Unit 1 - Hardware

Peripherals

What are peripherals?

- A peripheral is a device that operates *separately* from the computer but is connected to it.

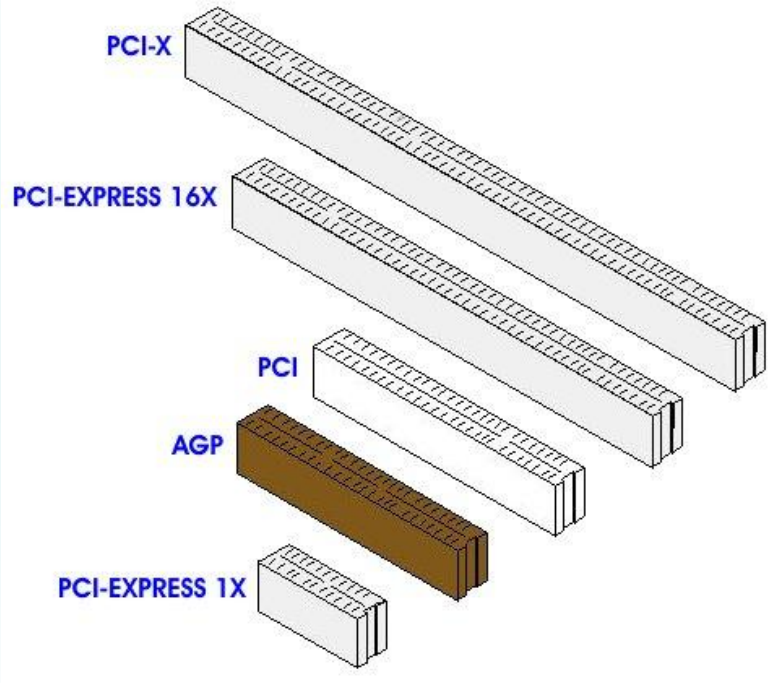
- Peripherals can be *external* (keyboard, mouse) or *internal* (CD-ROM, network card).

- They typically receive power from the computer, but some required a separate source of power.

