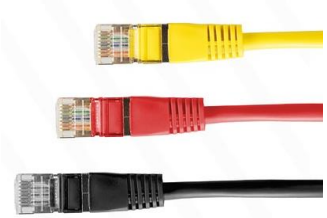
Computer Network

- Computing devices (nodes) connected using data links which allow for sharing of resources.



Computer Network: Hardware

- These nodes are connected together with different network devices such as:
  - Network Interfaces
  - Repeaters / Hubs
  - Switches
  - Routers



Computer Network: Interconnection

- Based on the geographical area, computers interconnect using 3 of the most commonly used networks:

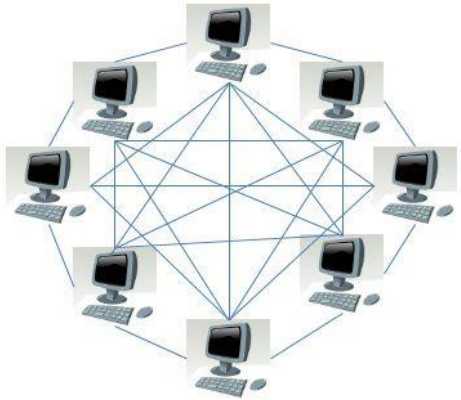
1. Local Area Network (LAN)
2. Metropolitan Area Network (MAN)
3. Wide Area Network (WAN)

Computer Network: Discussion

- In this classroom, where are the networking devices?

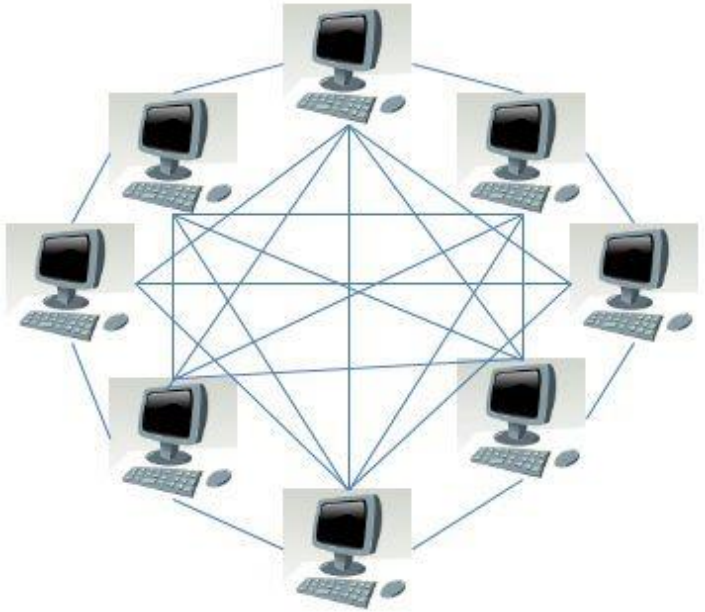
Computer Network: Peer-to-Peer and Client-Server

- Once a network is created, there are 2 common network models used:
  1. Peer-to-Peer Network Model
  2. Client-Server Network Model



Computer Network: Peer-to-Peer (P2P)

- Each node is considered as a "peer".
- Each node can either be a client or a server depending on the whether the node is requesting or providing the services.
- A node desiring for the specific services must broadcast the request for services to all other nodes in the peer-to-peer system. The node providing the requested service will respond to the node making the request.



Computer Network: Client-Server

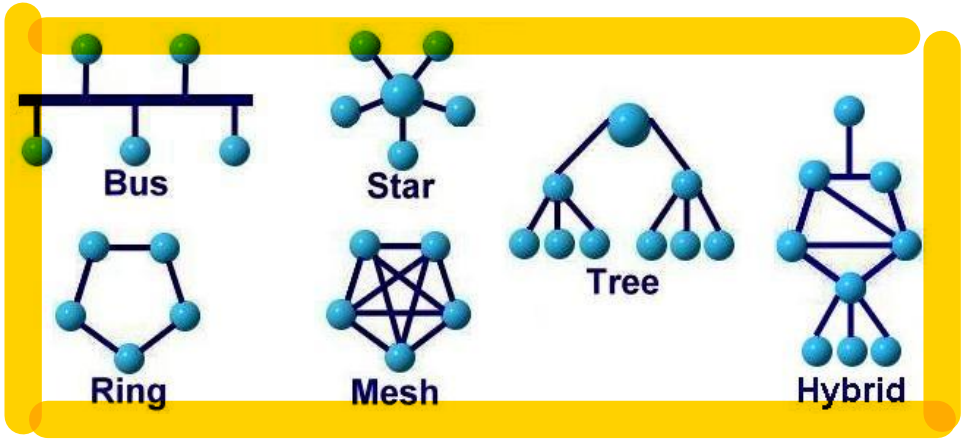
- Nodes are either “clients” or “servers”
- Servers are typically powerful computers providing a role to the network such as “File Sharing”.
- The client sends a request to the server. When the server receives the client request, it processes the request and replies back to the client.
- The client is dependent on the server to provide and manage information.

Computer Network: Network Model Discussion

- In a residential environment (home):
  - What type of network model is setup at home?
  - What type of network devices are found at home?
  - How do you log into each of the computers at home?
  - How do you know if you have Internet access?

