HARDWARE FUNDAMENTALS AND INSTALLATION 2

Outline

- BIOS
  - Configuration
  - Security
  - Monitoring
- BIOS CMOS RAM Battery
- POST
- Configure BIOS
- Peripheral Component Interface (PCI)
  - Mini PCI
  - PCI- Extended (PCI-X)
  - PCI Express (PCI-e)
- Accelerated Graphics Port
- CNR

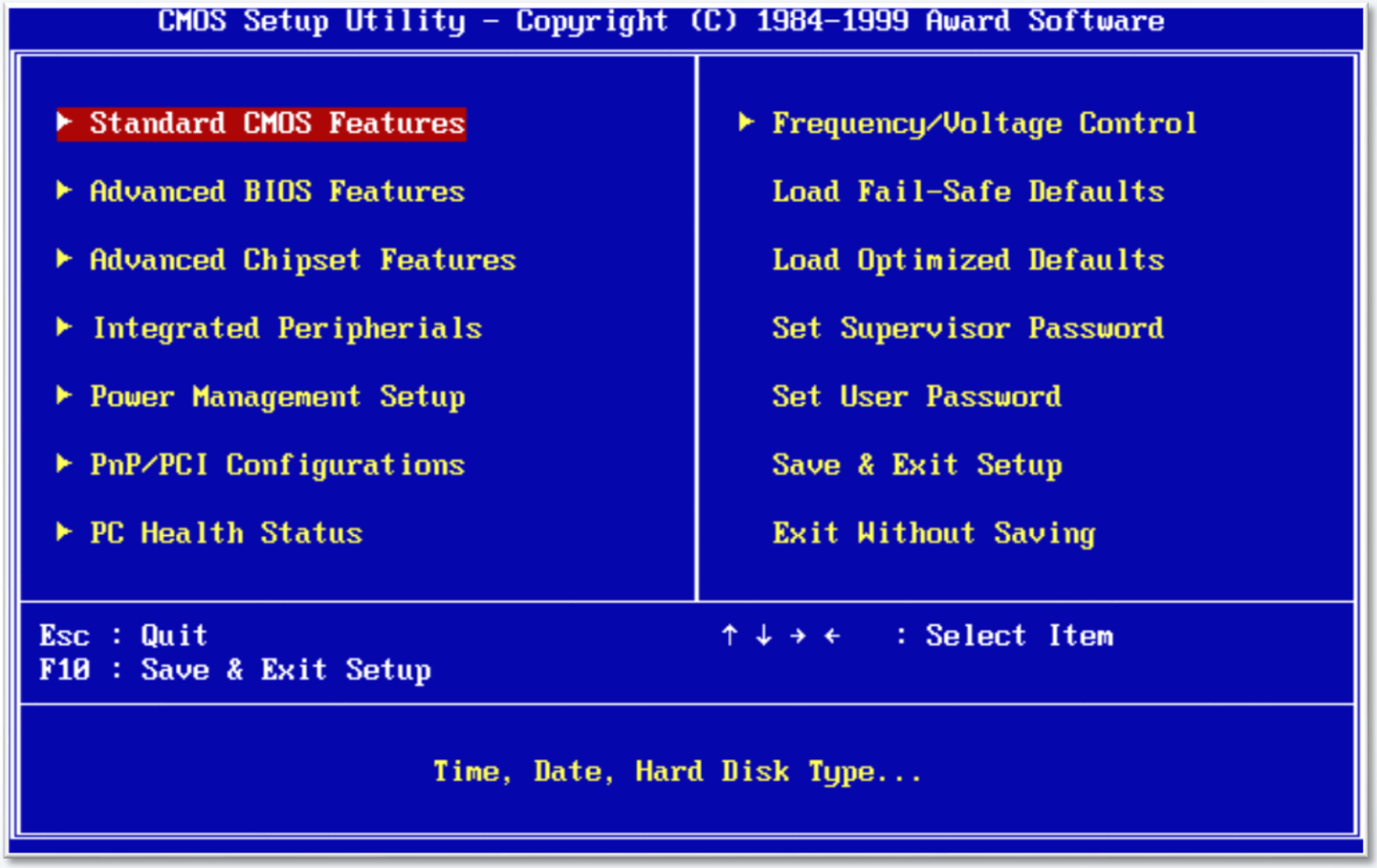
- Expansion Cards
  - Sound Cards
  - Audio Connectors
  - Video Cards
  - Network Interface Cards
  - Serial Port Cards
  - Parallel Port Cards
  - USB Cards
  - Firewire Cards
  - Memory Card Reader Cards
  - Modem Cards
  - Wireless Cellular Cards
  - Riser Cards

- Expansion Card Installation
- Device Manager Configuration
- Expansion Card Removal
- Display Devices
  - Selection
  - Adjust Output
  - Installation
- Multimedia Configuration
  - Windows 7
  - Windows XP
- Wireless Bluetooth
- Wireless IrDA

- Basic Input Output System
- Software stored in a ROM
- Settings stored in BIOS RAM Memory
- Sets hardware configuration, settings, environment
- Every computer has a system BIOS

BIOS Configuration

- During BIOS initialization press a predefined key which can vary by manufacturer (usually F2, F8)
- Can configure date, time, enable/disable specific devices such as hard drive controllers, I/O hardware, hardware virtualization, clock speeds, etc.


CMOS Setup Utility - Copyright (C) 1984-1999 Award Software
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherials
Power Management Setup
PnP/PCI Configurations
PC Health Status
Frequency/Voltage Control
Load Fail-Safe Defaults
Load Optimized Defaults
Set Supervisor Password
Set User Password
Save & Exit Setup
Exit Without Saving
Esc : Quit
F10 : Save & Exit Setup
↑ ↓ → ← : Select Item
Time, Date, Hard Disk Type...

- Access to BIOS configuration can be password protected
- HD can be encrypted
- Trusted Platform Module (TPM) - “chip” cryptographic co-processor that stores keys, hardware and platform authentication, digital rights management, and software licensee
- BIOS Lo-Jack – after-market tracking system

- Temperature and Fan Speed – CPU, Motherboard, HD, GPU, etc.
- Intrusion Detection
- Voltage – Motherboard, CPU, GPU
- Clock – time
- Bus Speeds

BIOS CMOS RAM Battery

- BIOS setting stored in BIOS/CMOS (Complementary Metal Oxide Semiconductor) RAM.
- Flat cell lithium ion battery provides power to RAM to retain BIOS settings.
- If BIOS setting reset after every power off, usually the battery needs to be replaced.

- Power On Self Test
- Built in test
- Run every boot cycle
- Checks: power, CPU, BIOS, BIOS memory, RAM, I/O bus, I/O controller
- Actual process, beeps, and error notifications vary from manufacturer to manufacturer

