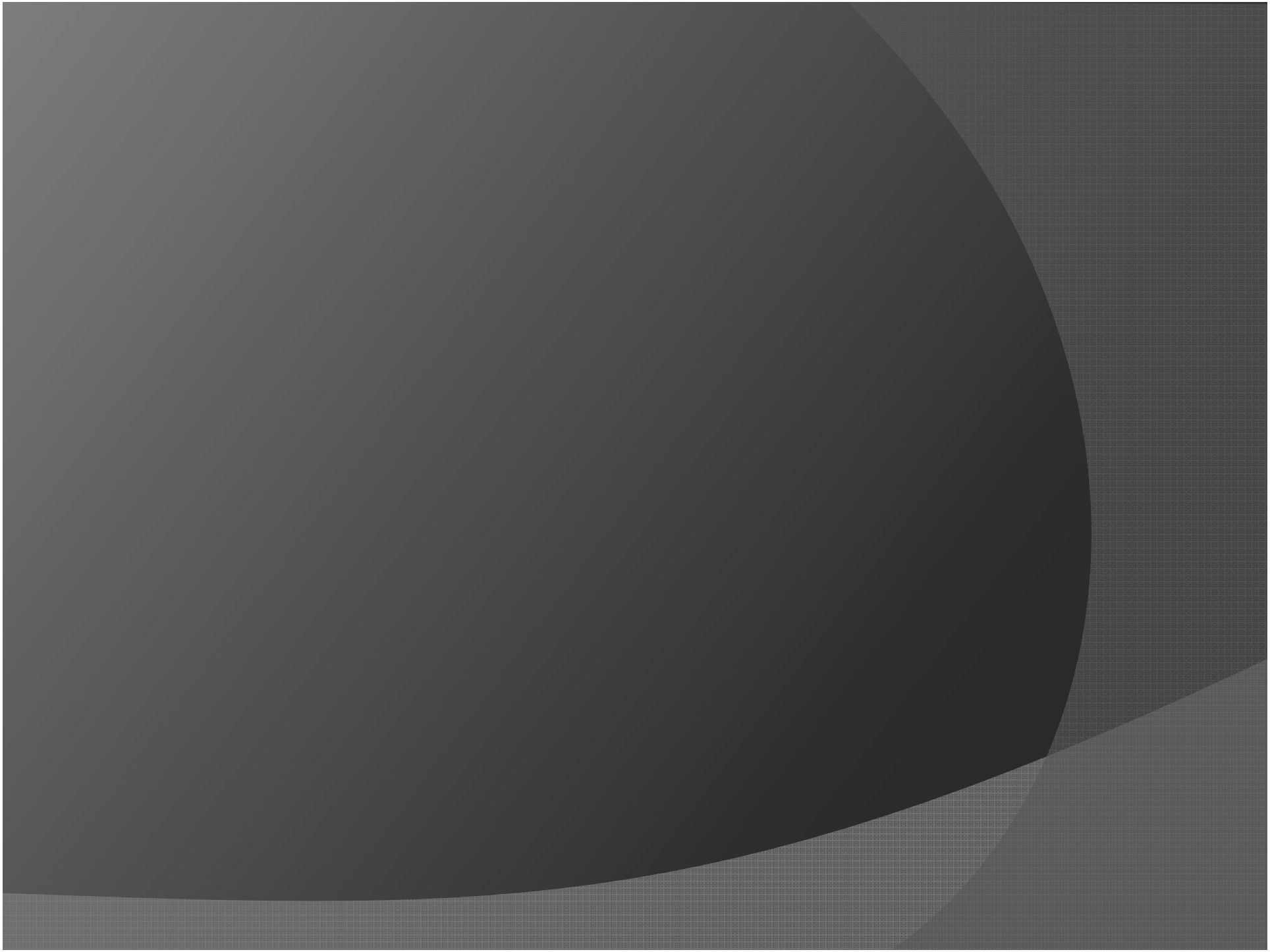
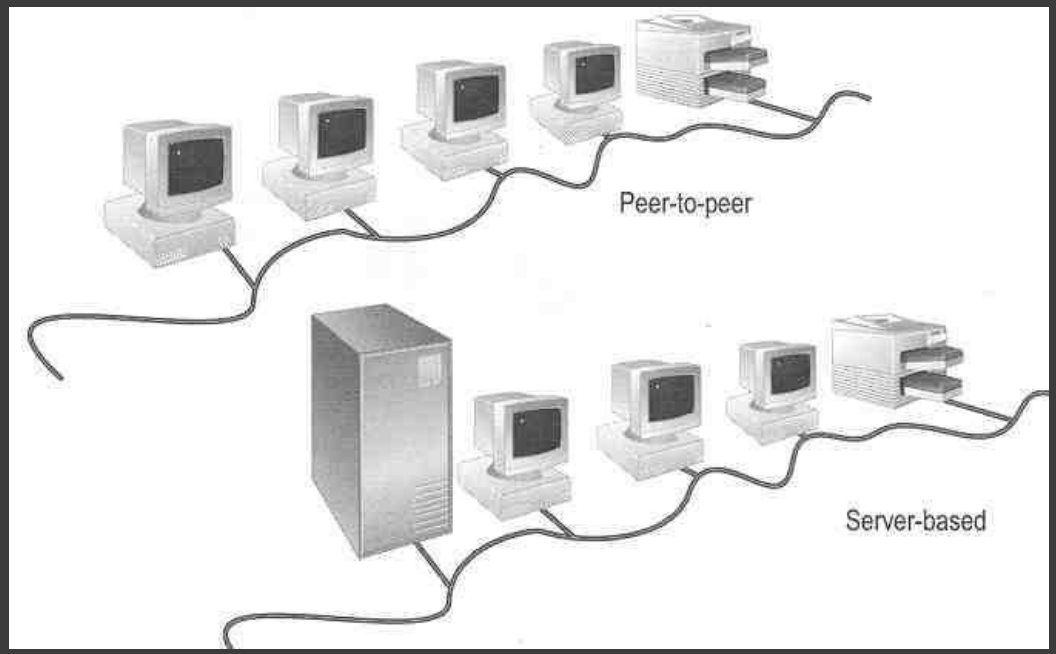
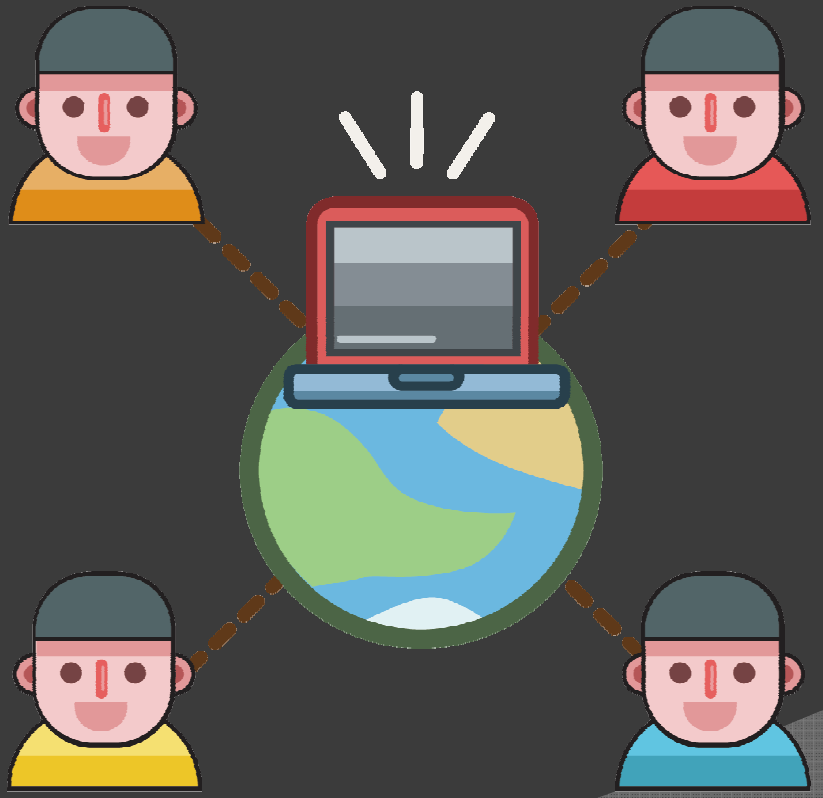


