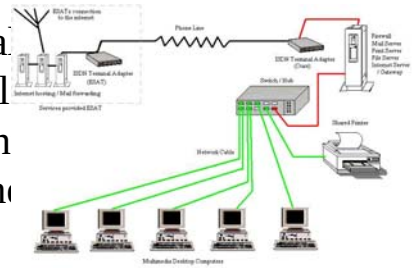
What is a network?

- Two or more computers linked together to share resources
  - Share files, printers, electronic communication etc.
  - Linked through cables, telephone lines, radio waves, satellites or infrared beams.
- Three basic types of networks
  - Local Area Network (LAN)
  - Metropolitan Area Network (MAN)
  - Wide Area Network (WAN)

Local Area Network

- Network confined to a relatively small geographic area. Typically lab in CA, office etc.
- Typica er which control resources ….prin re powerful than th



Metropolitan Area Network

- Covers larger geographic areas, cities, schools, local libraries, government offices
- Typically uses dedicated phone lines, coaxial cabling and wireless communication

Wide Area Network

- Connects larger geographic areas, such as global companies. Local and global networks are connected to form larger network.
- Typically uses transoceanic or satellite links
- Protocols used can be ATM networks or MPLS (carrying Ethernet) or others.
- Typically use special hardware and special fiber.

Personal Area Networks

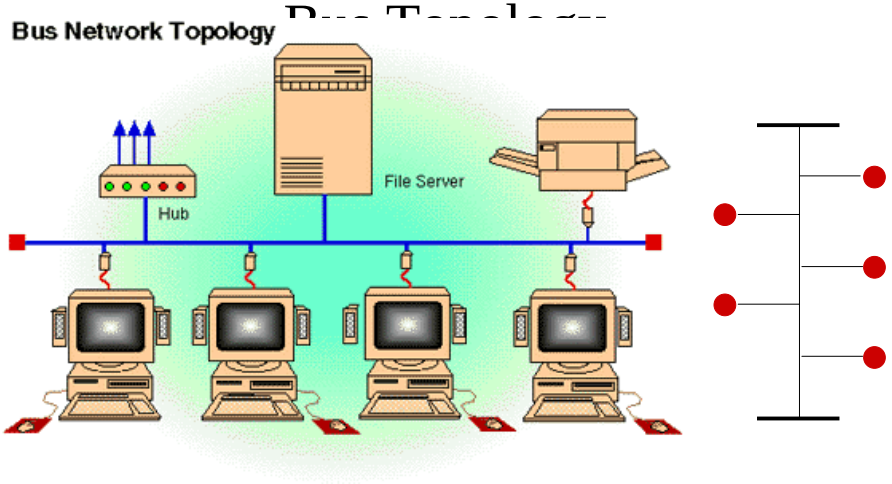
- Lately, we have seen the growth of PAN's
- Small Networks around you. Typically
  s t DA to laptop.

An early adopter: Lara Croft in Tomb Raider using a Bluetooth enabled phone

Network Topologies

- Topology is how the cables, computers and other peripherals are connected
- Different types of topologies
  - Star
  - Ring
  - Bus
  - Tree
  - Complete
  - Irregular

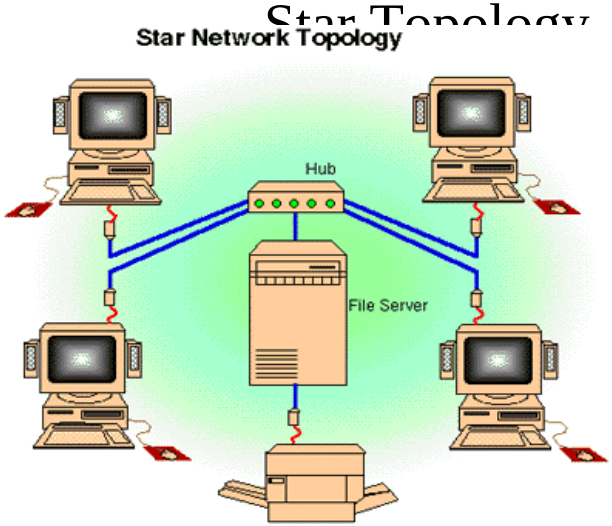
Bus Topology

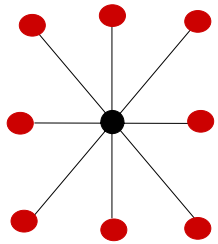


Bus Topology (2)

- Computers share the same bus (cable) with a terminator at each end. Each client is connected to the bus.
  - Old Ethernet on coaxial cable utilises a bus
- Simple and reliable
- Inexpensive cable and easy to expand
  - Uses the least cable
  - Management more problematic
- Heavy traffic slows overall throughput

Star Topology

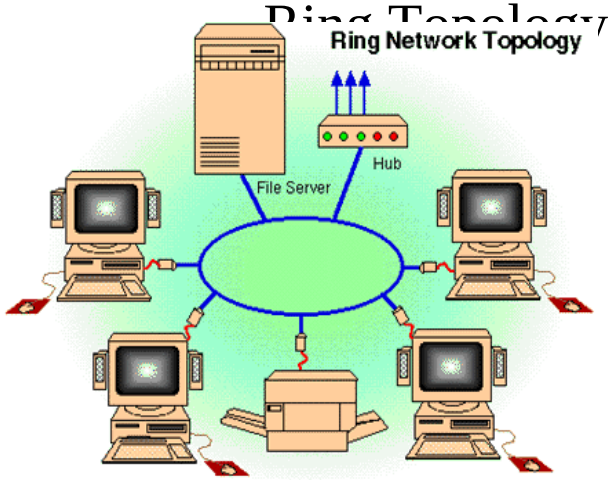


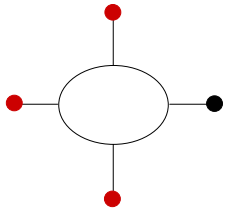


Star Topology (2)

- Each node connected directly to central computer. All data must go through central node (hub/switch)
- Relies heavily on central computer
- Each device has a separate wire. Easy to install new devices. Disconnecting / Adding devices does not interrupt network. Easy to detect breaks/faults
- More cable is required

Ring Topology

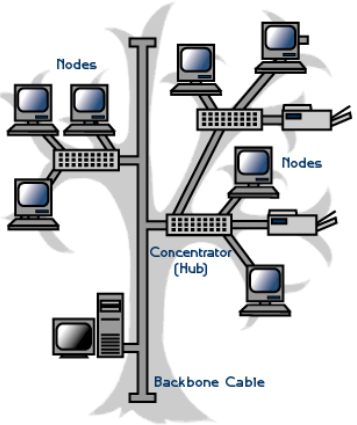




Ring Topology (2)

- Computers tied together in a ring
- Each device is connected to the next one in line
- Circle of cable
- Signal travels in one direction
- When a device receives control (token)
  - It acts on it
  - or passes it on

Tree Topology



Tree Topology (2)

- Modern LANs utilise Switches to build a tree topology, even when the network looks like a mesh.
- We will take a look at the Spanning Tree Protocol, STP, later

Topology Considerations

- Money
  - Bus cheapest, no need for central node
- Length of cable
  - Bus uses shortest cable
- Future growth
  - Star topology easies to add new nodes
- Cable type
  - Most common cable is twisted pair, most often used with star topologies