Configure – BIOS

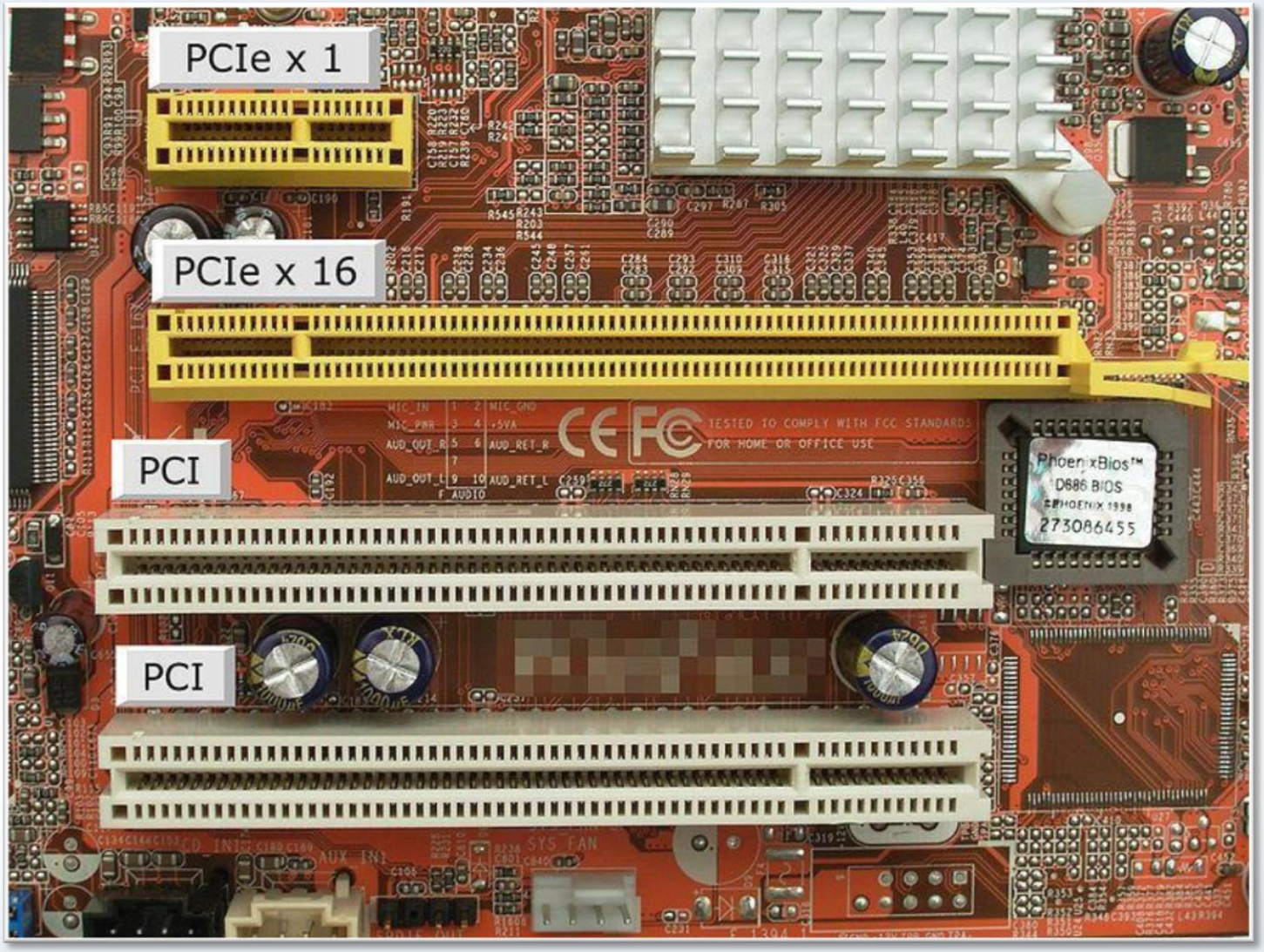
- Screens, options, keys, and interface vary by manufacturer and BIOS version
- General: motherboard and BIOS info, date/time, boot sequence
- Memory: amount and type of RAM
- CPU: performance, virtualization support
- Power: settings and management

- Clock speed: CPU, RAM, bus
- Devices: video card, enable/disable HD controllers, RAID, monitor, USB, Serial/Parallel ports, input devices
- Security: manage passwords, TPM, tracking software

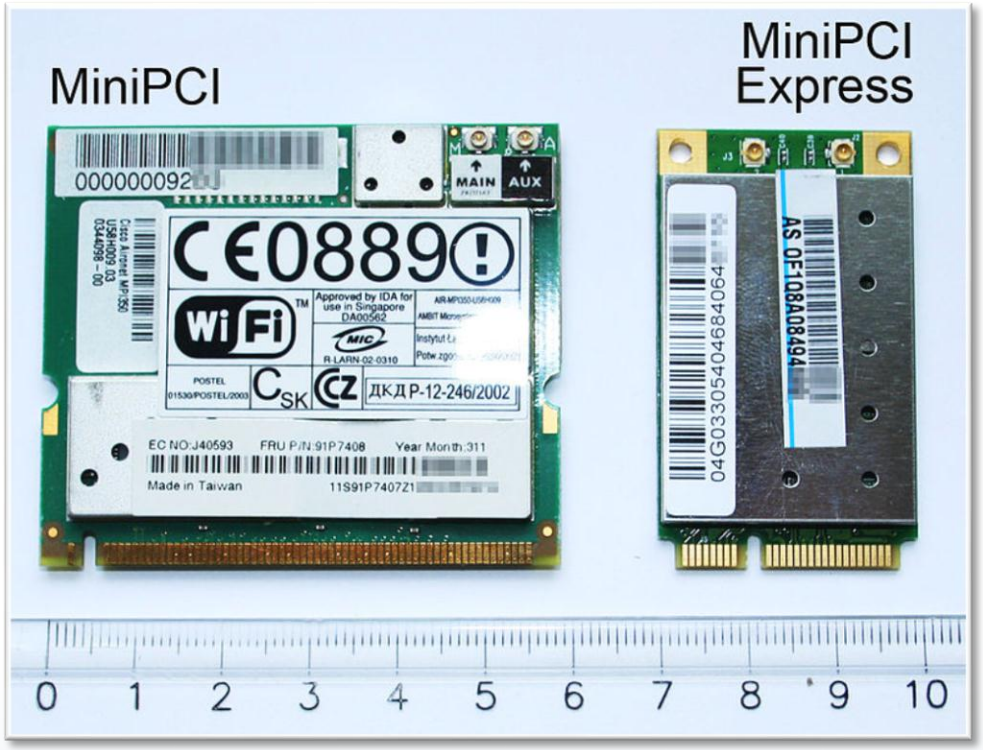
Peripheral Component Interface (PCI)

- Known as PCI
- Created in 1994
- 32bit and 64bit bus width
- Throughput
  - 133 MB/s (32bit 33Mhz)
  - 266 MB/s (32bit 66Mhz, 64bit 33Mhz)
  - 533 MB/s (64bit 66Mhz)

Peripheral Component Interface (PCI)