INFORMATION TECHNOLOGY
NETWORKING FUNDAMENTALS



Introduction to Networking

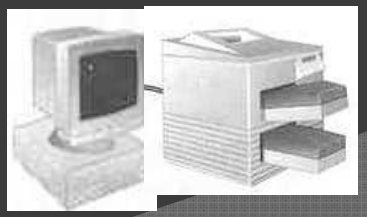
Why Networking???



NETWORKING

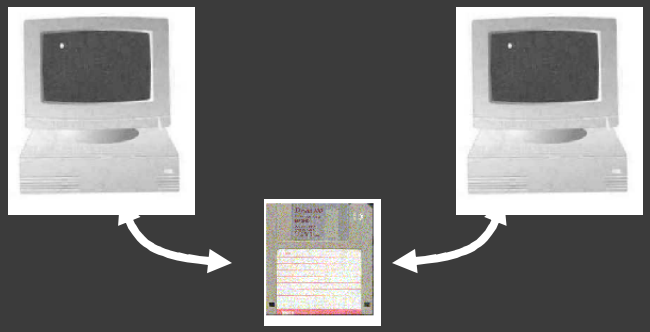
What is a Network?

A network consists of 2 or more computers connected together, and they can communicate and share resources (e.g. information)



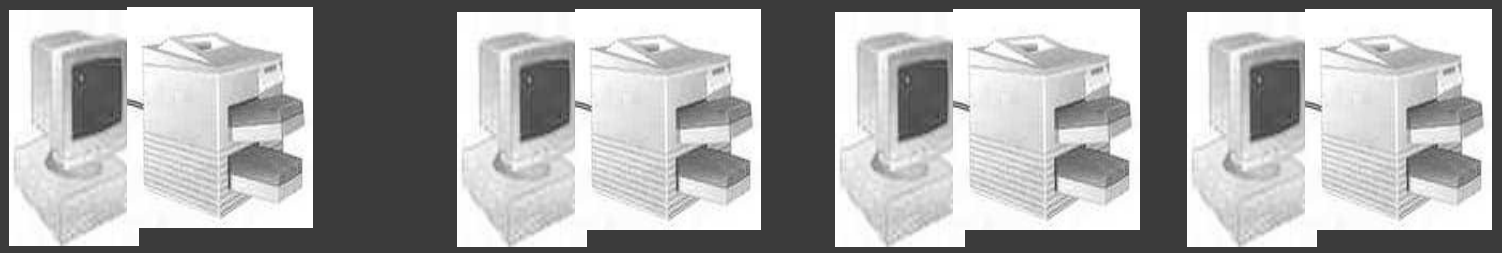
Why Networking?

- **Sharing information — i.e. data communication**
  - **Do you prefer these?**

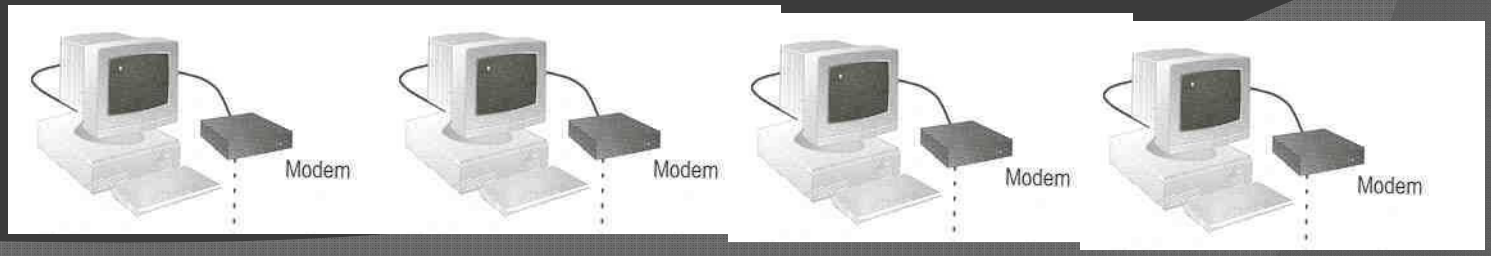


  - **Or this?**

- **Sharing hardware**
  - **E.g. print document**



- **Centralize administration and support**
  - **E.g. Internet-based, so everyone can access the same administrative or support application from their PCs**



Advantages of networking

- **Connectivity and Communication**
- **Data Sharing**
- **Hardware Sharing**
- **Internet Access**
- **Internet Access Sharing**
- **Data Security and Management**
- **Performance Enhancement and Balancing**
- **Entertainment**

The Disadvantages (Costs) of Networking

- **Network Hardware, Software and Setup Costs**
- **Hardware and Software Management and Administration Costs**
- **Undesirable Sharing**
- **Data Security Concerns**

Networking Terminology

LAN - Networks are often called LANs, short for *local area network.*

ON THE NETWORK - Every computer connected to the network is said to be "on the network." The technical term (which you can forget) for a computer that's on the network is a *node.*

ONLINE, OFFLINE - When a computer is turned on and can access the network, the computer is *online. When a computer can't access the network, it's offline.*

UP, DOWN - When a computer is turned on and working properly, it's *up. When a computer is turned off, broken, or being serviced, it's down.*

