Computer Systems

Lecture 5: Laptops & Portable Devices

Virtual Laptop

- Virtual laptop is a stand-alone tool designed to:
  - Supplement classroom learning.
  - Provide a virtual “hands-on” experience where real equipment is limited.

Virtual laptop: Demo on the StudentShare or download from http://www.cisco.com/web/learning/netacad/downloads/zip/laptop.zip.

Laptops

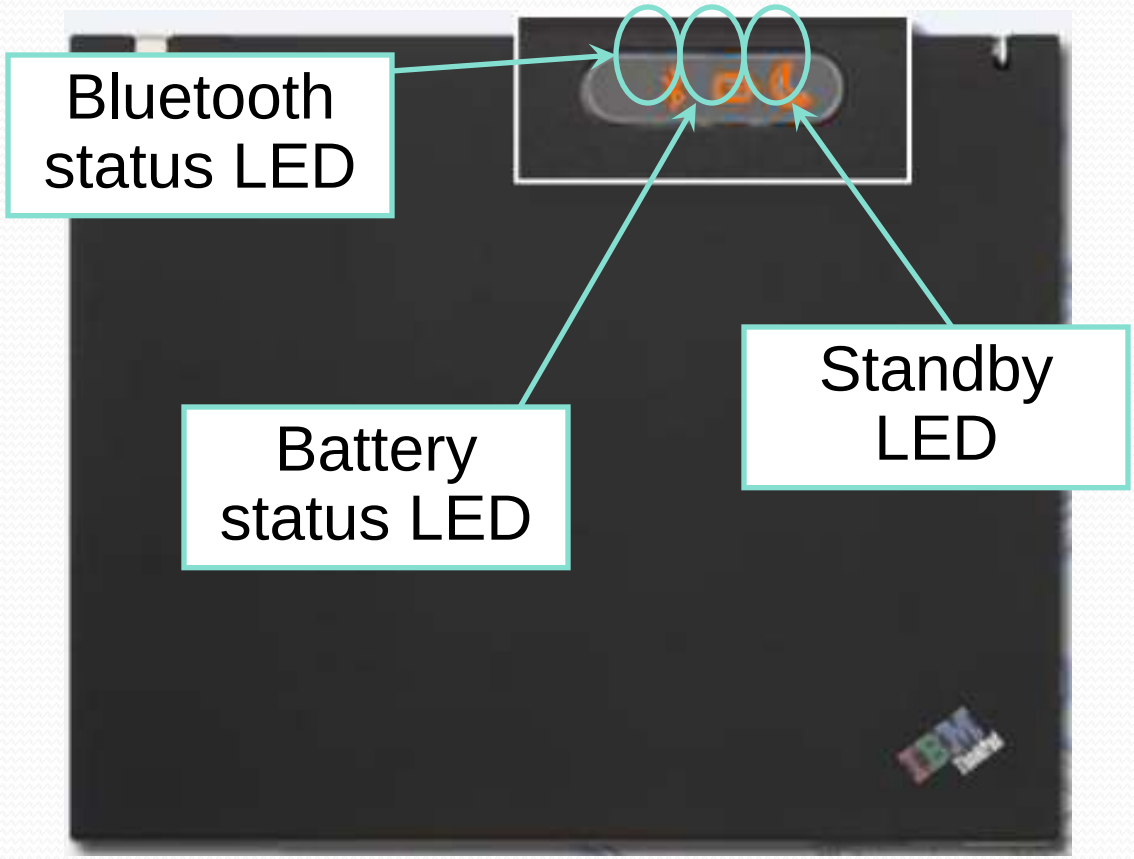
- Notebooks, laptops and tablets are types of portable computers.
- The most significant feature of a laptop is its compact size. The design of the laptop places the keyboard, screen, and internal components into a small, portable case.
- Laptops can be used to take notes in school, present information in a business meeting, or access the Internet in a coffee shop.

Components Of A Laptop

- Common laptop features:
  - Integrated display screen in lid
  - Integrated keyboard
  - AC power source or rechargeable battery
  - Hot-swappable drives and peripherals
  - PC Card or ExpressCard slots
  - Status indicators, ports, slots, connectors, bays, jacks, vents, and a keyhole are on the exterior of the laptop