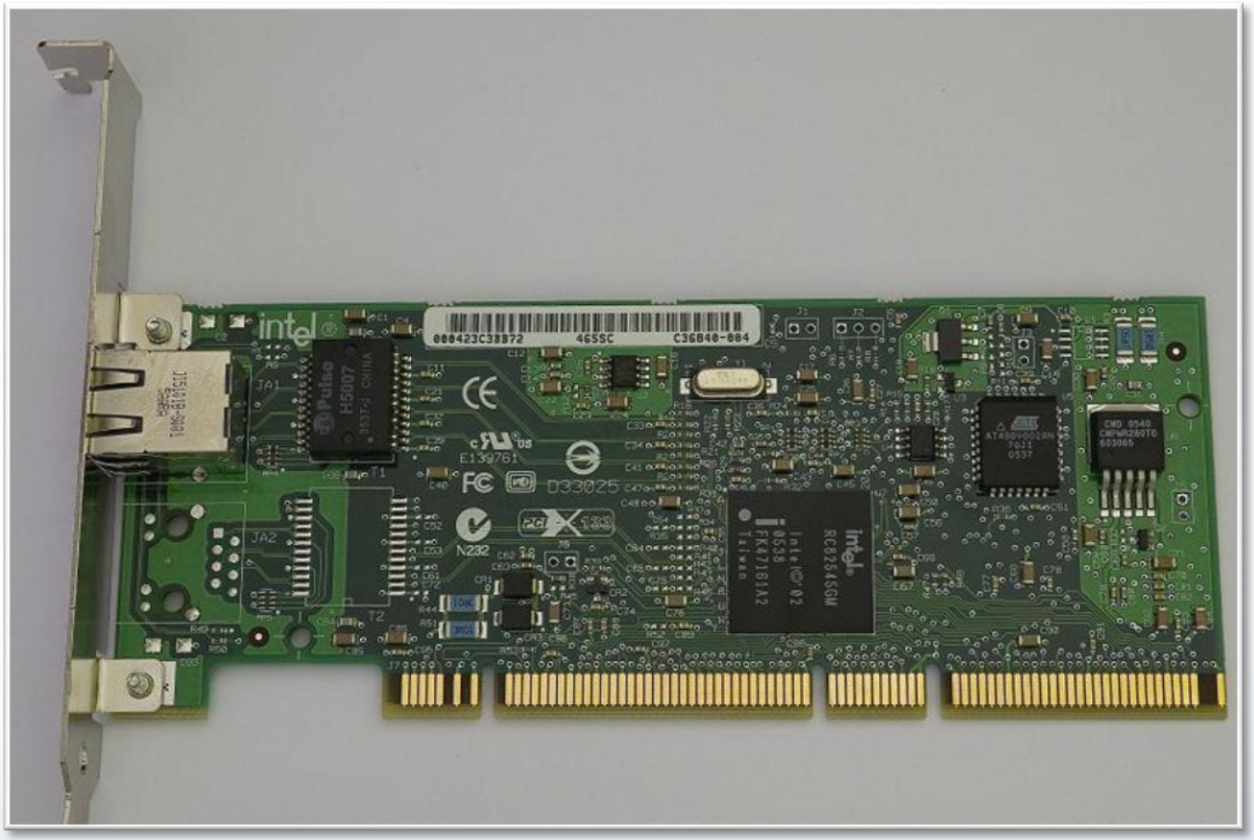


- Smaller for laptops
- Wifi, mobile data

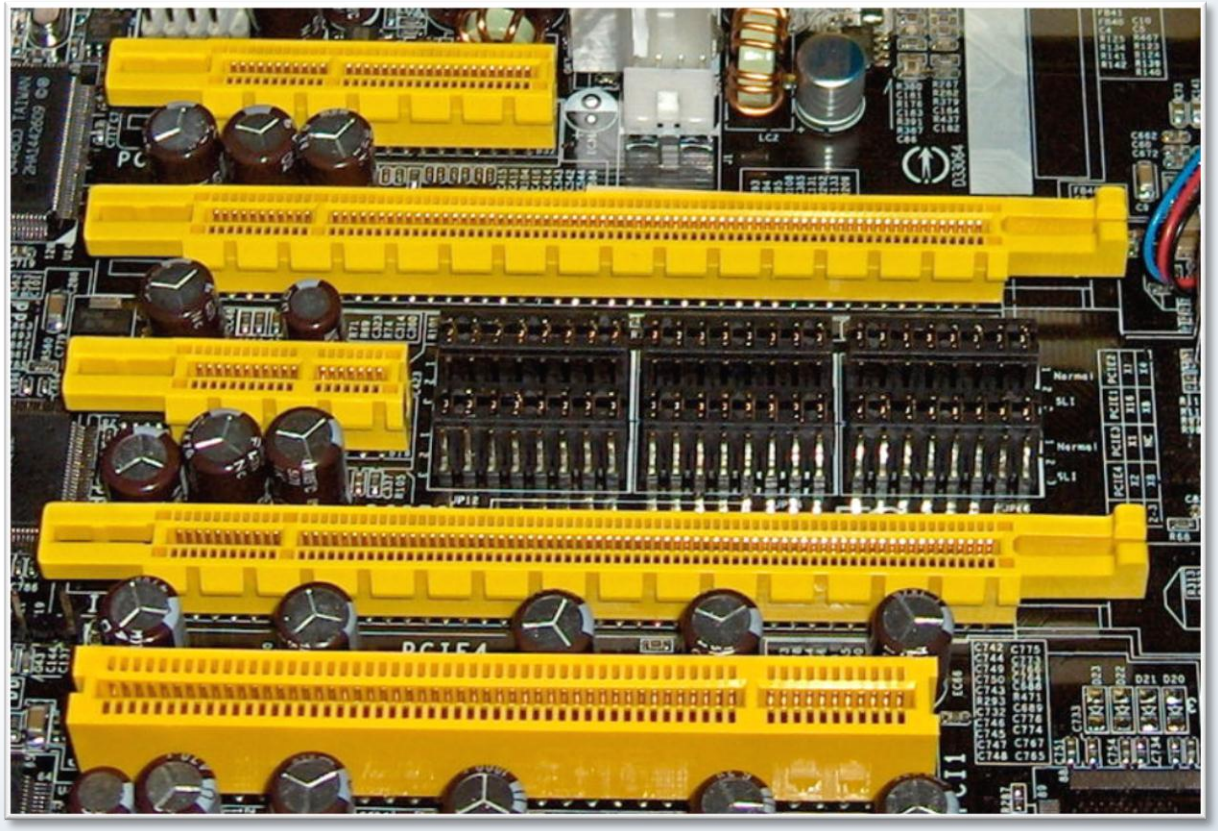


PCI extended (PCI-X)

- For servers
- High bandwidth
- 4x clock speed
- 1064 MB/s

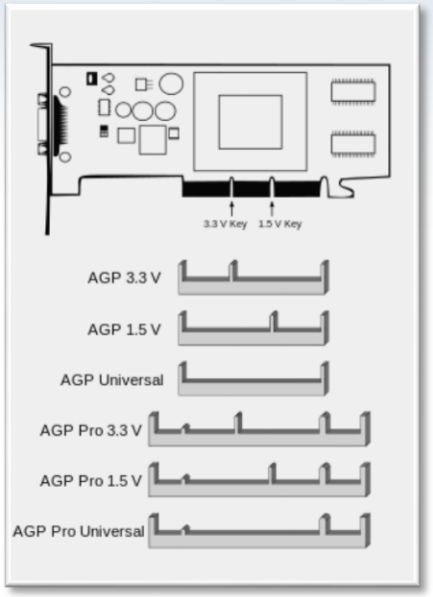


- Serial communication
- Slower devices don't slow down the bus
- x1, x2, x4, x8, x16, x32
- V1.x = 250 MB/s
- V2.x = 500 MB/s
- V3 = 1 GB/s
- V4 = 2 GB/s

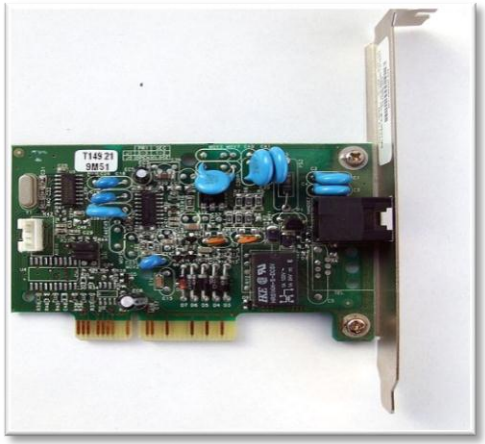


Accelerated Graphics Port

- AGP
- 1996
- Bridge between PCI and PCI-e
- AGP 1x 266 MB/s
- AGP 2x 522 MB/s
- AGP 4x 1.07 GB/s
- AGP 8x 2.1 GB/s
- AGP Pro-additional pins on cards for electrical power

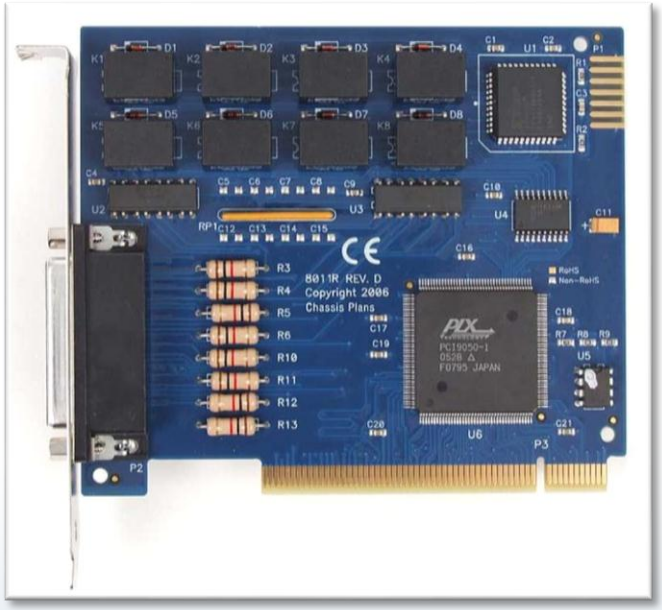


- Communications and Network Riser – specialized in network, audio, and telephony equipment
- 2 rows of 30 pins, circa 1996
- Phased out in favor of motherboard and embedded components