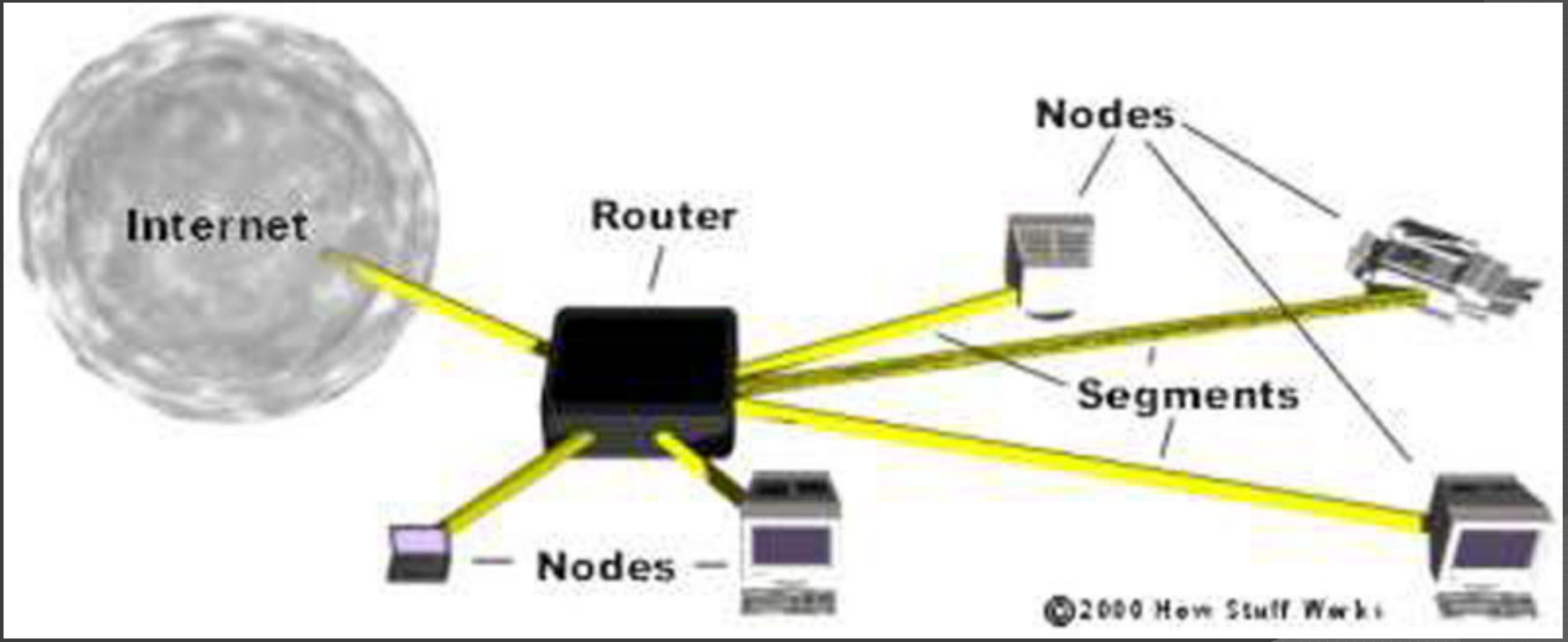
LOCAL, REMOTE - A resource such as a disk drive is *local if it resides in* your computer. It's *remote if it resides in another computer somewhere* else on your network.

INTERNET, INTRANET - Internet is a worldwide system of computer networks. An intranet is a private network that is contained within an enterprise.

Understanding Networking

INFORMATION TECHNOLOGY
NETWORKING FUNDAMENTALS

What do you see here for a typical network?



Network Structure

- Node : anything connected to the network, usually a computer, but it could be a printer or a scanner.
- Segment : any portion of a network that is separated by a switch, bridge or a router from another part of a network.
- Backbone : the main cabling of a network that all of the segment connect to. Usually, the backbone is capable of carrying more information than the individual segments..
- Topology : The way each node is physically connected to the network

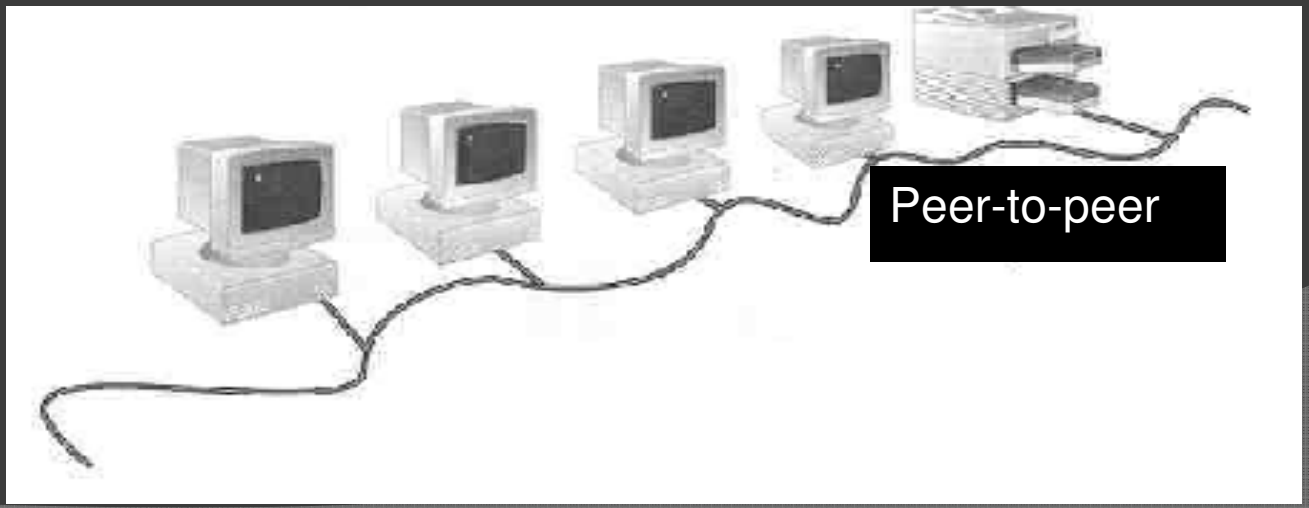
Network architecture ↗

Clients and Servers

- Network Clients (Workstation)
  - Computers that request network resources or services
- Network Servers
  - Computers that manage and provide network resources and services to clients
    - Usually have more processing power, memory and hard disk space than clients
    - Run Network Operating System that can manage not only data, but also users, security, and applications on the network
    - Servers often have a more stringent requirement on its performance and reliability

Peer-to-Peer Networks

- Peer-to-peer network is also called workgroup
- No hierarchy among computers ⇒ all are equal
- No administrator responsible for the network



- **Advantages of peer-to-peer networks:**
  - **Low cost**
  - **Simple to configure**
  - **User has full accessibility of the computer**

- **Disadvantages of peer-to-peer networks:**
  - **Difficult to uphold security policy**
  - **Difficult to handle uneven loading**

- **Advantages of client/server networks**
  - **Facilitate resource sharing – centrally administrate and control**
  - **Facilitate system backup and improve fault tolerance**
  - **Enhance security – only administrator can have access to Server**
  - **Support more users – difficult to achieve with peer-to-peer networks**

- **Disadvantages of client/server networks**
  - **High cost for Servers**
  - **Need expert to configure the network**