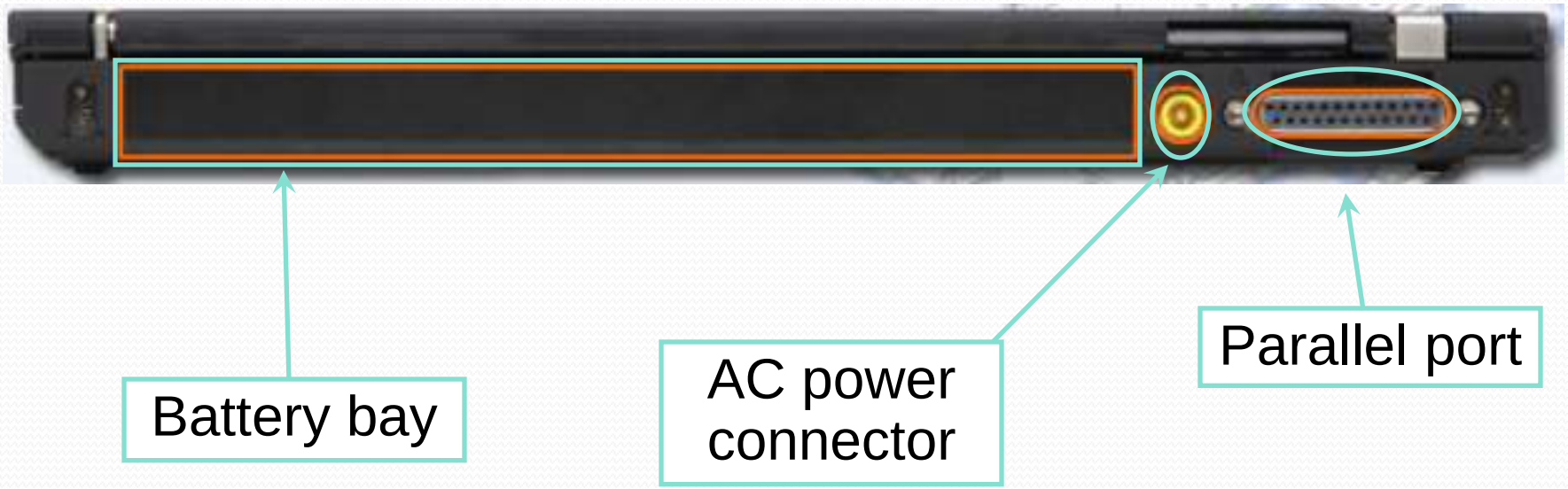
Components On The Outside Of Laptop

- Top view of virtual laptop



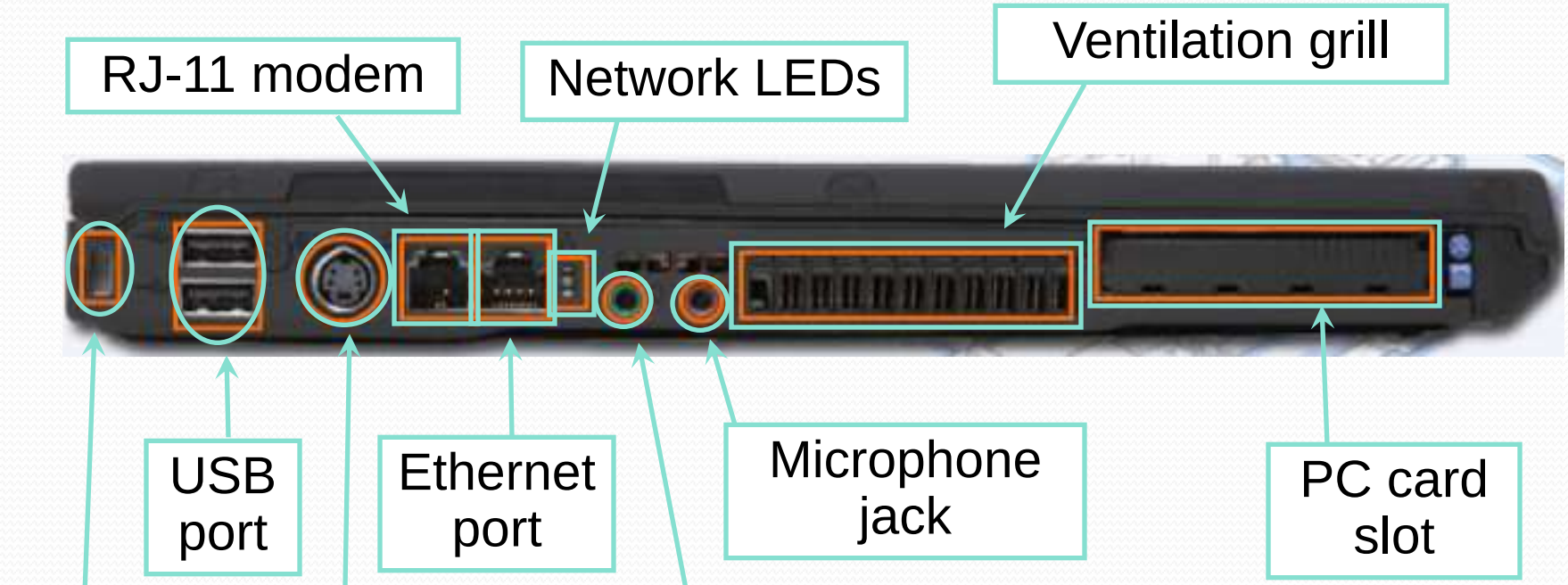
Components On The Outside Of Laptop

- Rear view of virtual laptop



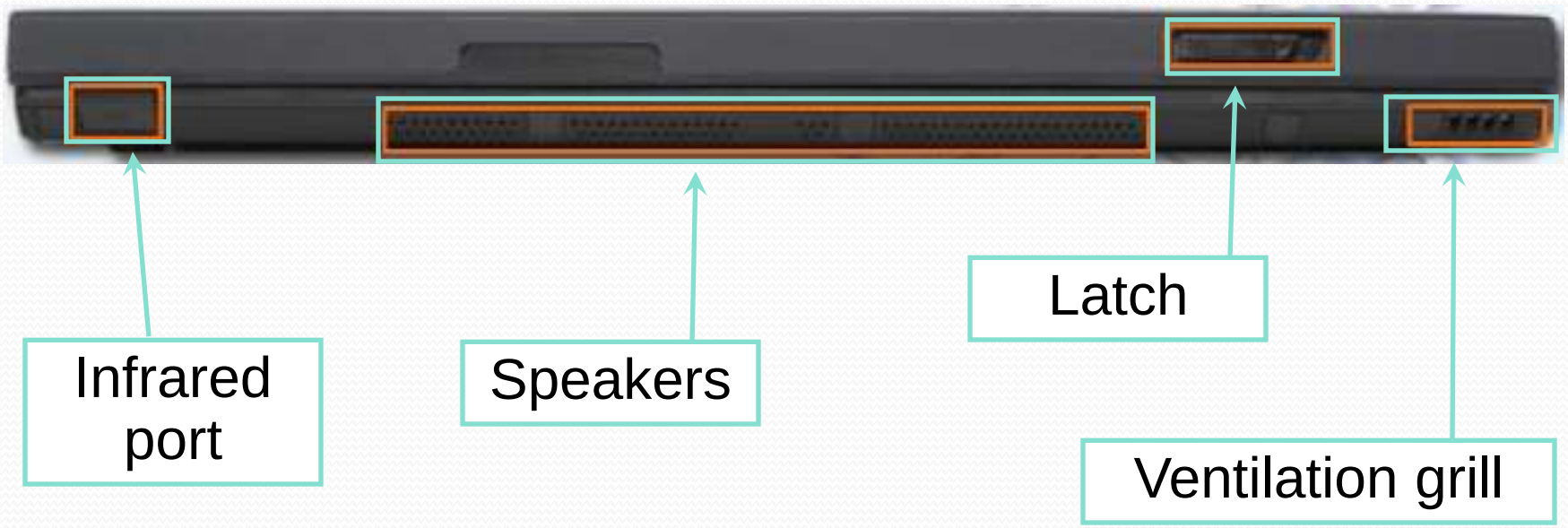
Components On The Outside Of Laptop

- Left side view of virtual laptop



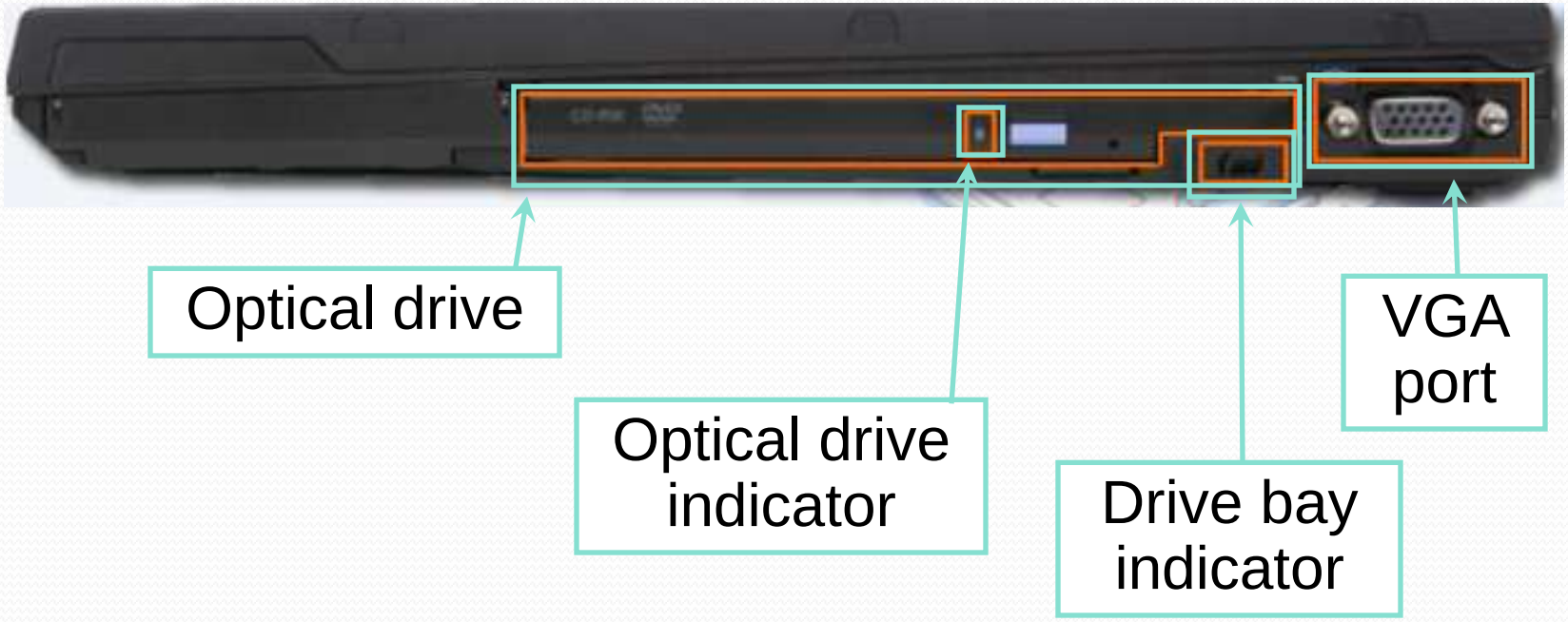
Components On The Outside Of Laptop

- Front view of virtual laptop



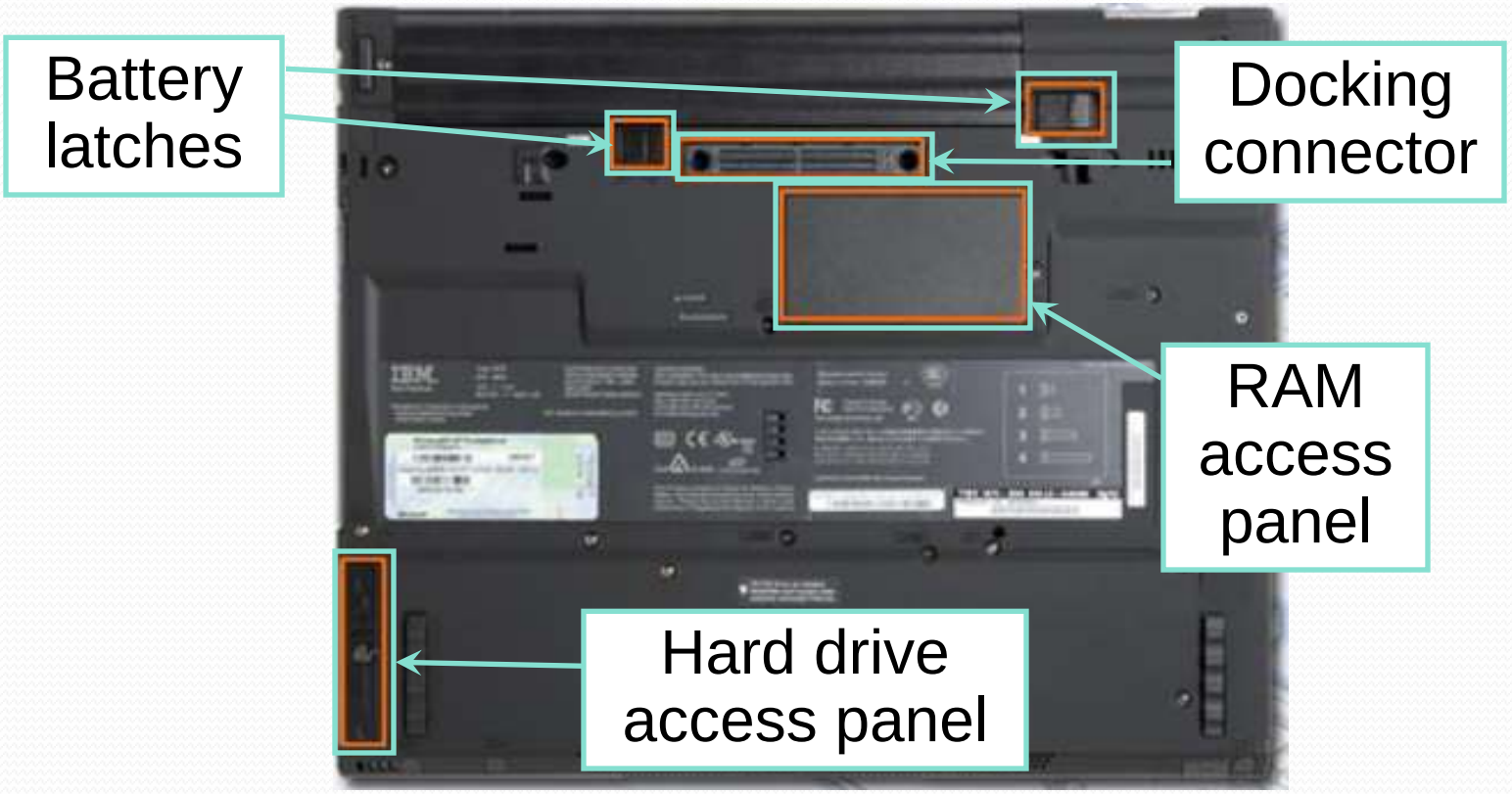
Components On The Outside Of Laptop

- Right side view of virtual laptop



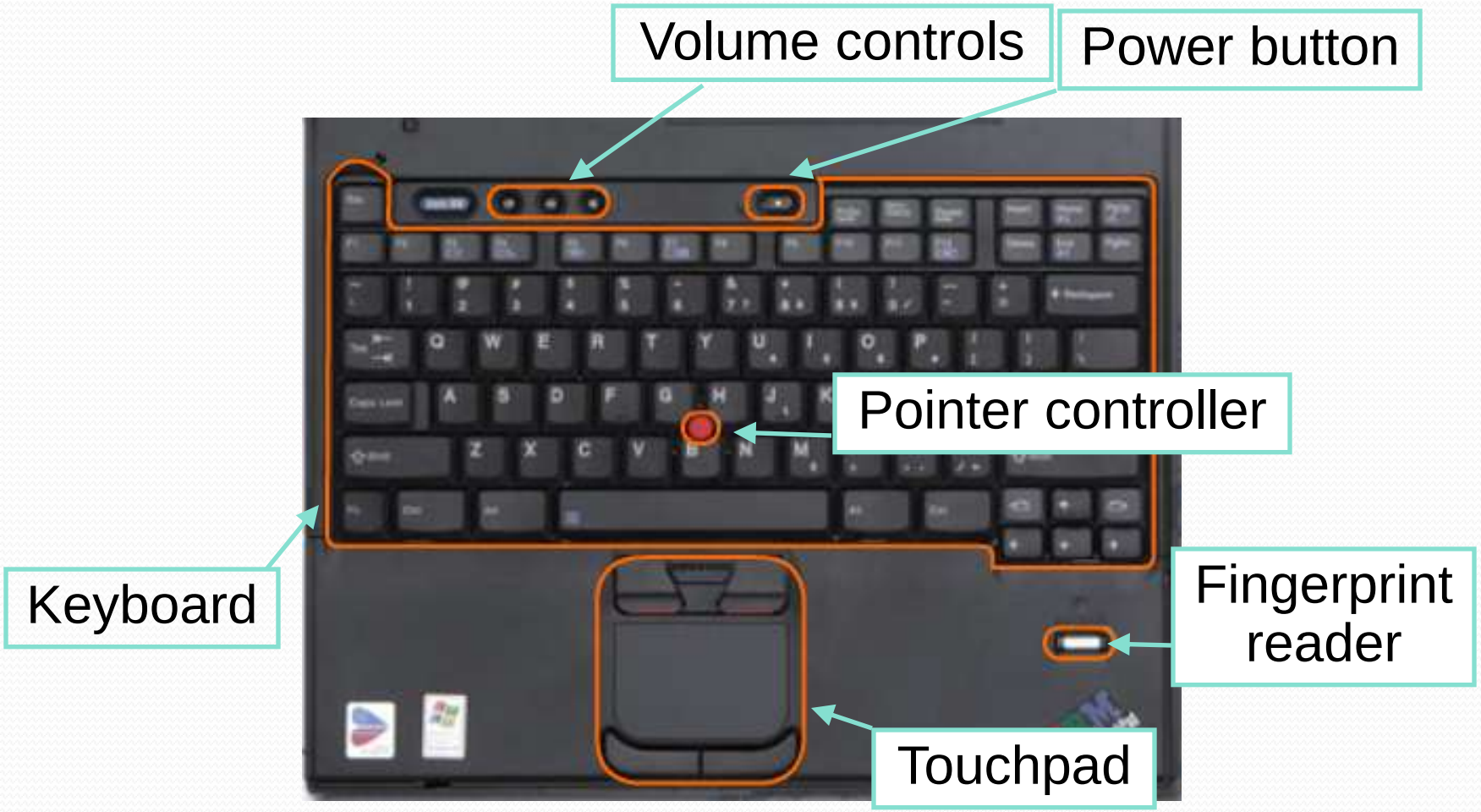
Components On The Outside Of Laptop

- Underside view of virtual laptop