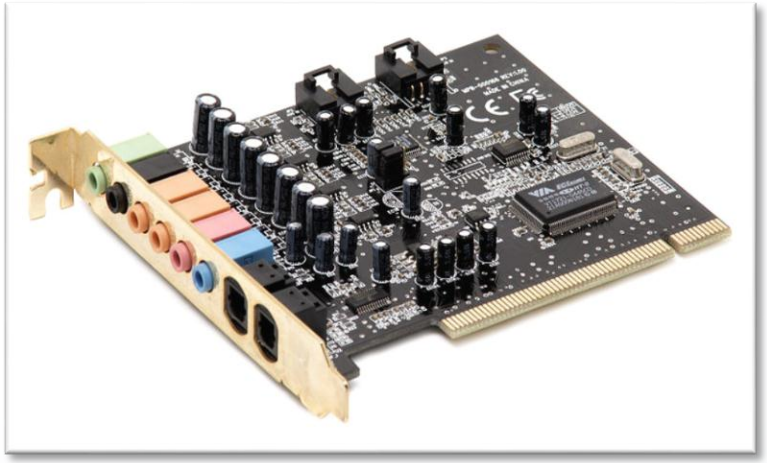
Expansion Cards

- Printed circuit boards
- Plugs into PCI, AGP, ISA slots on motherboard
- Examples: video, sound, network, serial, parallel, USB, Firewire, storage, modem, wireless, cellular, TV tuner, video capture, and riser cards.



Sound Cards

- Creates sound and music primarily from software programs such as games, audio/video players/editors, presentations, etc.
- Has connections to external speakers, headphones, microphones, music devices (MIDI)

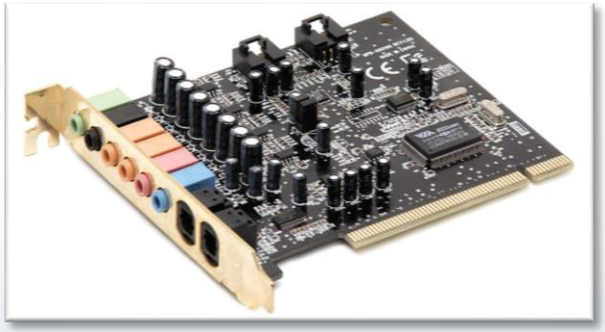


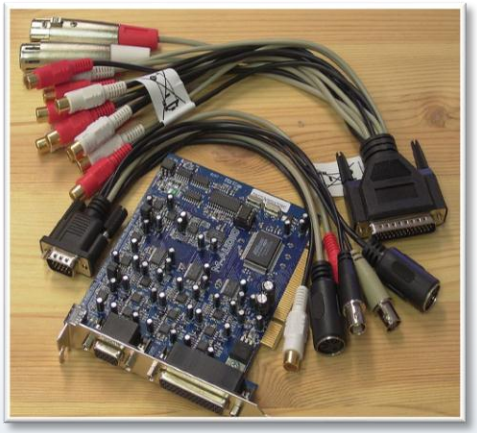
Sound Cards

- Modern motherboards have sound card capability integrated
- External sound cards generally improve quality, features, or connections to external audio devices

Audio Connectors

- 3.5mm minijacks
- Pink mic
- Light blue audio in
- Lime green headphone, front speakers
- Brown surround R/L
- Black surround rear
- Orange surround center, subwoofer
- 15 pin D - Game port MIDI

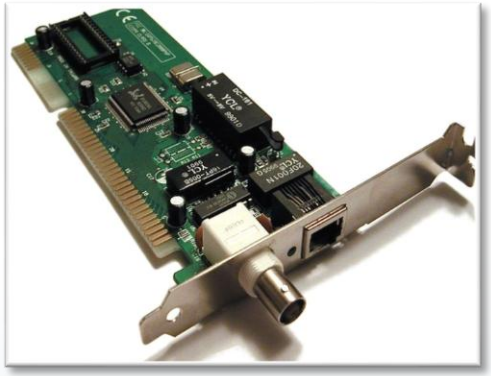




- Creates 2D/3D graphics, video decoding for video displays
- Many video cards have an onboard GPU – Graphics Processing Unit to significantly improve 2D and 3D graphic quality and speed
- Modern motherboards and CPUs have integrated video cards

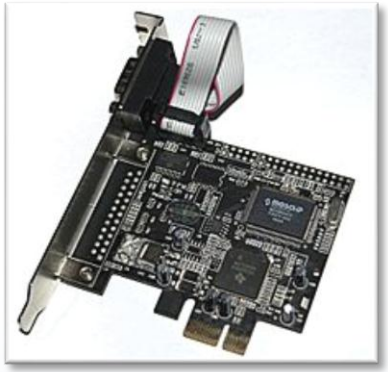
Network Interface Cards

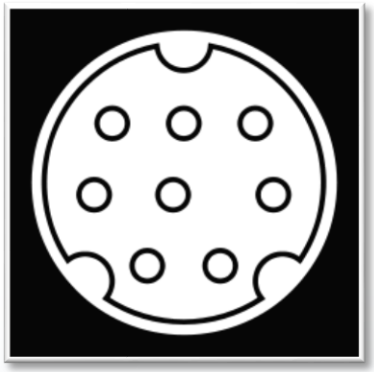
- NIC – connects a computer to a network (usually by RJ45/UTP/Ethernet cabling)
- Typically support 10, 100, 1,000, 10,000 Mb/s
- IEEE 802.3
- OSI Layer 1 and 2
- Modern motherboards and have integrated NIC cards



Serial Port Cards

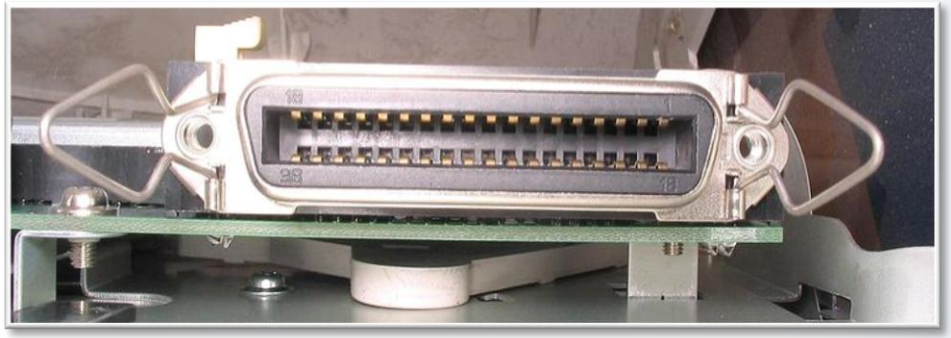
- Serial – 1 bit at a time
  - RS-232, DE-9, 9 pin port
  - Mini DIN-8
  - Speed: 75, 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bit/s
  - Typical setting: 8 data bits, no parity, 1 stop bit





Parallel Port Cards

- Parallel – multiple bits at a time
  - DB-25, 25 pin port on the computer
  - 36 pin female port on printers
  - IEEE 1284
  - Speed: PP: 12,000 Kb/s EPP: 2 MB/s

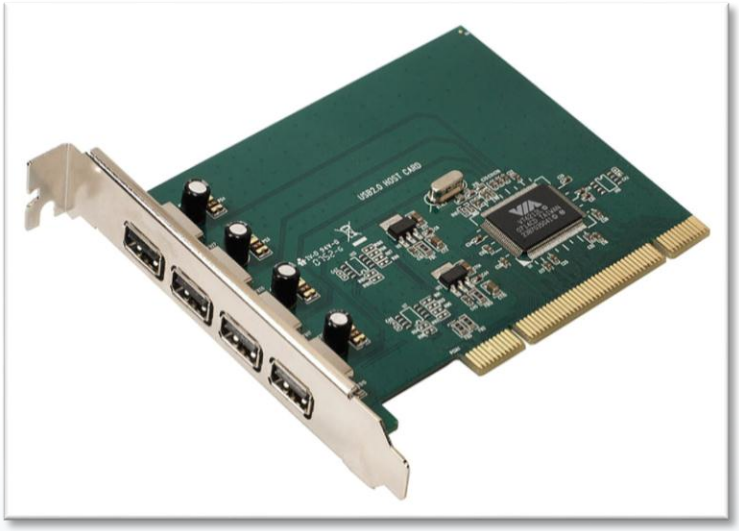


Parallel Port Cards

- Commonly used with older printers, scanners, external modems, sound cards, webcams, gamepads, joysticks, external hard disk drives, and CD-ROM drives
- Mostly replaced by USB and network technology