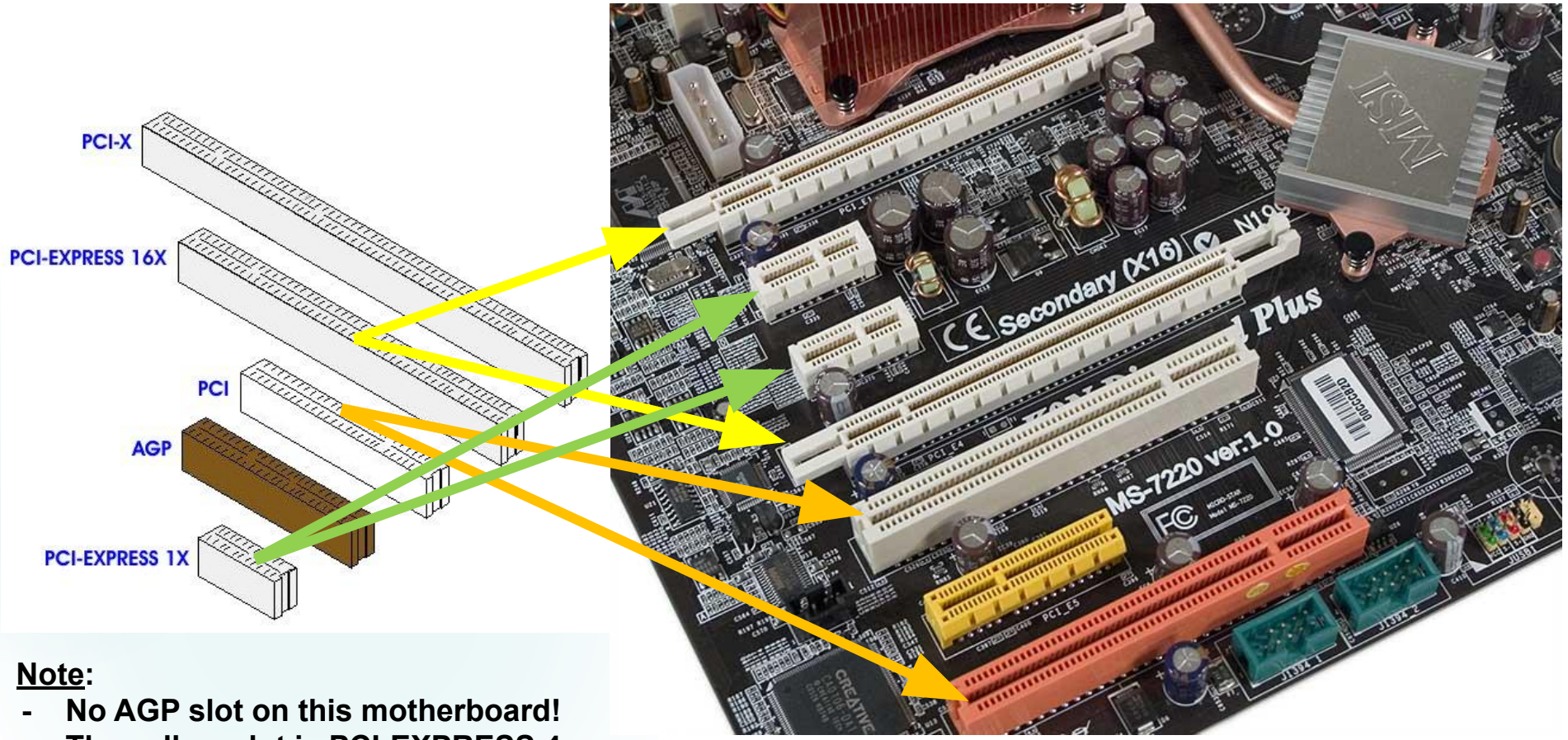
Internal Peripheral Connections: Slots

- Internal peripherals may connect directly to the motherboard through *slots*

- Slots have different architectures (PCI, PCI-e, AGP)



Internal Peripheral Connections: Slots



Note:

- **No AGP slot on this motherboard!**
- **The yellow slot is PCI-EXPRESS 4x**

Internal Peripherals: Examples

- Sound Cards
  - Usually integrated on to motherboard!
  - Older or higher quality sound cards connect using slot.

Internal Peripherals: Examples

- Video Cards
  - Might be integrated on to motherboard…
  - Most variations in bus types (AGP, PCI-E, PCI-E 16x, etc)

External Peripheral Connections: Universal Serial Bus (USB)

- Generally, the standard for input/output devices.

- **Sample devices:** mouse, keyboard, webcam, external storage

External Peripheral Connections: High-Definition Multimedia Interface (HDMI)

- Primarily used for streaming media from computer to TV
- Transfers both video and audio through one cable!

External Peripheral Connections: VGA & DVI

- VGA (Video Graphics Array):
  - Used for older, limited resolution video transfer
  - Still very common!
- DVI (Digital Video Interface)
  - Newer, higher resolution video transfer

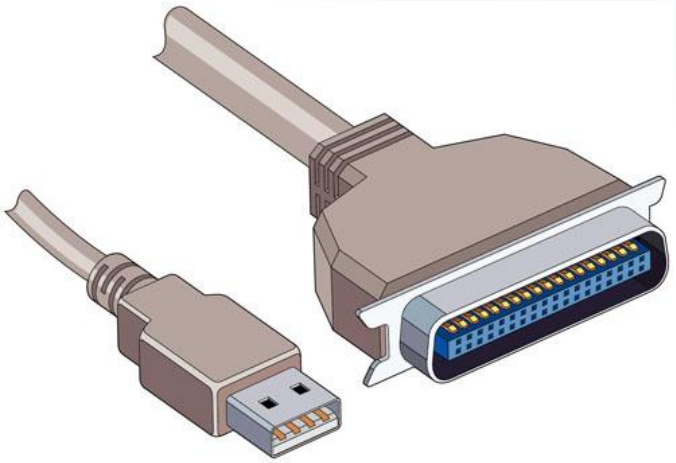
External Peripherals: Keyboard & Mouse

- Keyboard
  - Most computers will not boot without keyboard attached (BIOS beeps)
  - Some systems may be designed to operate without a keyboard.
  - Uses USB or PS2 connectors – USB is more common, nowadays.
  - Adapters exist to convert PS2 to USB.

- Mouse
  - Generally, useful for all modern computers… but not required!
  - In some applications, replaced by touchpad/touchscreen.