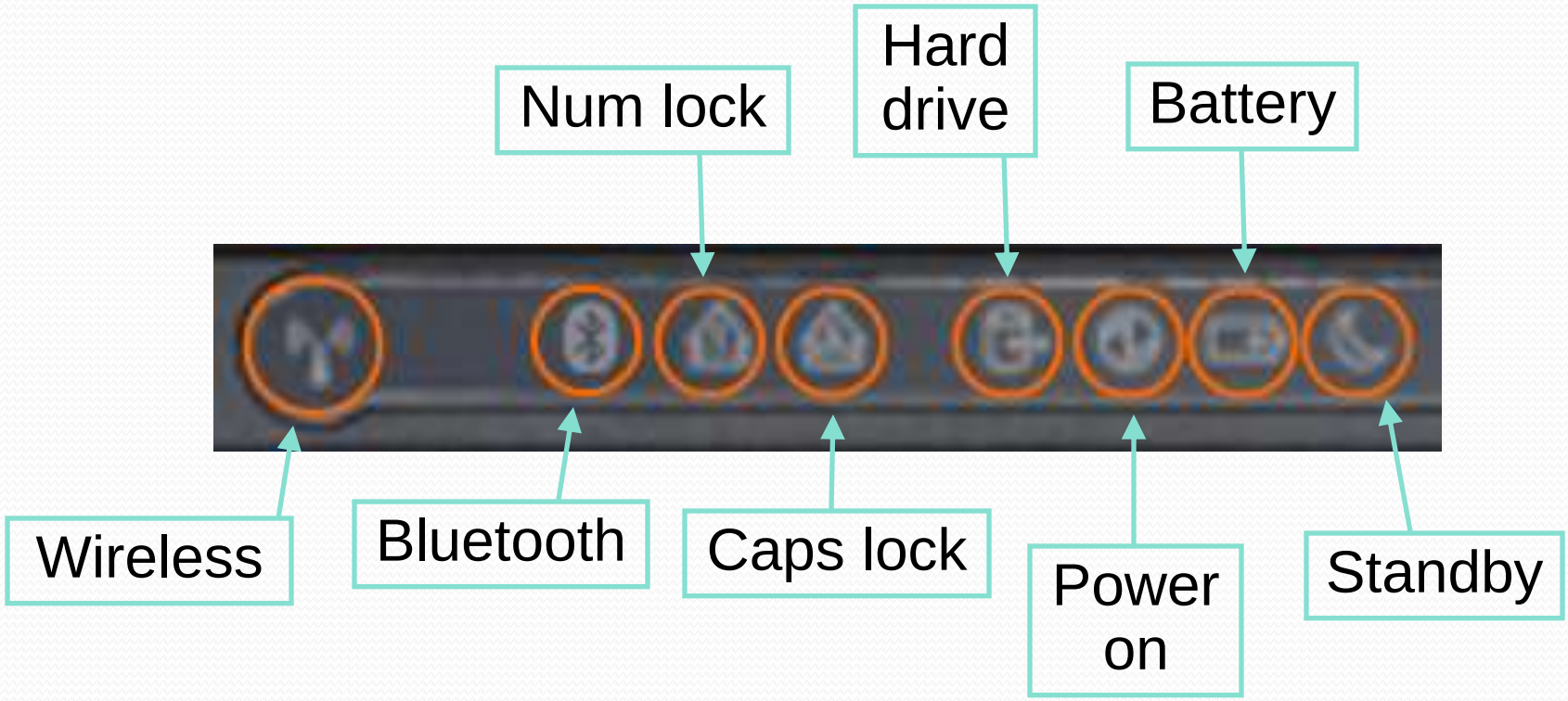
Components On The Inside Of Laptop

- Open view of laptop



Components On The Inside Of Laptop

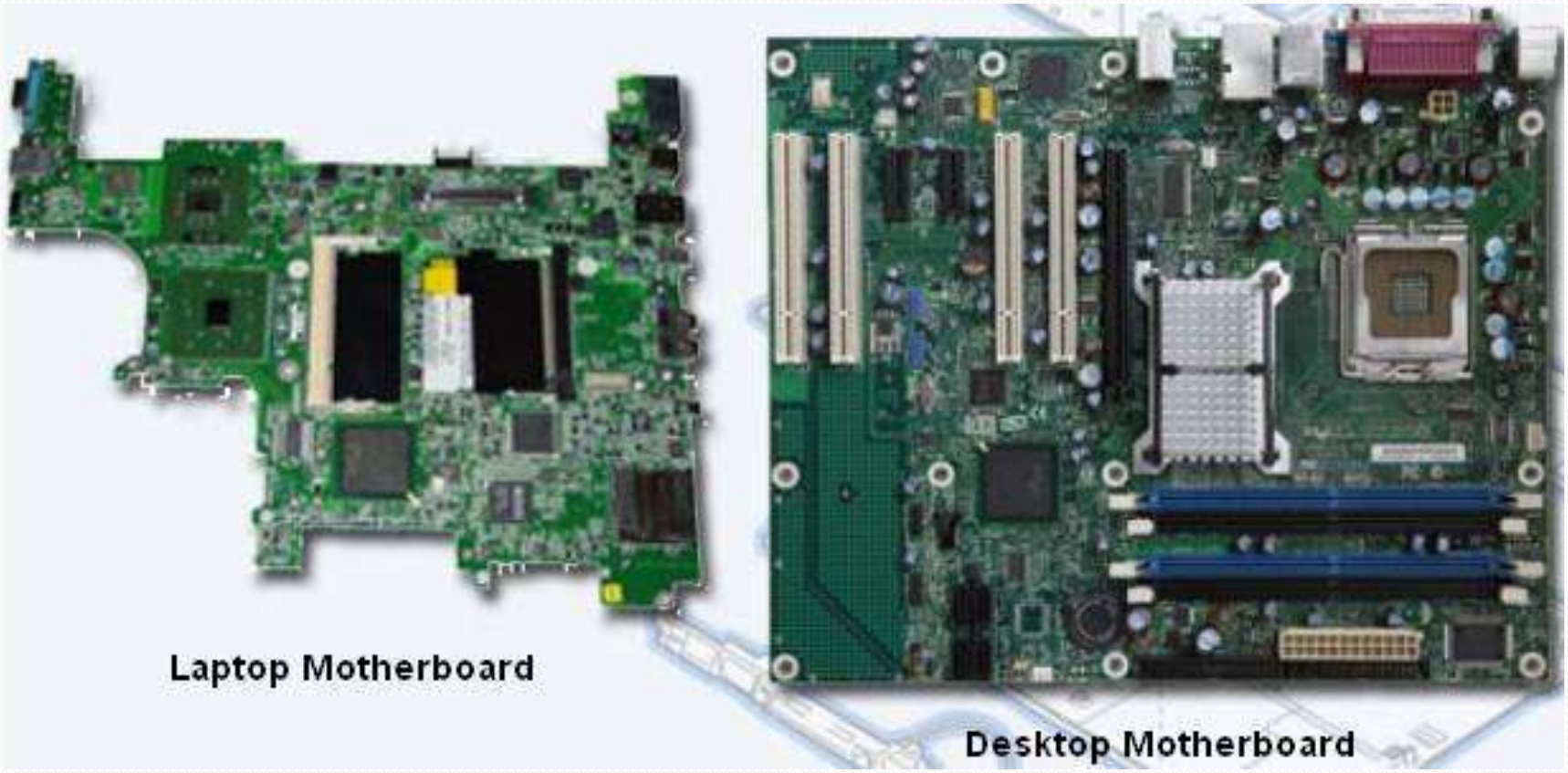
- LEDs inside laptop



Compare Desktop Components And Laptop Components

- Desktop components tend to be standardised. They usually meet **universal** form factors.
- Laptop manufacturers focus on refining laptop components to make them more efficient and compact as a result, laptop components are **proprietary**.
- You may not be able to use components made by one laptop manufacturer to repair a laptop made by another manufacturer.

Compare Desktop and Laptop Motherboards



Laptop Components - Laptop CPU