USB Cards

- Adds USB connection capability to a computer
- Nearly every modern motherboards have USB connectivity integrated
- Modern use would be to add USB 3.0 ports to a computer



FireWire Cards

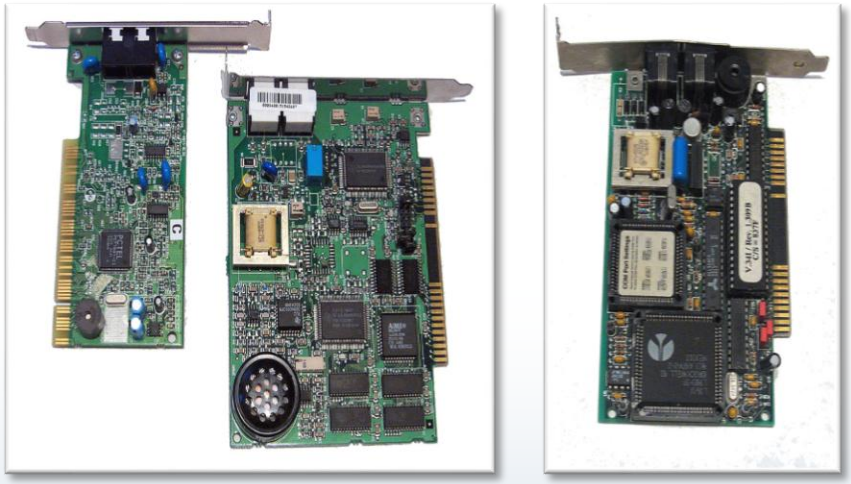
- Adds FireWire connection capability to a computer
- Some modern motherboards have FireWire connectivity integrated especially with Apple computers
- Modern use would be to add FireWire capability to a computer

Memory Card Reader Cards

- Adds memory card connection capability to a computer
- Some modern motherboards have memory card reader connectivity integrated, especially laptop and portables
- Modern use would be to add memory card reader capability to a computer
- Usually connection is made using an external USB device

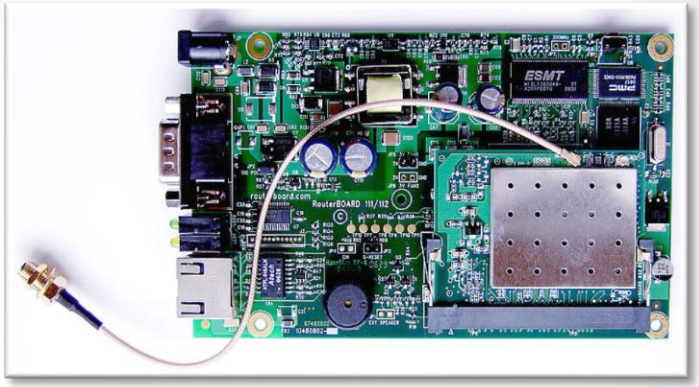
Modem Cards

- Modem – modulate demodulate
- Enabled data communication over PSTN – public switched telephone network
- v.21, v.22, v.26, v.27, v.32, v.34, v.90, v.92
- Speed: 0.1 – 56 Kb/s
- Currently rare, largely replaced by broadband connections (DSL, cable, FiOS, wireless)



Wireless/Cellular Cards

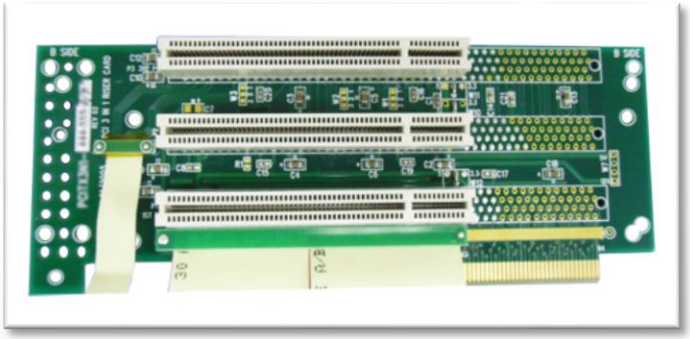
- Wireless modem
- Enabled data communication over wireless networks (802.11, 3G, 4G)
- Speed:
  - 3G: 0.03 – 5.7 Mb/s
  - 4G: 0.1 – 1 Gb/s



- Use case: 802.11 capability to a desktop/server, expand wireless data capability of laptop, mobile devices
- Can also use USB connections

Riser Card

- An expansion card that allows at least 1, usually multiple, expansion cards to connect to a motherboard
- In rackmount servers allows addition of expansion cards in horizontal position vs vertical position
- Example, PCI riser card,
- Use: expand capability on small motherboards, servers; space on rackmount servers



Expansion Card – Installation

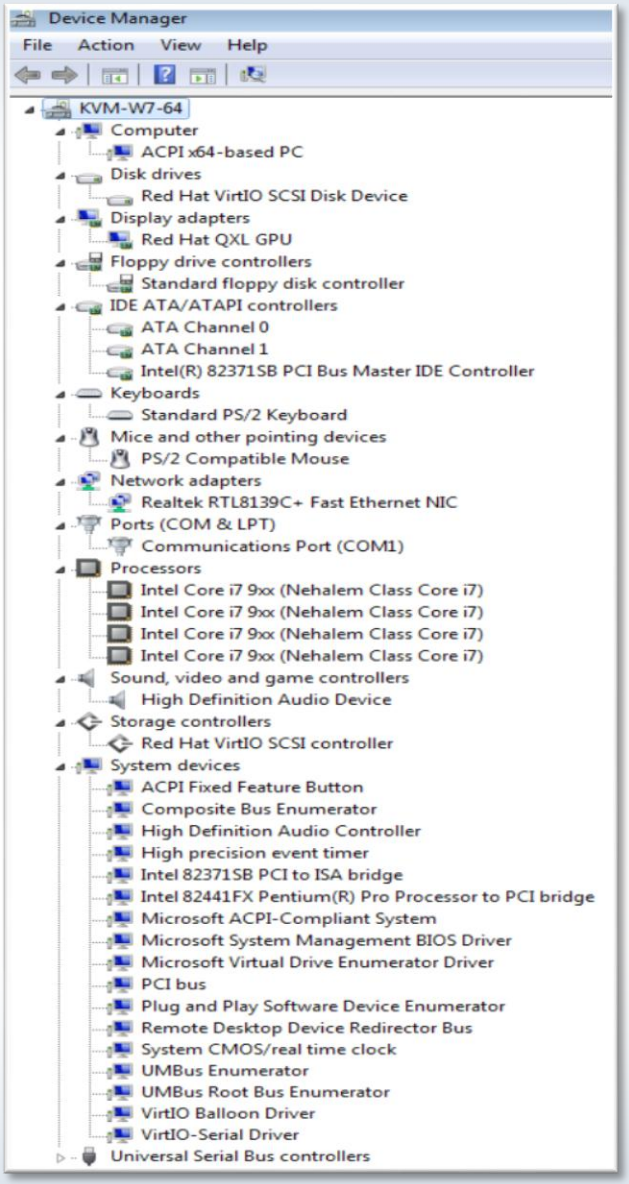
- Power off and unplug everything, open the system case, ground yourself
- Insert the expansion card into the appropriate slot with firm force until it is seated
- Connect any internal or external cables