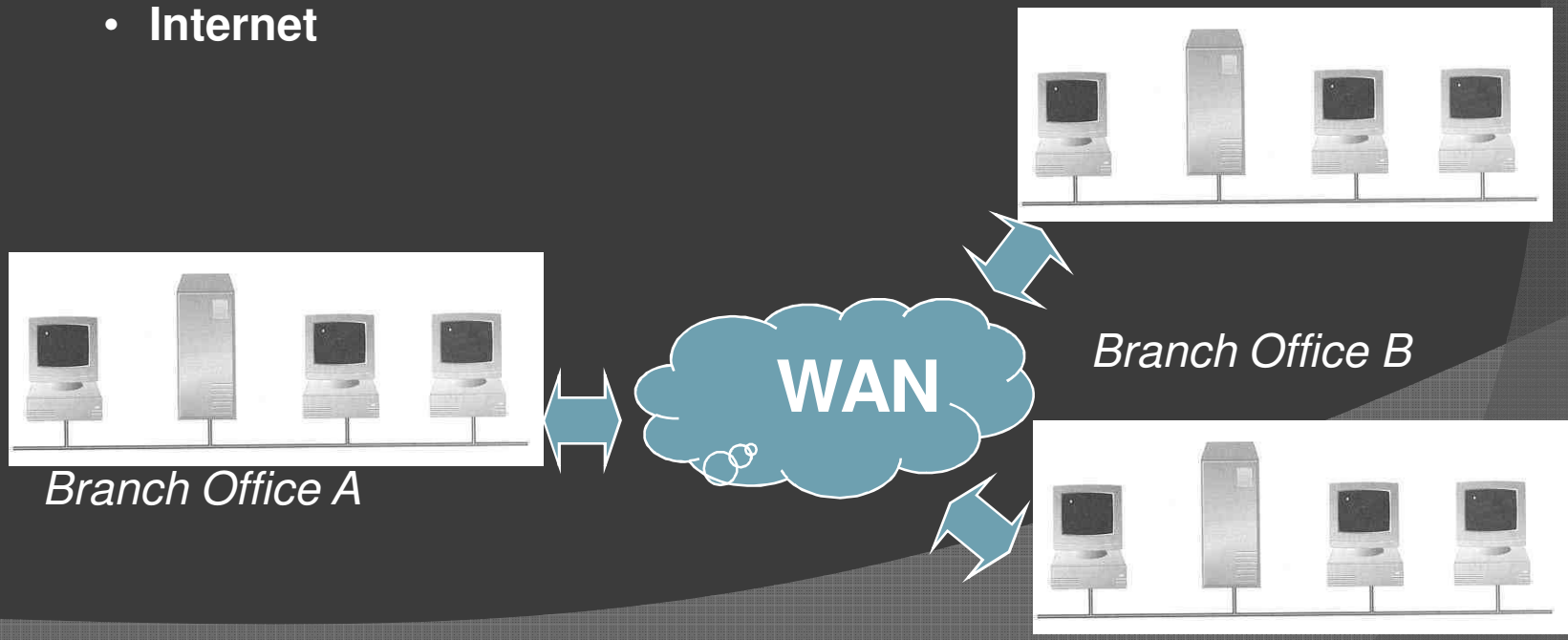
LAN

- **Local Area Network (LAN)**
  - **Small network, short distance**
    - **A room, a floor, a building**
    - **Limited by no. of computers and distance covered**
    - **Usually one kind of technology throughout the LAN**
    - **Serve a department within an organization**
  - **Examples:**
    - **Network inside a Computer Laboratory**
    - **Network inside your home**
    - **Network inside your office**

WAN

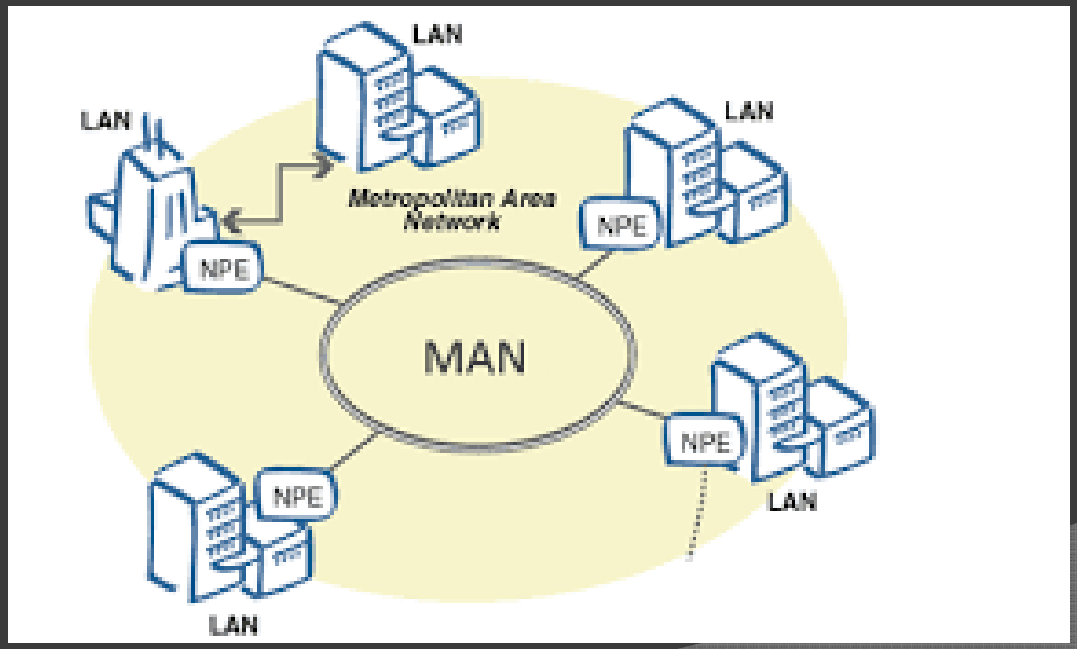
Wide Area Network

- **A network that uses long-range telecommunication links to connect 2 or more LANs/computers housed in different places far apart.**
  - **Towns, states, countries**
- **Examples:**
  - **Internet**



MAN

- metropolitan area **network**
  - is a **network** that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area **network** (LAN) but smaller than the area covered by a wide area**network** (WAN).



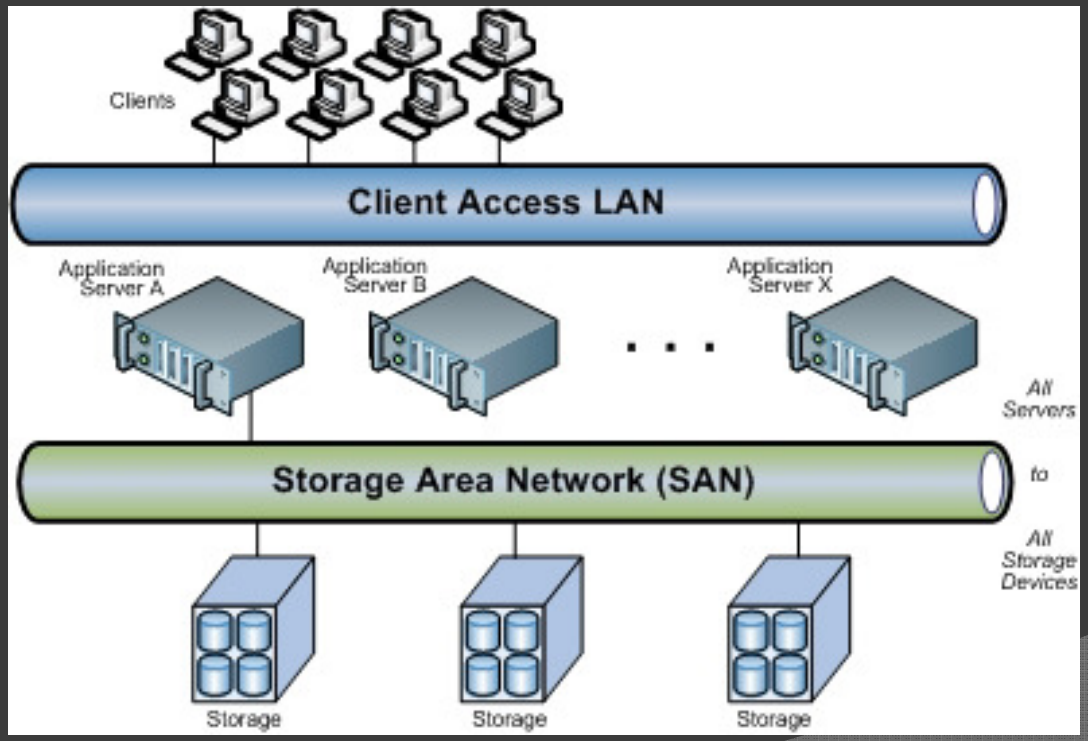
PAN

- **personal** area **network**
  - is a computer network for interconnecting devices centered on an individual person's workspace.

SAN

storage area network

- is a specialized, high-speed network that provides block-level network access to storage.



WLAN

wireless LAN

- is a wireless computer network that links two or more devices using wireless communication to form a local area network (LAN) within a limited area such as a home, school, computer laboratory, campus, office building etc.