- Laptop processors are designed to use less power and create less heat than desktop processors. As a result, laptop processors do not require cooling devices that are as large as those found in desktops.

- Laptop processors also use CPU throttling to modify the clock speed as needed to reduce power consumption and heat. These specially-designed processors allow a laptop to operate longer when using a battery.

Laptop Components (Continued)

Monitor, Fn key, and Function keys F1 through F12

- A laptop monitor is a built-in LCD. A desktop monitor can be added to a laptop.
- The Fn key is used to activate a second function on a dual-purpose key.
  - The feature that is accessed by pressing the Fn key in combination with another key is printed on the key in a smaller font or different color.
- The purpose of the Function keys F1-to-F12 depends on the operating system and the application running.

Laptop Components (Continued)

- **Port Replicator** - may contain a SCSI port, a networking port, PS/2 ports, USB ports, and a game port.

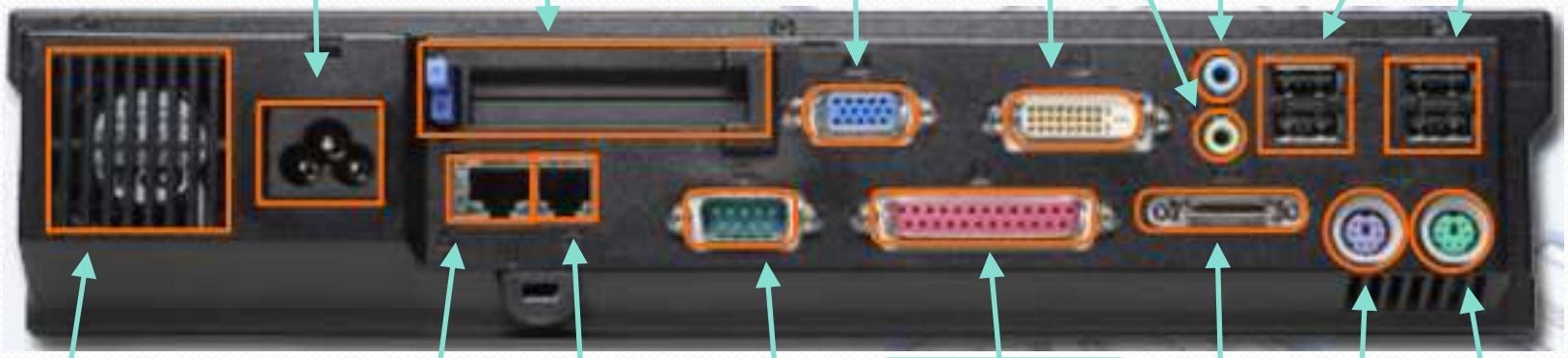
- **Docking Station** **-** has the same ports as a port replicator, but adds the ability to connect to PCI cards, additional hard drives, optical drives, and floppy drives.
  - A laptop connected to a docking station has the same functionalities as a desktop computer.