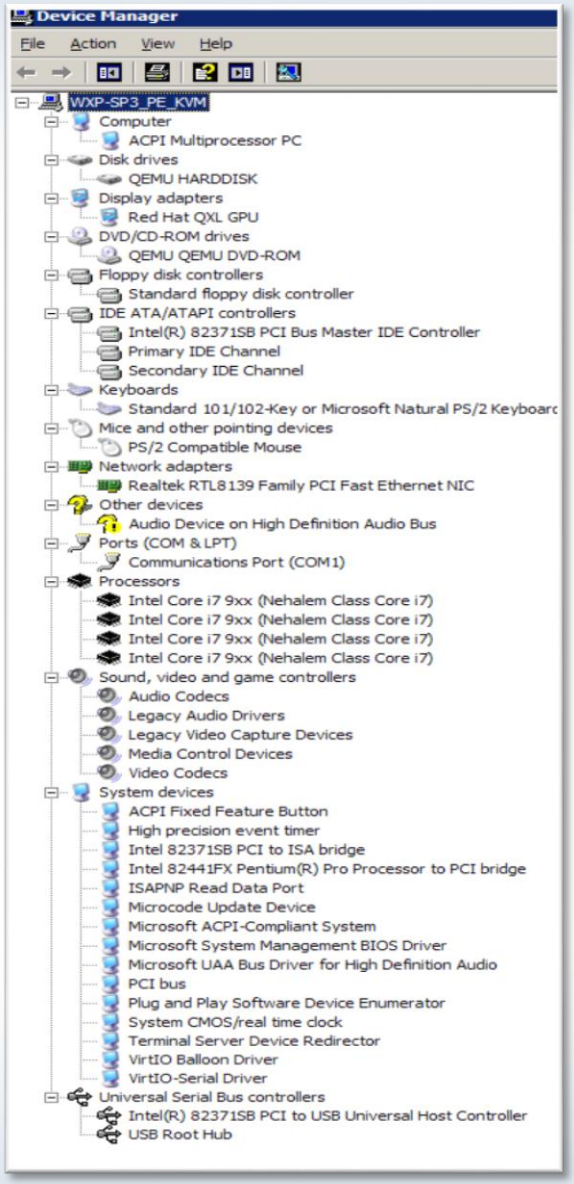
Expansion Card – Installation

- Secure the expansion card to the case with screws and replace the case
- Turn on the system and make BIOS or firmware settings if necessary
- Install/configure software/drivers (if needed)
- Verify the expansion card is functioning

- PnP – Plug and Play
  - Automatic OS configuration (+Windows 95)
- READ AND FOLLOW MANUFACTURER'S INSTRUCTIONS
- Manually install manufacturer software/driver
- Use Add Hardware wizard
  - Hardware scan
  - Choose from list of devices

Device Manager Configuration





Expansion Card – Removal

- Power off and unplug everything, open the system case, ground yourself
- Disconnect any internal or external cables/wire and make note of location/orientation
- Remove the screw holding in the expansion card

Expansion Card – Removal

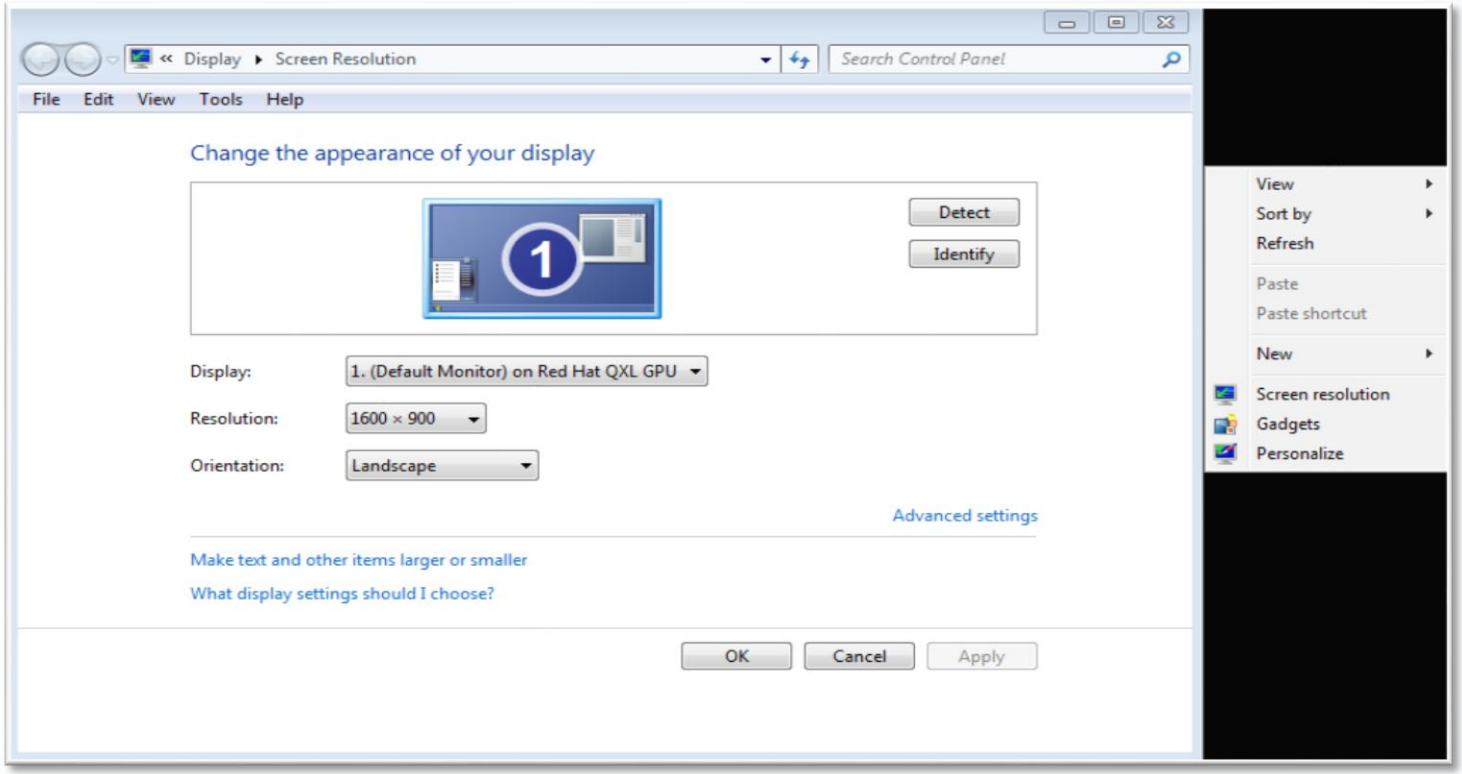
- Rock the card back and forth to loosen and remove it from the slot
- Place card into an anti-static bag
- Replace and screw down the slot cover
- Replace the case and power on the system

Display Devices - Selection

- Size
- Technical needs: software, application use, high resolution, multiple displays, etc
- Efficiency (order least to greatest): CRT → Plasma → LCD → LED → OLED
- Cost (order low to high cost): LCD → LED → OLED → Plasma

- Resolution
  - Windows 7: Screen Resolution Tool
    - Right click on desktop, select Screen Resolution
    - Select the desired resolution, Press OK
    - Select Keep Changes or Revert
  - Windows XP:
    - Right click on desktop, select Properties → Settings tab
    - Select the desired resolution, Press Apply
    - Select Keep Changes or wait to revert
    - Select Apply then OK in the Display Properties

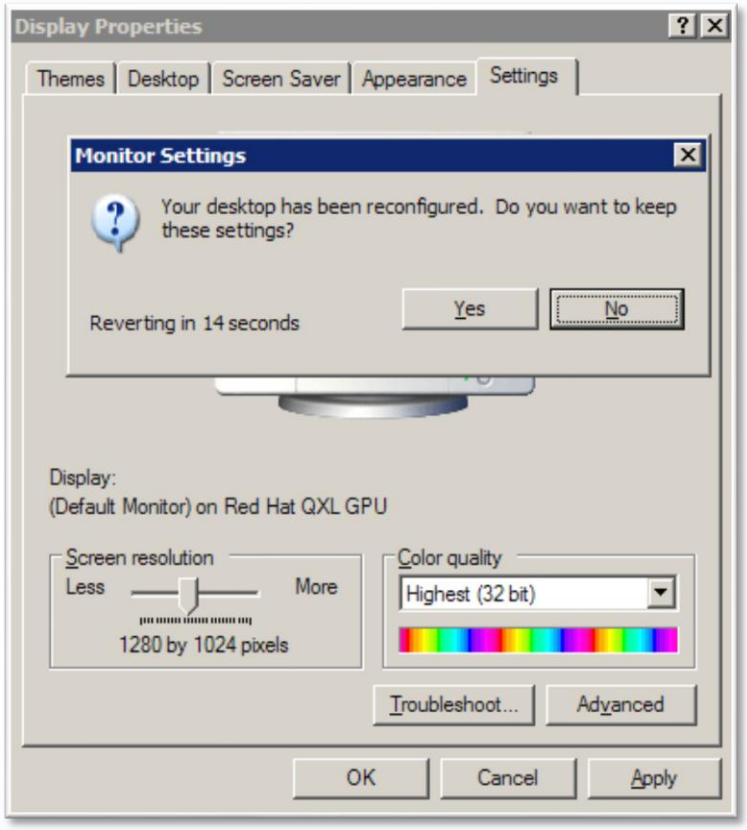
Windows 7


« Display ▸ Screen Resolution
Search Control Panel
File Edit View Tools Help
Change the appearance of your display
Detect
Identify
1
Display:
1. (Default Monitor) on Red Hat QXL GPU
Resolution:
1600 × 900
Orientation:
Landscape
Advanced settings
Make text and other items larger or smaller
What display settings should I choose?
OK
Cancel
Apply
View
Sort by
Refresh
Paste
Paste shortcut
New
Screen resolution
Gadgets
Personalize