CONNECTION TYPES

POINT-TO-POINT

- is a direct link between two devices.

e.g. computer-printer, pc-to-pc, microwave antennas.

MULTIPOINT

- also called *multidrop* is a link between three or more devices.

Network topology

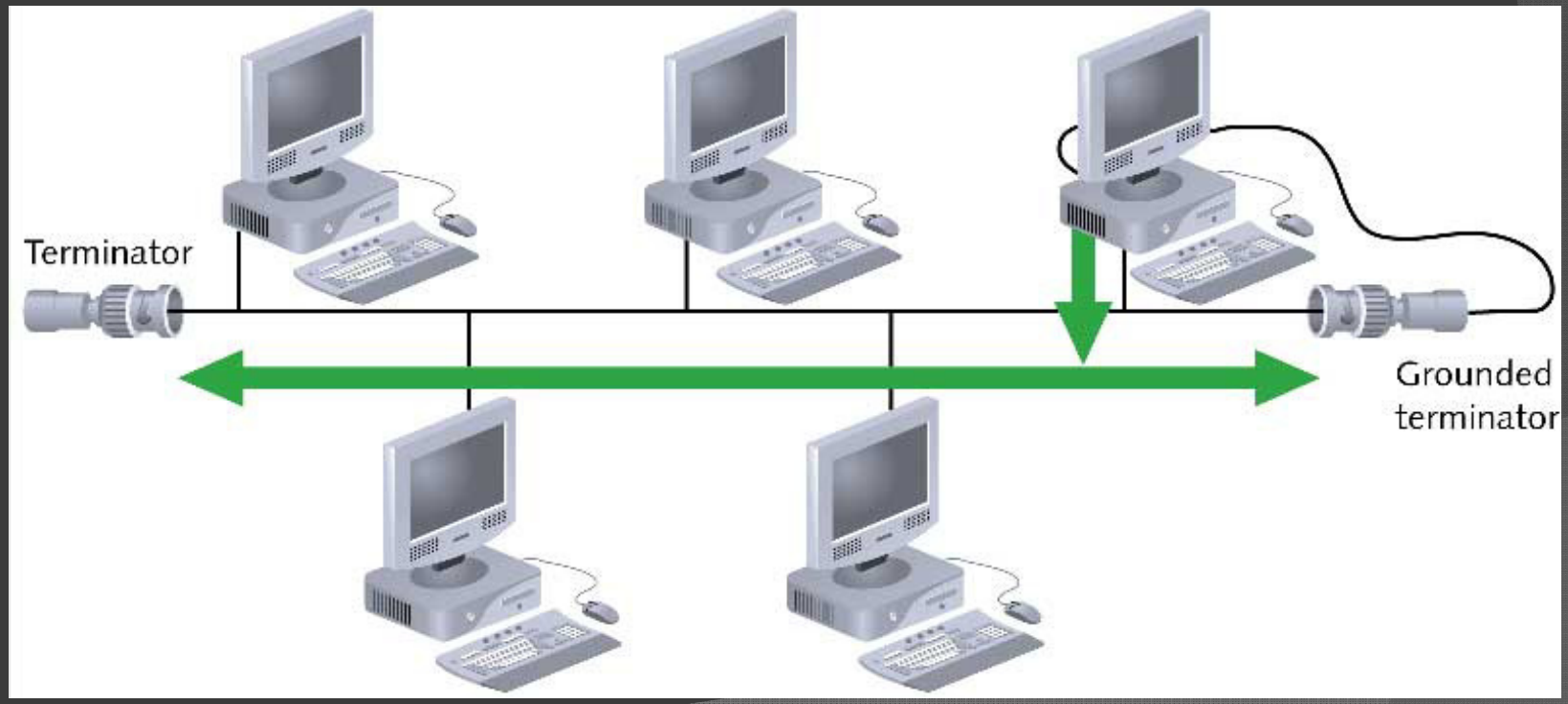
- A *topology* is a way of "laying out" the network. Topologies can be either physical or logical.
- *Physical topologies* describe how the cables are run.
- *Logical topologies* describe how the network messages travel

PHYSICAL TOPOLOGY

- Is the complete physical structure of the transmission media.

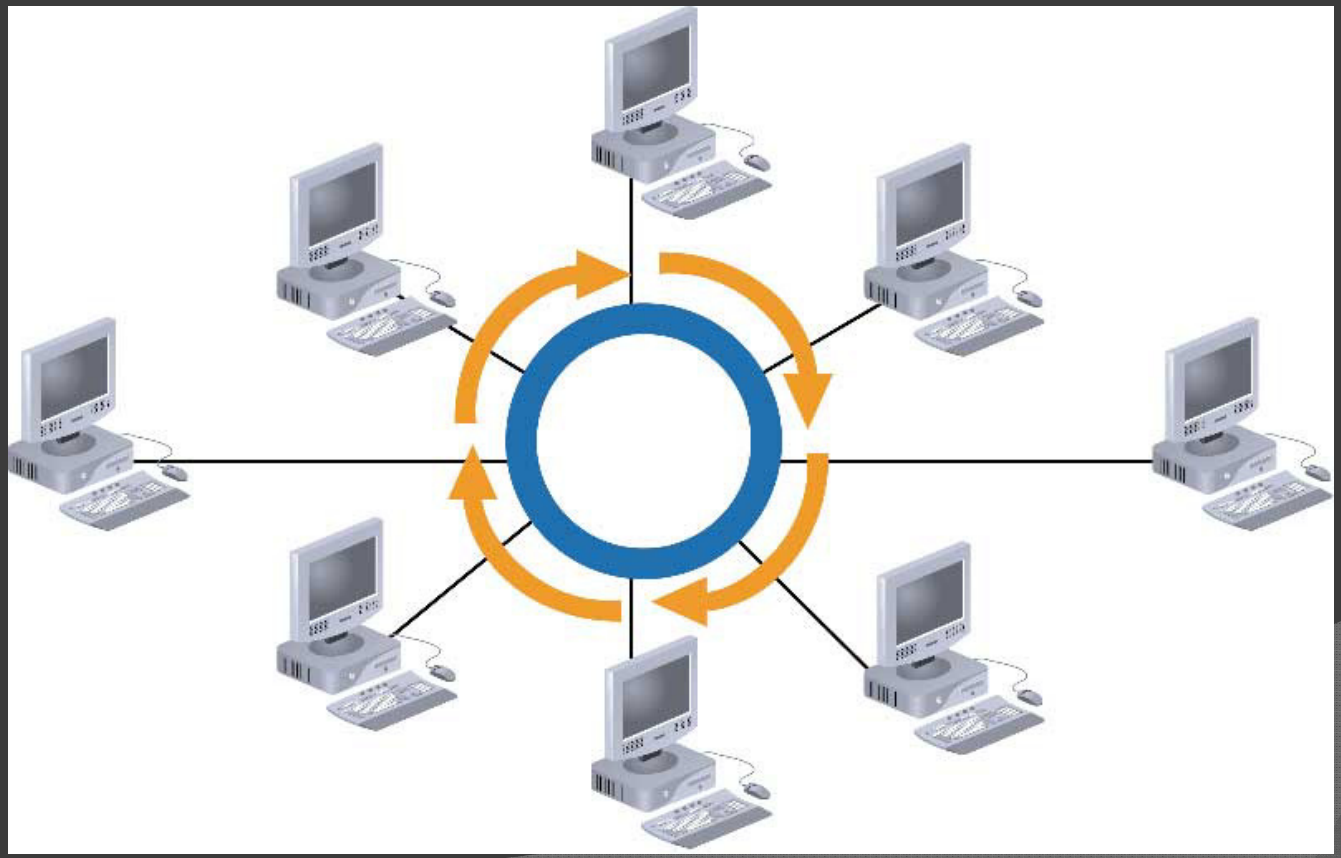
Bus

- Typically uses one lomg cable, called *backbone,* short cables called *drop cables.*
- **Bayonet Neill-Concelman** (after its inventors),