Components On A Docking Station

- Top view of docking station

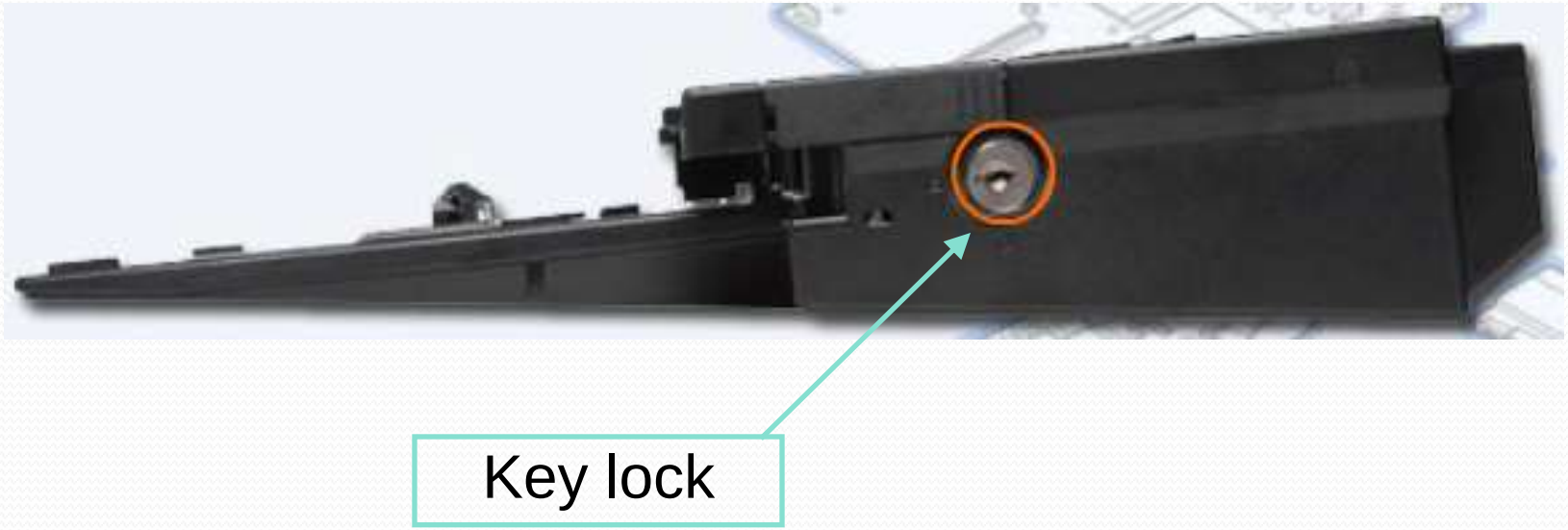
Components On A Docking Station

- Rear view of docking station



Components On A Docking Station

- Right side view of docking station



Other Laptop Components

- Display
  - HDMI
  - Display port
  - DVI

- SD/Micro SD Card Slot
  - read the memory cards from a digital camera
  - Or extra memory space

- WI-FI Antenna Connectors
  - Typically located above the screen
  - Connects to wireless card

- Webcam and Microphone
  - Built into most laptops today

Laptop Display Types

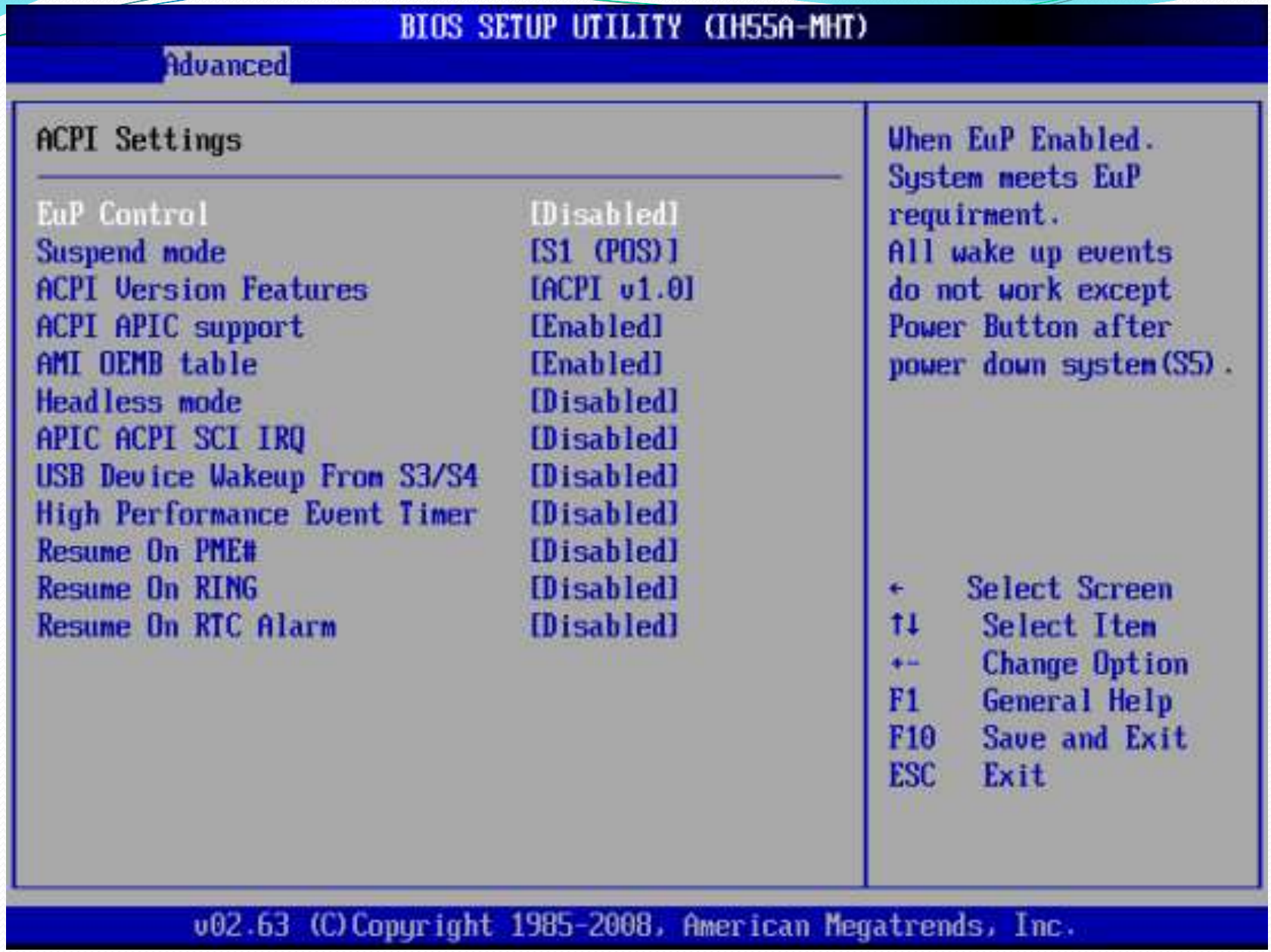
Laptop monitors are built-in displays. There are four types of laptop displays:

- **LCD** - Liquid Crystal Display
- **LED** – Light Emitting Diode - uses less power and has a longer lifespan than LCD monitors
- **OLED** - Organic LED
- **Plasma** – rarely used in laptops due to high power consumption

Configure Laptop Power Settings

- The **Advanced Configuration and Power Interface (ACPI)** standards create a bridge between the hardware and OS and allow users to create power management schemes to get the best performance from the computer.
- The ACPI standards are applicable to most computers, but they are particularly important when managing power in laptops.

- These are the steps to access the ACPI settings in the BIOS:
  1. Enter BIOS setup by pressing the appropriate key or key combination while the computer is booting. Typically this is the Delete key or the F2 key, but there are several other options.
  2. Locate and enter the “Power Management settings” menu item.
  3. Use the appropriate keys to enable ACPI mode.
  4. Save and Exit BIOS setup.