Display Devices – Installation

- Power off and unplug everything
- Find the connectors (VGA, DVI, HDMI, USB) and cables
- Align and insert connectors into proper port on both display graphics adapter port, computer system, and the display
- Secure the cables to ports using finger screws
- Plug in and power on everything
- Verify the display works
  - Power light steady on, color is correct, no lines, waves, or distortions

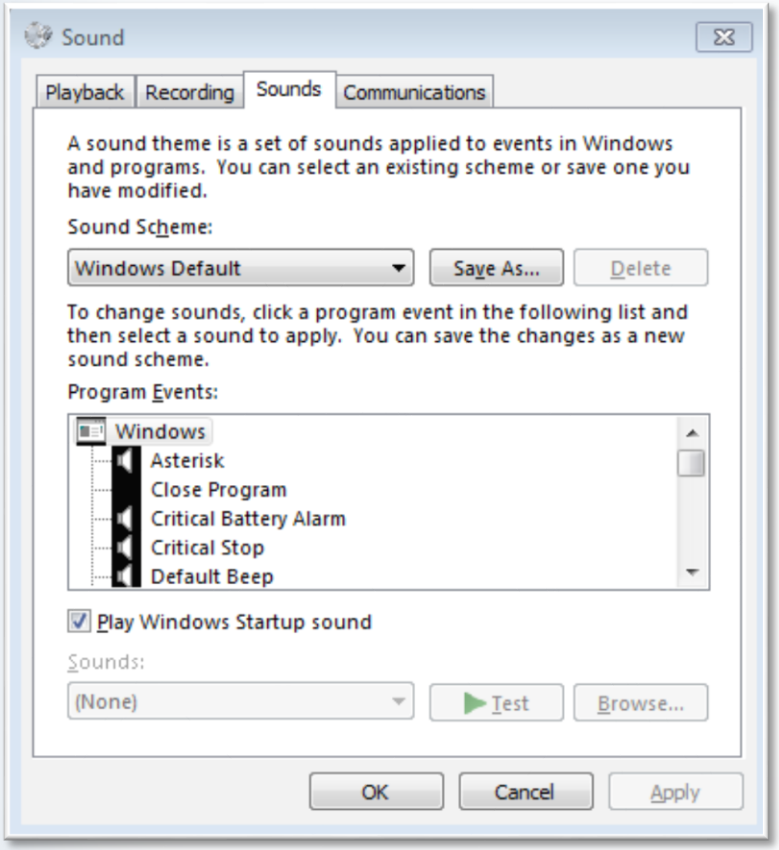
Windows XP

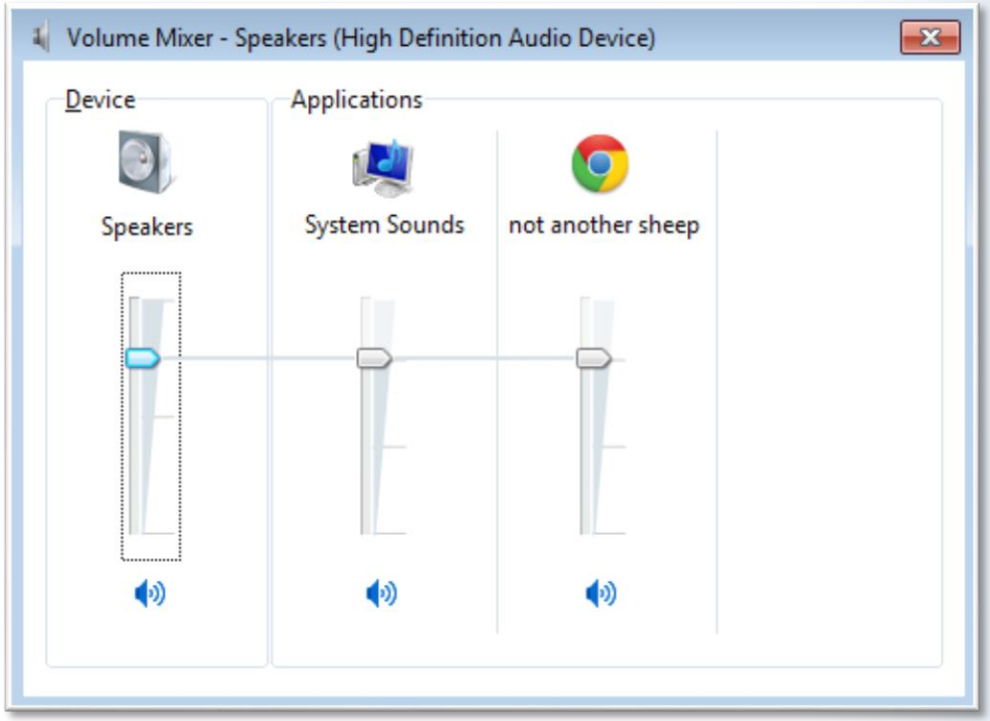

Display Properties
Themes
Desktop
Screen Saver
Appearance
Settings
Monitor Settings
Your desktop has been reconfigured. Do you want to keep these settings?
Reverting in 14 seconds
Yes
No
Display:
(Default Monitor) on Red Hat QXL GPU
Screen resolution
Less
More
1280 by 1024 pixels
Color quality
Highest (32 bit)
Troubleshoot...
Advanced
OK
Cancel
Apply

Windows 7

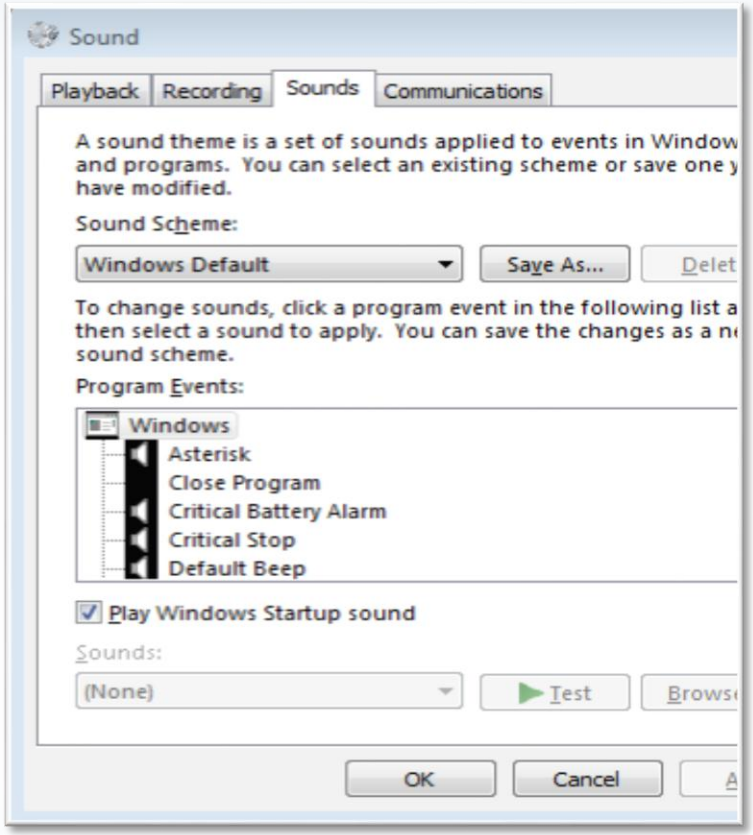
- Control Panel → Hardware and Sound
  - Adjust system volume settings link
  - Manage audio devices link
    - Playback tab – select and configure playback device
    - Recording tab – select and configure microphones and audio input devices
    - Sounds tab – assign sounds and schemes for operations and events
- Device manager for MIDI and other devices