External Peripherals: Printer & Scanner

- Printers
  - Have their own microprocessor, RAM, and power supply.
  - Often connected via USB. Older printers connect via serial connection.
  - In office settings, printers connected via network.
- Scanner
  - Scans images and digitizes them.
  - Connected via USB.



External Peripherals: Camera & Microphone

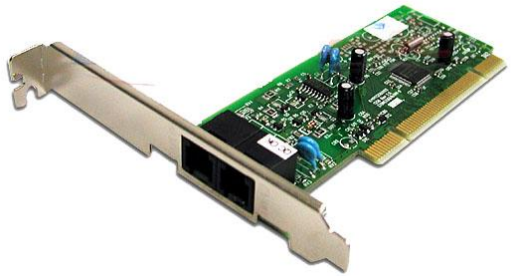
- Cameras
  - Typically, USB connection.
  - Limited frame rates (laggy video) and resolution (picture quality)
  - Video lag is *actually* a limitation of the USB connection, not the camera.

- Microphone
  - Older models plugged into sound card.
  - Newer models: USB connectivity.

External Peripherals: Older or Obsolete Examples

- Network (NIC) cards
  - Plugged into PCI slots.
  - Provide connectivity via RJ45 (Ethernet) cable.
  - Mostly replaced by on-board network cards.

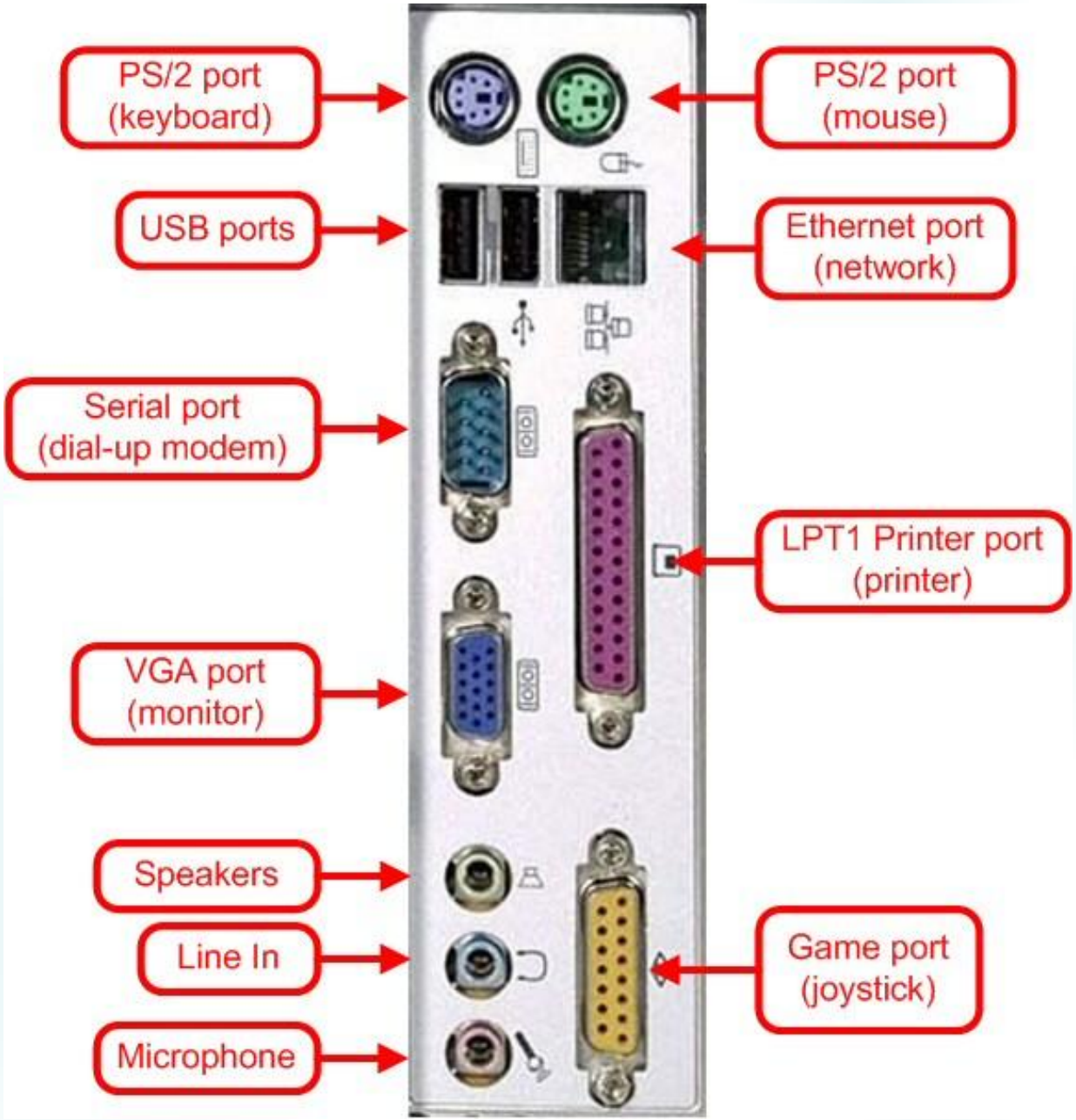
- Fax Modem
  - Used to connect to other computers (servers) for networking purposes.
  - Internet Service Providers (ISPs) then relayed connections to website.
  - Replaced by network cards.