BIOS SETUP UTILITY (IH55A-MHT)
Advanced
ACPI Settings
EuP Control [Disabled]
Suspend mode [S1 (POS)]
ACPI Version Features [ACPI v1.0]
ACPI APIC support [Enabled]
AMI OEMB table [Enabled]
Headless mode [Disabled]
APIC ACPI SCI IRQ [Disabled]
USB Device Wakeup From S3/S4 [Disabled]
High Performance Event Timer [Disabled]
Resume On PME# [Disabled]
Resume On RING [Disabled]
Resume On RTC Alarm [Disabled]
When EuP Enabled.
System meets EuP
requirment.
All wake up events
do not work except
Power Button after
power down system(S5).
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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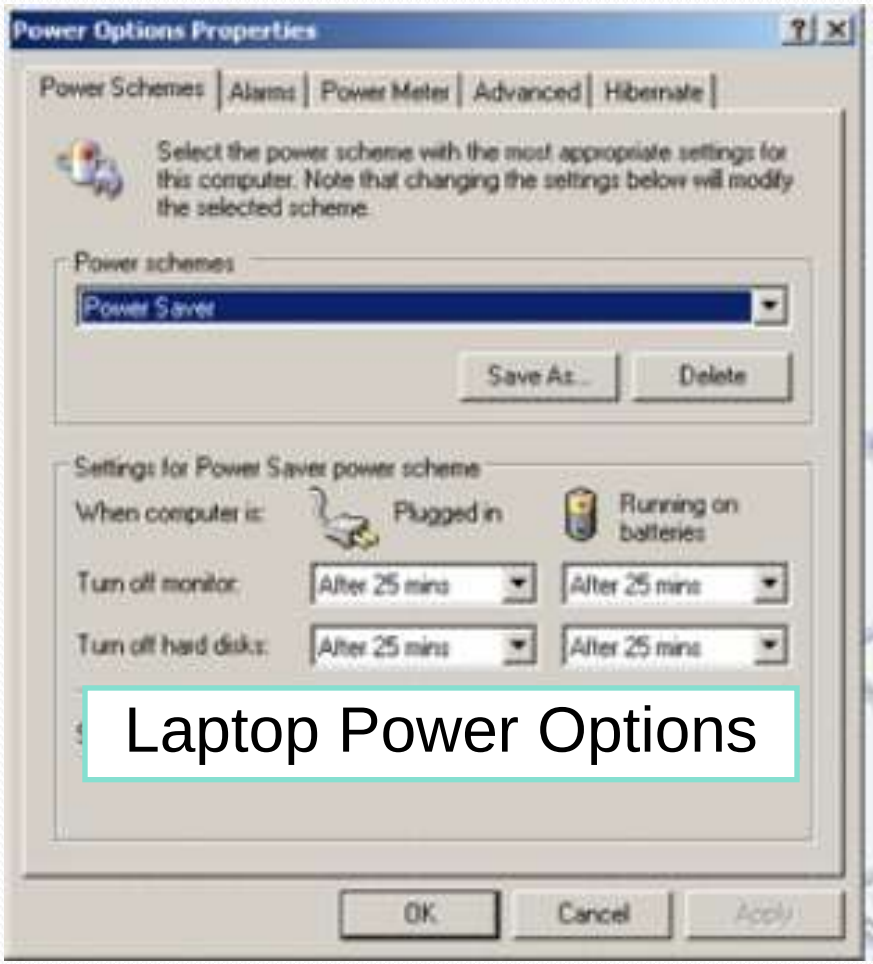
Laptop Power Settings cont'd

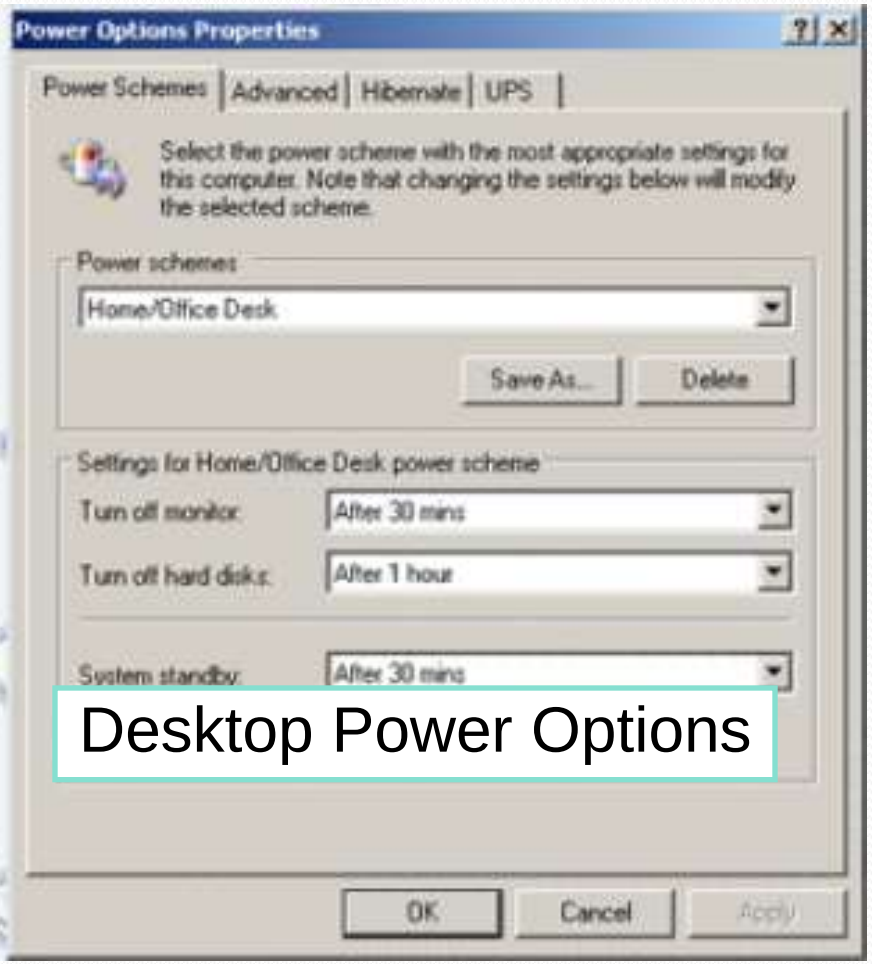
- ACPI Standards
  - **S0:** The computer is on and the CPU is running.
  - **S1:** CPU is still powered, and unused devices are powered down. RAM is still being refreshed. Hard disks are not running.
  - **S2:** The CPU is off, but the RAM is refreshed to maintain the contents. The system is in a lower power mode than S1.
  - **S3:** Power supply output is reduced. The CPU is off, and the RAM is set to a slow refresh rate. This mode is often called "Save to RAM". In Windows, this state is known as the Standby mode.
  - **S4:** Lowest-power sleep mode and takes the longest to come up. The CPU and RAM are off. The contents of RAM have been saved to a temporary file on the hard disk. This mode is also called "Saved to Disk". In Windows, this state is known as the Hibernate mode.
  - **S5:** The computer is off and nothing has been saved.

