Networking

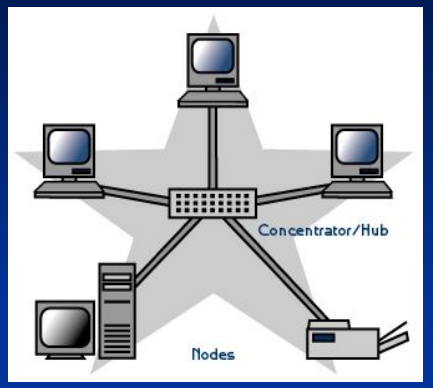
TEJ 4M

Networking

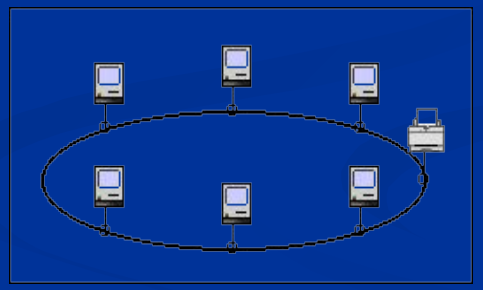
- A network is defined as two or more computers/devices connected to each other
  - Peer-to-peer when a server is not involved
  - Client-server when a server is involved
- Uses and Benefits of a LAN
  - Shared peripherals
  - Shared storage
  - Shared Applications
  - Reliability and Resilience
  - Security through id and password
  - centralized backup systems for data recovery
  - centralized virus protection

Types of Networks

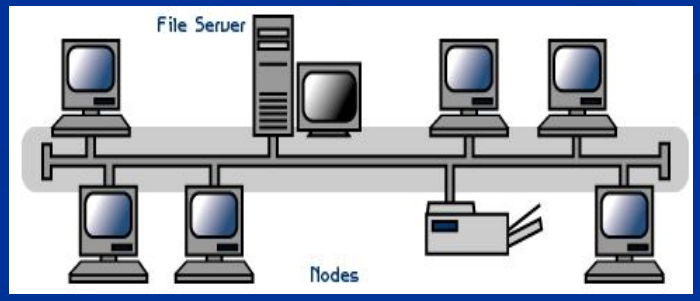
- Star **Network**
  - Centralized hub (typical systems)
  - Each machine runs independently from the other, but hubs connect



- Ring **Network**
  - Avoids the need of a network server
  - If one computer goes down the entire network may do the same
  - Outperforms Bus Network



- Bus **Network**
  - All machines on the same line, line goes down the network may do the same
  - Difficult to repair but inexpensive to construct



Setting Up a Home Network

- It seems that lately almost all homes have more than one computer and that wireless networks are almost necessary.
- Key components of a typical home network:
  - High Speed Internet Service (connected through a Modem)
  - Wireless Router
  - Computers (or other devices) equipped with Wireless (or close enough to router to be wired with ethernet cable)

Desktop Wireless Card

- Here is a version of a PCI wireless card (right)

- USB wireless adapters are common as well

Laptops and Other Wireless Devices

- Most newer laptops and netbooks have Wi-fi capability built in.
- Other wireless devices that use Wi-fi technology and can be connected to home networks are:
  - SmartPhones (BlackBerry, iPhones, etc.)
  - iPad, iPod Touch, Playstation 3, Media Players
  - Any others?

Unsecured Connection?

- There are many people who do not know how to secure their wireless networks.
- They are at risk of:
  - Having information stolen that is shared on the network (banking files, pictures, etc.)
  - Other people using your internet connection may be doing illegal things
  - Other people downloading may cause you to exceed your bandwidth (extra fees for you)

Network Security Types

- Wi-Fi Protected Access **(WPA)**
- WPA encrypts information, and it also checks to make sure that the network security key has not been modified. WPA also authenticates users to help ensure that only authorized people can access the network.
- There are two types of WPA authentication: WPA and WPA2 (newer and more secure)

Network Security (cont.)

- Wired Equivalent Privacy **(WEP)**
- WEP is an older network security method that is still available to support older devices, but it is no longer recommended. When you enable WEP, you set up a network security key. This key encrypts the information that one computer sends to another computer across your network. However, WEP security is relatively easy to crack.

Network Security (cont.)

- **MAC Filtering**
- permits and denies network access to specific devices
- an individual person is not identified by a MAC address, rather a device only
- Uses two lists to determine whether a device is allowed or not (authenticated and unauthenticated)
- Can be time consuming (need to add a friend's iPod to the approved list rather than just giving them the network key)

Windows Recommendation

- **Warning!**
- We don't recommend using WEP.
- WPA or WPA2 are more secure. If you try WPA or WPA2 and they don't work, we recommend that you upgrade your network adapter to one that works with WPA or WPA2

-found at
http://windows.microsoft.com/en-US/windows-vista/What-are-the-different-wireless-network-security-methods

3 Important Things

- When setting up a secured wireless home/small business network it is important to:
  1. Set WPA, WEP, or another encryption password
  2. Change the Router Name
  3. Change default Administrator Passwords

NOTE: Steps 2 and 3 eliminate the chance of YOU being locked out of your own network!

Switches

- A network switch or switching hub is a computer networking device that connects network segments or network devices on the same network

- Similar to a wired router and typically uses Ethernet (Cat5) cables.

Features of Switches

- Turn particular port range on or off
- Link bandwidth and duplex settings
- Priority settings for ports
- IP Management
- MAC filtering and other types of "port security" features which prevent MAC flooding

IP Addresses

- Stands for "Internet Protocol"
- Used to identify and communicate to specific devices on a network
- Two types of IP addressing:
  - IPv4 contains a 4 part address (separated by dots). Each part of the address is stored in a BYTE (8 x 4 = 32 bits)
  - IPv6 contains an 8 part address (separated by colons). Each part uses a hexadecimal value
  - 2001:0db8:3c4d:0015:0000:0000:abcd:ef12

    global prefix | subnet | Interface ID
- The main advantage of IPv6 is that is has 2^{128} unique addresses while IPv4 only has 2^{32}

Setting up a Router/Switch

- Each group will get a router or switch to setup
- Each pair of groups will get a router or switch to set up

1. Find user guide online (download PDF) for your router.switch
2. Plug the router into power
3. Reset the router to factory settings (read the manual to see how to do this)
4. Once you learn how to build a network cable you will access setup screen through a browser (see the manual for the correct IP address to use in your browser address bar as well as the default username and password)
5. Then later on you will connect the two computers to the switch/router using the proper ethernet cables that you will build yourselves.
6. AND finally you'll share files successfully between 2 devices , play a LAN game, set up and share a server and its service.
7. EXTENSION – able to do this on two OSs.