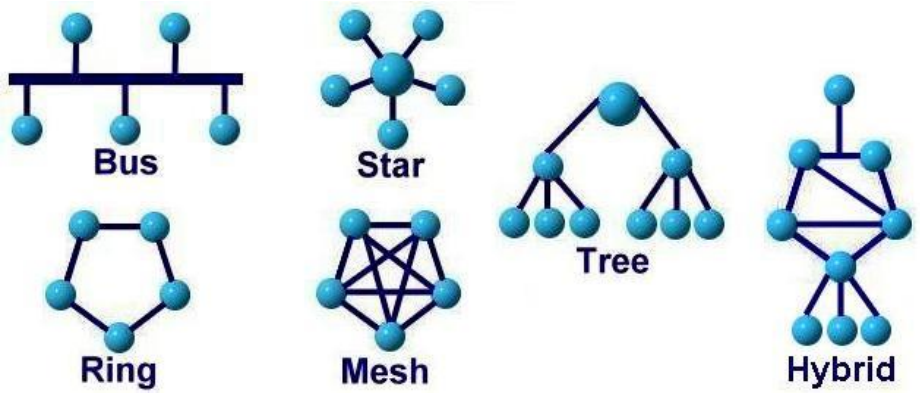
Network Topologies

- Data flow between nodes can be represented using Network Topologies.
- This shape does not necessarily correspond to the actual physical layout of the devices on the network.
- For example, the computers on a home network may be arranged in a circle in a family room, but it would be highly unlikely to find a ring topology there.



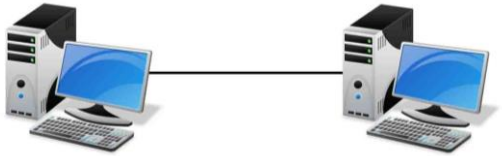
Network Topologies: Activity

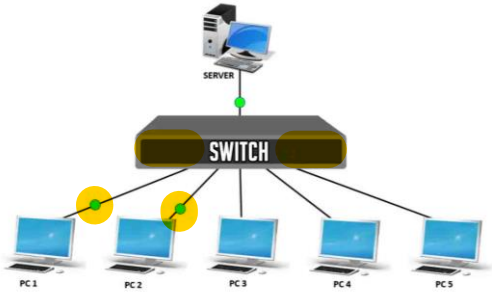
- In groups:
  - Define each of the topologies
  - List the advantages
  - List the disadvantages

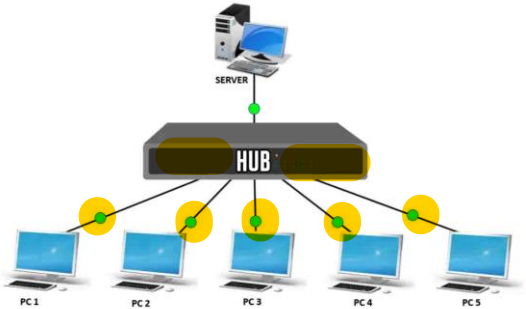


Data Transmission

- There are 3 different methods of data transmission on a network:
  1. Unicast
  2. Multicast
  3. Broadcast





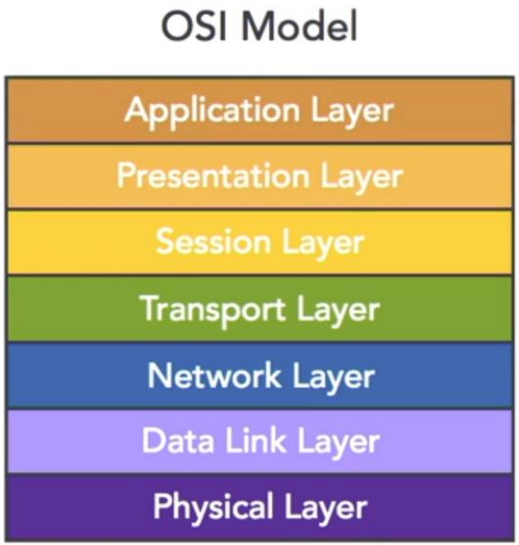


Network Protocols

- Formal standards and policies comprised of rules, procedures and formats that define communication between two or more devices over a network.
- Network protocols incorporate all the processes, requirements and constraints of initiating and accomplishing communication between computers, servers, routers and other network-enabled devices.
- Examples:
  - ARP
  - ICMP
  - IP
  - HTTP
  - DNS
  - DHCP

OSI Model

- OSI is an acronym for “Open System Interconnect”
- Introduced in 1984 by the ISO and ITU-T.
- The OSI model is a reference model for how applications communicate over a network.
- The model contains 7 levels:
  1. Application
  2. Presentation
  3. Session
  4. Transport
  5. Network
  6. Data Link
  7. Physical



OSI Model: Activity #2

- Learn more about the OSI model through Activity #2.

Additional Resources

- Introduction to Networking
- OSI Model
- Introducing TCP/IP
- The Functionality of Various Networking Devices
- Network Topologies
- Client/Server vs Peer to Peer Network Models
- Understanding Different Server Structures