Power Settings in Windows

- The **Power Options** feature in Windows allows you to reduce the power consumption of a number of devices or of the entire system. Use Power Options to control the power management features of the following:
  - Laptop
  - Hard drive
  - Display
  - Sleep timers
  - Low-battery warnings
- To configure your power settings, click:
  Start > Control Panel > Power Options

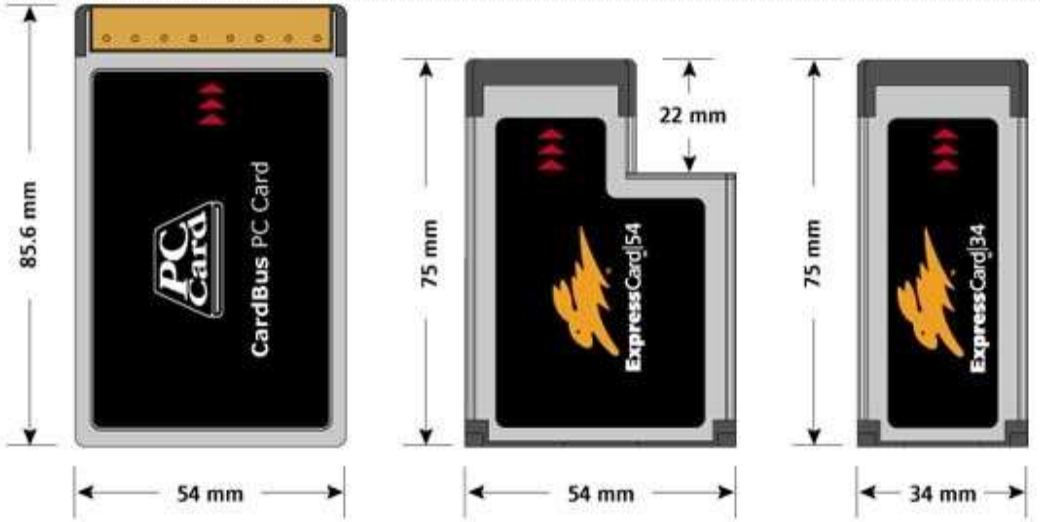
Compare desktop and laptop power options





Laptop Expansion Options

- PC Card or ExpressCard slots used to add functionality such as:
  - Wi-Fi connectivity
  - Ethernet access
  - USB and FireWire ports
  - External hard drive access
  - Additional memory



- ExpressCard is the newer model of expansion card and is most commonly used:
  - ExpressCard /34 - 34 mm wide
  - ExpressCard /54 - 54 mm wide

Laptop Expansion Options

- **Flash Memory**
  - External Flash Drive
  - Flash Cards and Flash Card Readers
- **SODIMM -** smaller profile memory chip used by laptops
  - 72-pin and 100-pin configurations for support of 32-bit transfers.
  - 144-pin, 200-pin, and 204-pin configurations for support of 64-bit transfers.

Note: Before purchasing and installing additional RAM, consult the laptop documentation or the website of the manufacturer for form-factor specifications.

Replacing Hardware Devices

- **Customer Replaceable Units (CRUs)** can be replaced by the customer.
- **Field Replaceable Units (FRUs)** should only be replaced by a qualified field technician typically in a repair center. Repairs include:
  - Hardware and software diagnostics
  - Data transfer and recovery
  - Hard drive installation and upgrades
  - RAM installation and upgrades
  - Keyboard and fan replacement
  - Internal laptop cleaning
  - LCD screen repair
  - LCD inverter and backlight repair

Battery Replacement

- **Battery may need to be replaced when:**
  - Laptop shuts off immediately when AC power is removed.
  - Battery is leaking.
  - Battery overheats.
  - Battery does not hold a charge.

Keyboard, Touchpad and Screen Replacement

- The keyboard and touchpad are input devices considered to be FRUs
- A laptop's display screen is often the most expensive component to replace.

Hard Drive and Optical Drive Replacement

Storage devices are CRUs, unless a warranty requires technical assistance.

- Laptop hard drives are 1.8 in. (4.57 cm.) or 2.5 in. (6.35 cm.) in width.
- External USB hard drive connects to a laptop using the USB port.
- IEEE 1394 external hard drive connects to the FireWire port.

Replacing Hardware Devices

- **Before replacing a wireless card**, determine which form factor is required by the laptop.
- **Before a CPU** can be replaced, the technician must remove the fan and heat sink.
  - **NOTE**: A CPU is one of the most fragile components in a laptop. It should be handled with great care.
- **Before replacing a laptop motherboard**, make sure that the replacement meets the design specifications of the laptop model.

Mobile Device Hardware Overview

- Mobile Device Hardware
  - Mobile Device Parts
  - Non-Upgradeable Hardware
  - Touchscreens
    - Recognise two or more points of contact
    - Common Gestures: Swipe, Double touch, Long touch, Scroll, Pinch, Spread
  - Solid State Drives
    - Advantages: Power efficiency, Reliability, Lightweight, Compact, Performance, No noise
  - Connection Types
    - Wired: Micro/Mini USB, Lightning, Proprietary vendor specific
    - Wireless: NFC, IR, Bluetooth
  - Accessories
    - External Battery
    - Docking Station
    - Portable Chargers
    - Ear Buds
    - Headsets
    - Speakers
    - Game Pad
    - SD cards
    - Credit Card Reader

Mobile Device Hardware Overview

- Other Mobile Devices
  - Wearable Devices
    - Smart Watches
    - Fitness Monitors
    - Smart Headsets
  - Specialty Devices
    - GPS Receiver
    - Smart Cameras
    - Electronic Readers

Preventive Maintenance Techniques

- **The Preventive Maintenance Schedule** for laptops should include these standard procedures:
  - Cleaning
  - Hard drive maintenance
  - Software updates
- The most effective preventive maintenance programs require a set of routines to be conducted monthly.

Preventive Maintenance Techniques for Laptops and Mobile Devices

- Scheduled Maintenance for Laptops and Mobile Devices
  - Scheduled Maintenance
    - More exposure
      - Dirt and contamination
      - Spills
      - Wear and tear
      - Drops
      - Excessive heat & cold
      - Excessive moisture
    - Laptops
      - Cleaning
      - Hard drive maintenance
      - Software updates
    - Mobile Devices
      - Cleaning
      - Backing up the data
      - Updating the system and applications

Proper Cleaning Procedures

- Follow proper cleaning procedures to clean a laptop.
  - Keyboard
  - Ventilation
  - LCD display
  - Touch pad
  - Floppy drive
  - Optical disk drive
  - CD or DVD disc

- **CAUTION:**
  - Turn off laptop, remove batteries, disconnect from electrical outlet, and disconnect all attached devices.
  - Do not spray cleaning solution directly onto the LCD display.
  - Use products specifically designed for cleaning LCD displays.
  - Use a soft, lint-free cloth with an approved cleaning solution to avoid damaging laptop surfaces.