Connections

How do we connect our I/O devices to desktop?

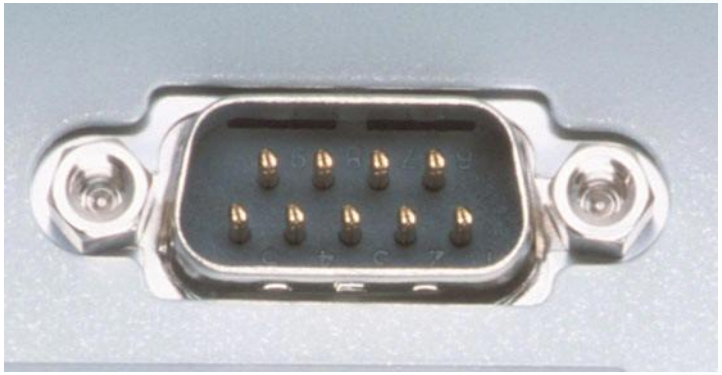
- Many devices use one or more of the following types of connection:
  - Serial port
  - Parallel port
  - DIN and PS/2
  - Ethernet
  - VGA
  - USB
  - Thunderbolt
  - Firewire
  - eSATA


PS/2 port (keyboard)
PS/2 port (mouse)
USB ports
Ethernet port (network)
Serial port (dial-up modem)
LPT1 Printer port (printer)
VGA port (monitor)
Speakers
Line In
Game port (joystick)
Microphone

Bandwidth

- Each connection has a bandwidth
- Bandwidth is the amount of data that can be passed along a communications channel over a given period of time.
  - Measured in bytes per second (bps) or hertz

The serial port



- The serial port is a general-purpose interface that can be used for almost any type of device, including modems, mice, and keyboards

The parallel port

- A parallel interface for connecting an external device such as a printer.

- On PCs, the parallel port uses a 25-pin connector (type DB-25) and is used to connect printers, computers and other devices that need relatively high bandwidth.

DIN and PS/2

- PS/2 is a port developed by IBM for connecting a mouse or keyboard to a PC. The PS/2 port supports a mini DIN plug containing just 6 pins.

- A DIN connector is a connector that conforms to one of the many standards defined by DIN. DIN connectors are used widely in personal computers.

VGA port

- Port on a PC that is used to connect a monitor

Ethernet Port

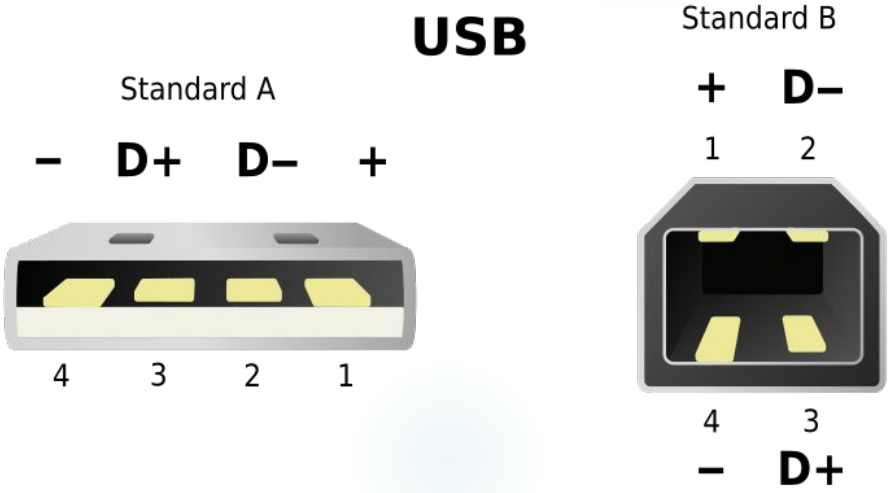
- The standard local area network access method
- Uses a RJ-45 connector and twisted pair cable to connect computers to a network