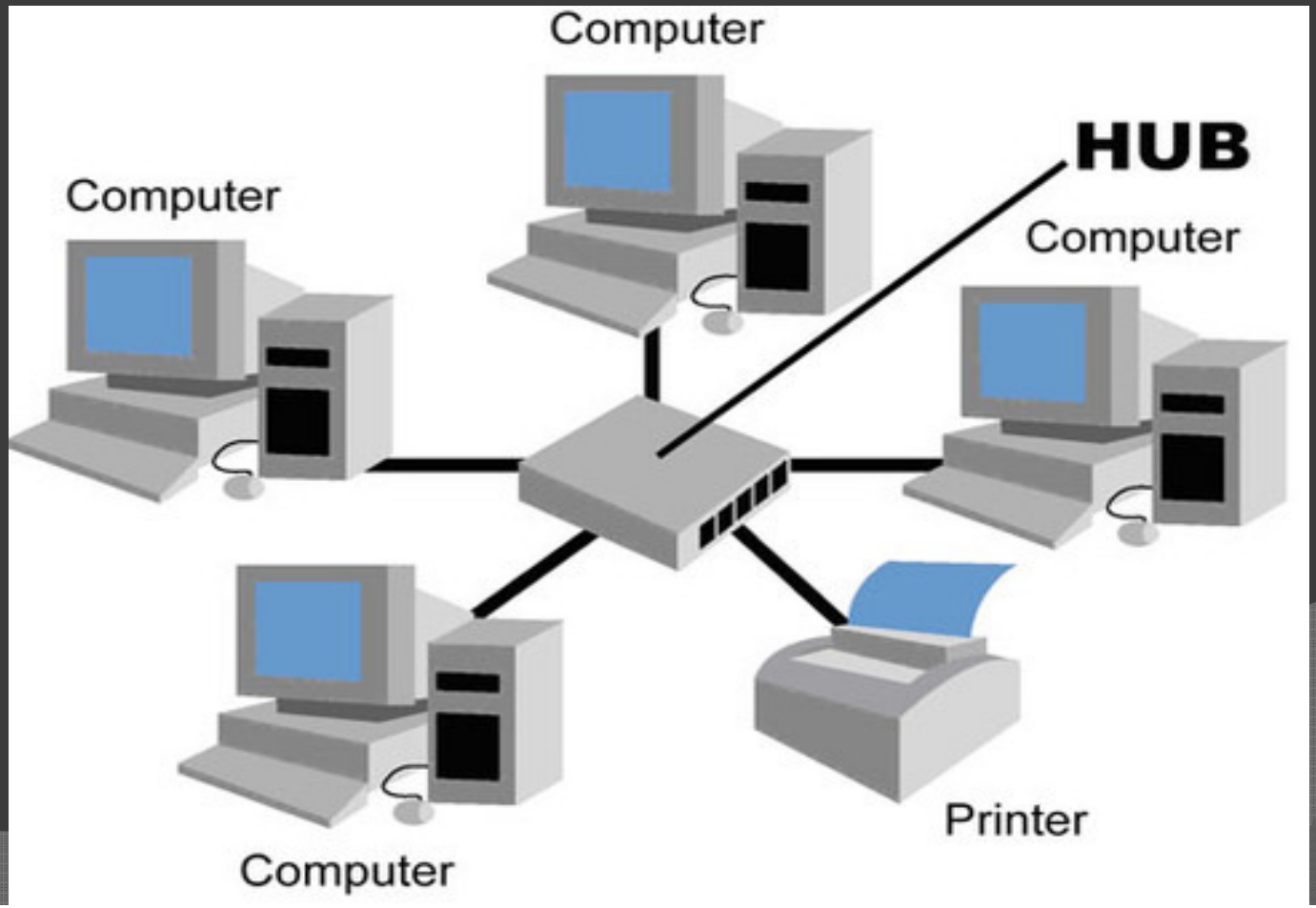
Ring

- Is a circular topology (or closed loop of point-to-point). Each node is connected to the two nearest nodes so the entire network forms a circle



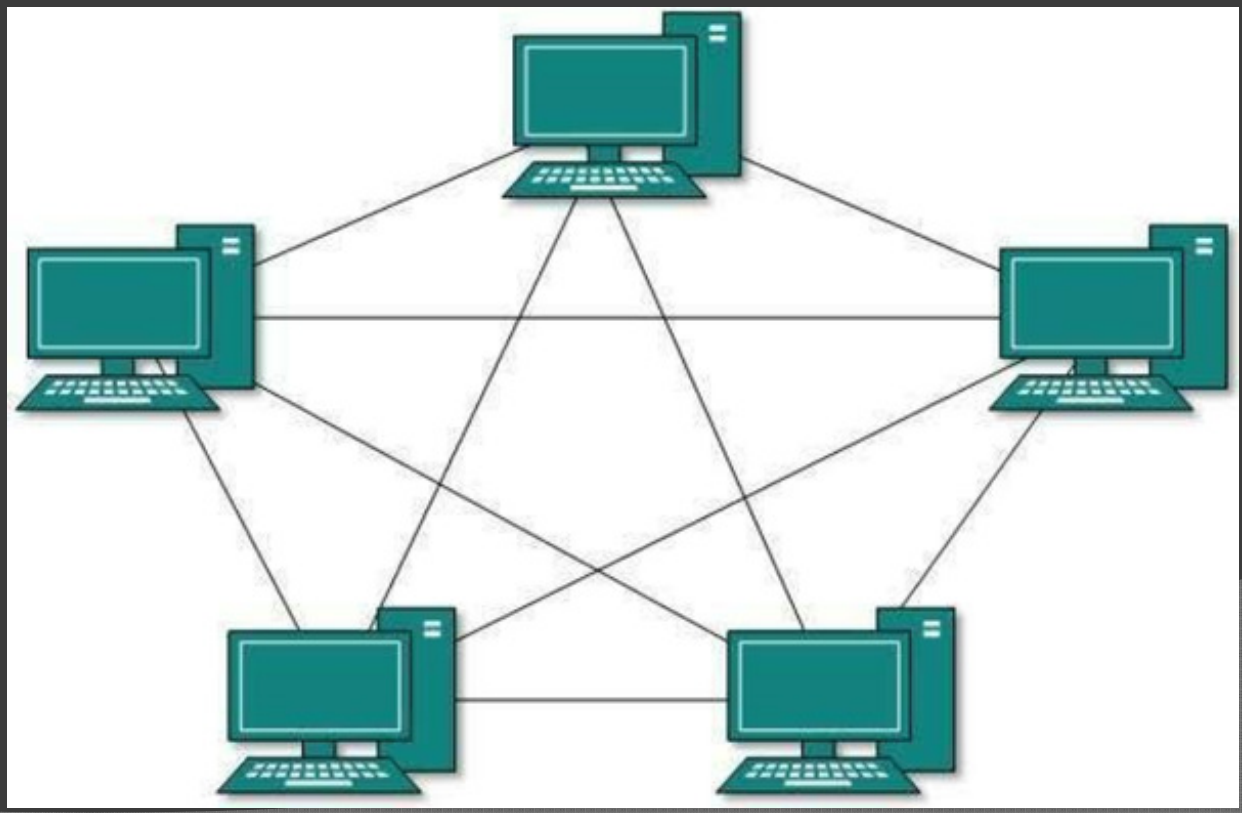
Star

- Use a central device with drop cables extending in all directions. Each networked device is connected via point to point link to the central device.