USB (1997)

- Introduced mid 90's
- Created be a consortium of corporations led by Intel
- Used to standardize the connection of peripherals
- Transfer rate of 12Mbits per second. It is more than 100 times as fast as a serial port

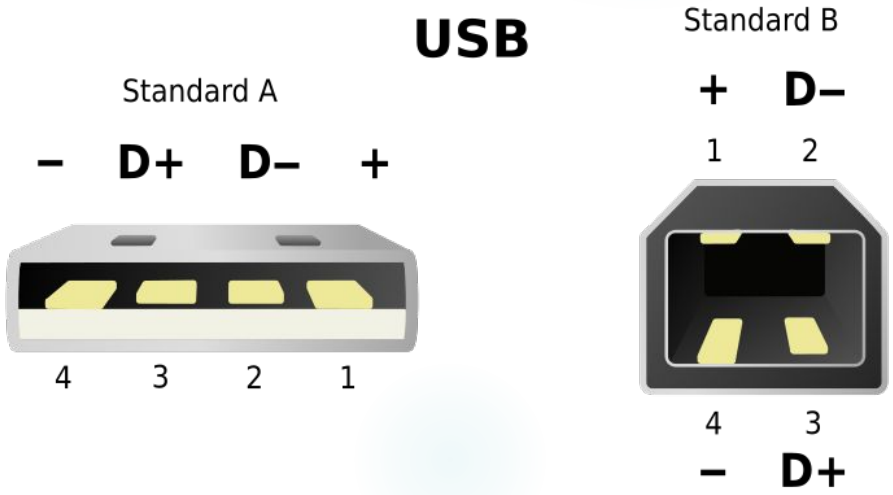
USB 2.0 (2000)

- 480 Mbps
- How do I determine if my PC has USB 2.0
  - Open Device Manager and expand USB
  - Host controller should be “enhanced”

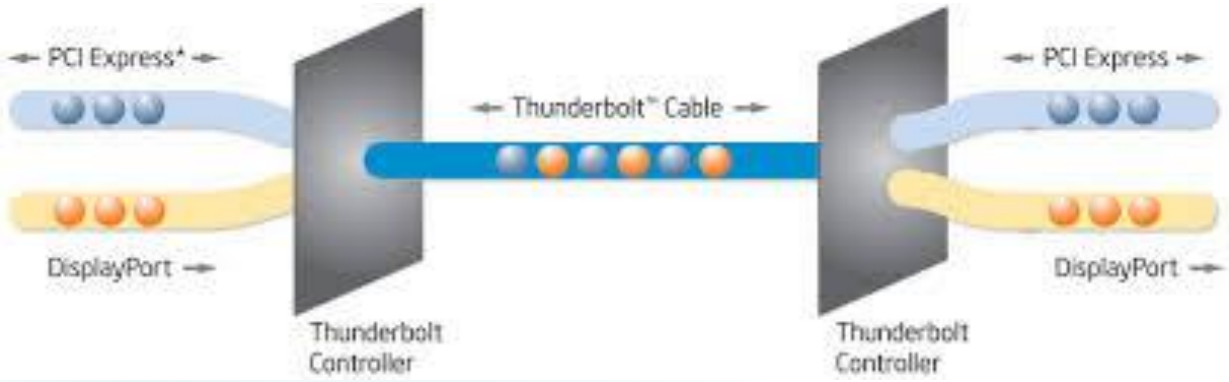


USB 3.0 (2007)

- "Superspeed USB"
- Up to 4.8 Gbps
- More power (900 mA)
- Effiecient



Thunderbolt



- On all Apple laptops and computers
- 10 Gb/s (PCI express on a cable)
- Very few peripherals need the bandwidth

Firewire IEEE1394

- 2007
- 800 Mbps

- External serial advanced technology attachment
- 2004
- Targeted external storage market
- 3.2 Gbps