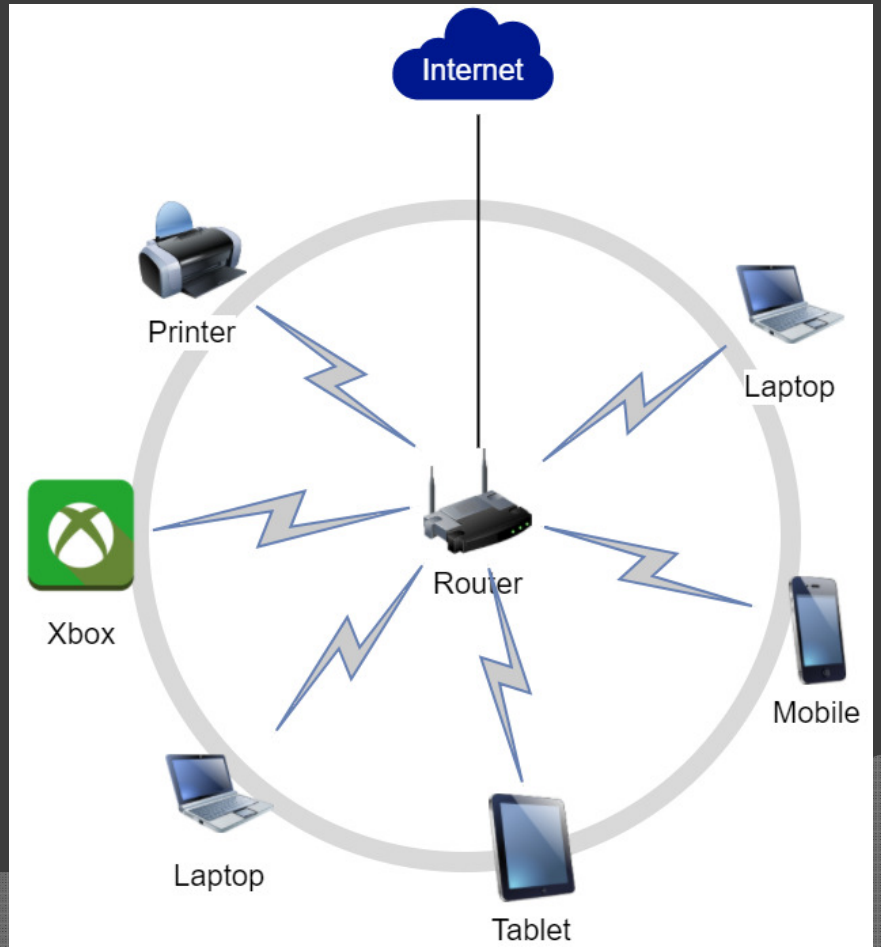
Mesh

- Has a point-to-point connections between every device in the network together with another topology. (mixed). Because each device requires interface for every device, it is not considered practical.



Cellular/Wireless

- Combines wireless point-to-point and multi-point strategies to divide a geographic area into cells. Devices within the cell communicates with a central station. It relies on the location of wireless media hub.



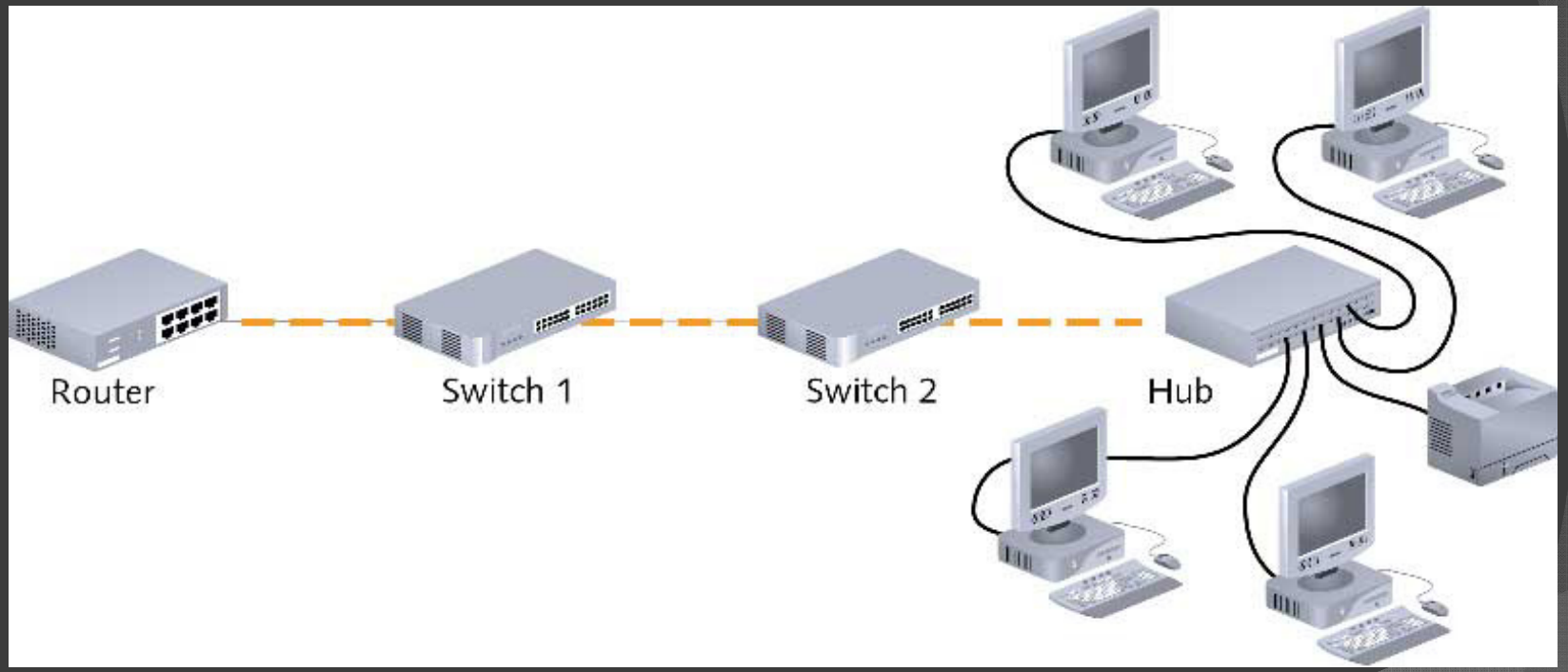
NETWORK BACKBONE

- Serial Backbone
- Distributed Backbone
- Collapsed Backbone
- Parallel Backbone

Serial Backbone

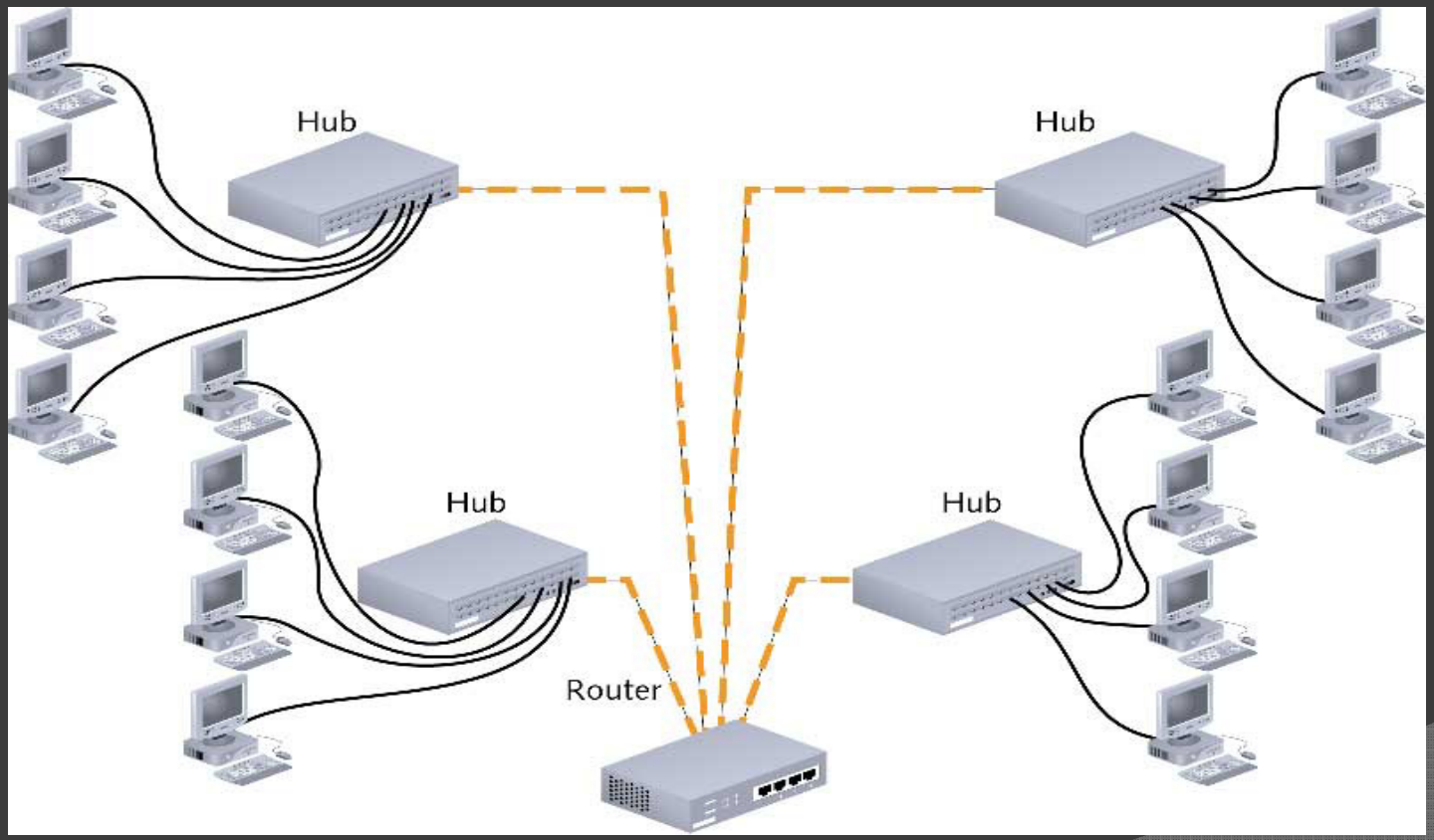
- Daisy chain: linked series of devices
  - Hubs and switches often connected in daisy chain to extend a network
- Hubs, gateways, routers, switches, and bridges can form part of backbone
- Extent to which hubs can be connected is limited

Network Backbone: Serial Backbone (continued)



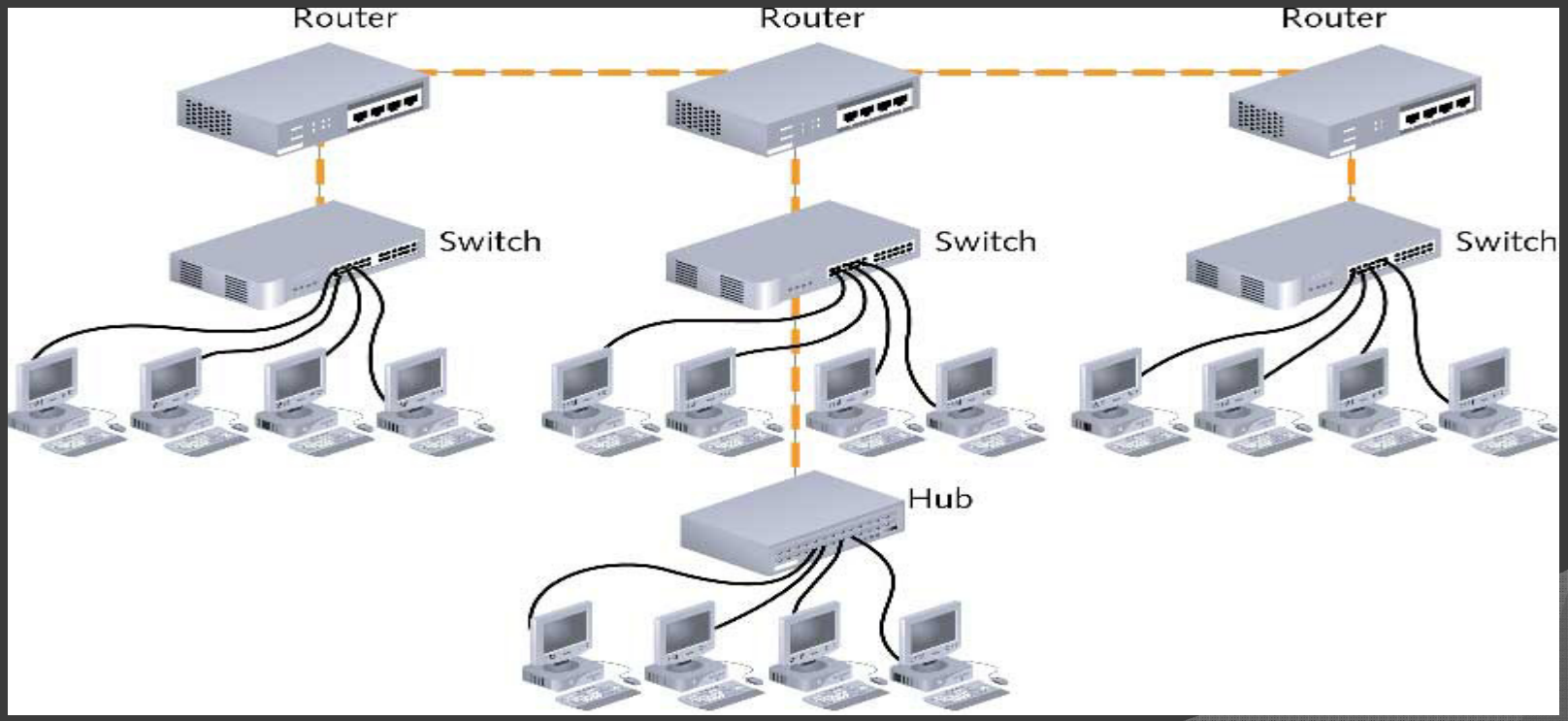
Collapsed Backbone

A network configuration that provides a backbone in a centralized location, to which all subnetworks are attached.



Distributed Backbone

is a backbone network that consists of a number of connectivity devices connected to a series of central connectivity devices, such as hubs, switches, or routers



Parallel Backbone

Each switch and router are connected by two cables. By having more than one cable connecting each device, it ensures network connectivity to any area of the enterprise-wide network