Windows 7


Sound
Playback
Recording
Sounds
Communications
A sound theme is a set of sounds applied to events in Windows and programs. You can select an existing scheme or save one you have modified.
Sound Scheme:
Windows Default
Save As...
Delete
To change sounds, click a program event in the following list and then select a sound to apply. You can save the changes as a new sound scheme.
Program Events:
Windows
Asterisk
Close Program
Critical Battery Alarm
Critical Stop
Default Beep
Play Windows Startup sound
Sounds:
(None)
Test
Browse...
OK
Cancel
Apply


Volume Mixer - Speakers (High Definition Audio Device)
Device
Applications
Speakers
System Sounds
not another sheep

Windows 7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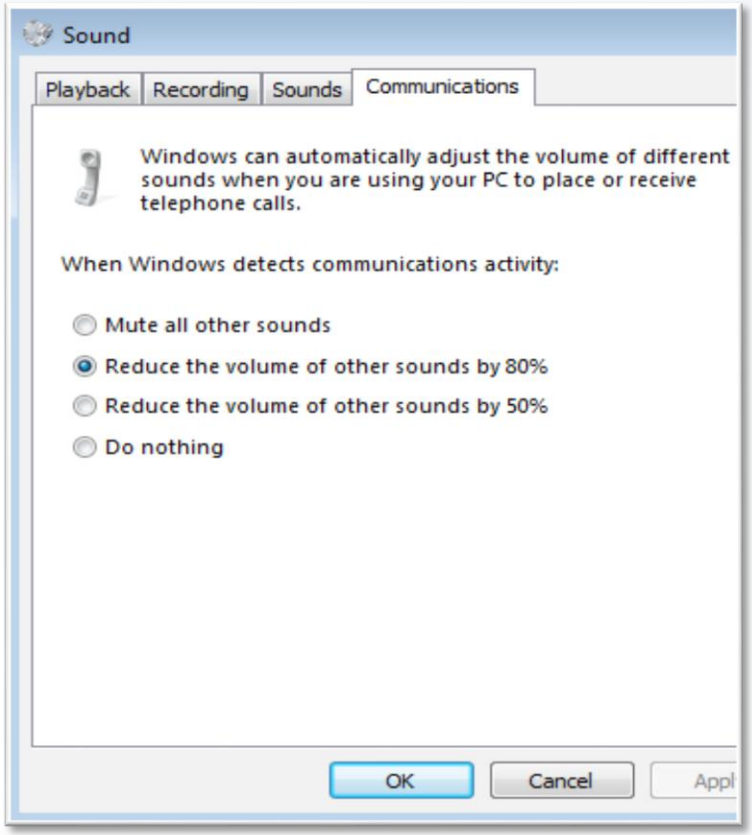
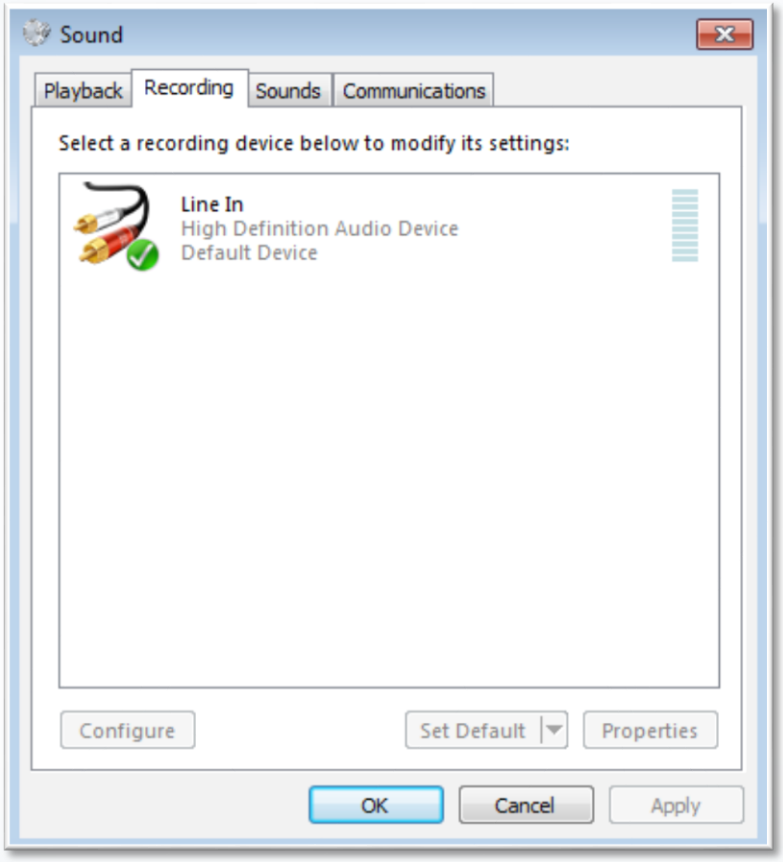

Sound
Playback
Recording
Sounds
Communications
Windows can automatically adjust the volume of different sounds when you are using your PC to place or receive telephone calls.
When Windows detects communications activity:
Mute all other sounds
Reduce the volume of other sounds by 80%
Reduce the volume of other sounds by 50%
Do nothing
OK
Cancel
Appl

Windows 7


Sound
Playback
Recording
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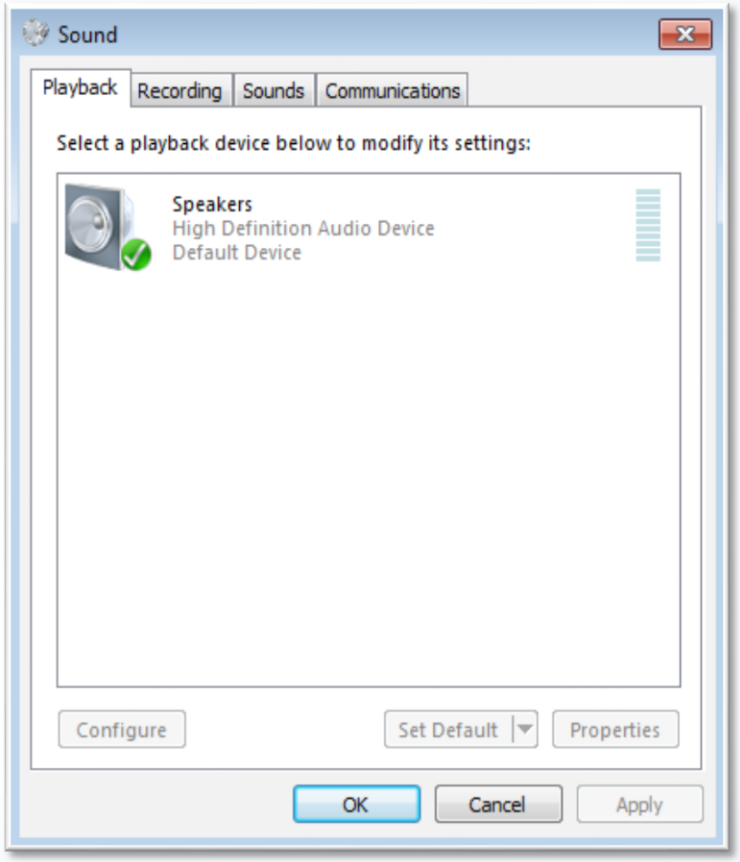
Communications
Select a recording device below to modify its settings:
Line In
High Definition Audio Device
Default Device
Configure
Set Default
Properties
OK
Cancel
Apply


Sound
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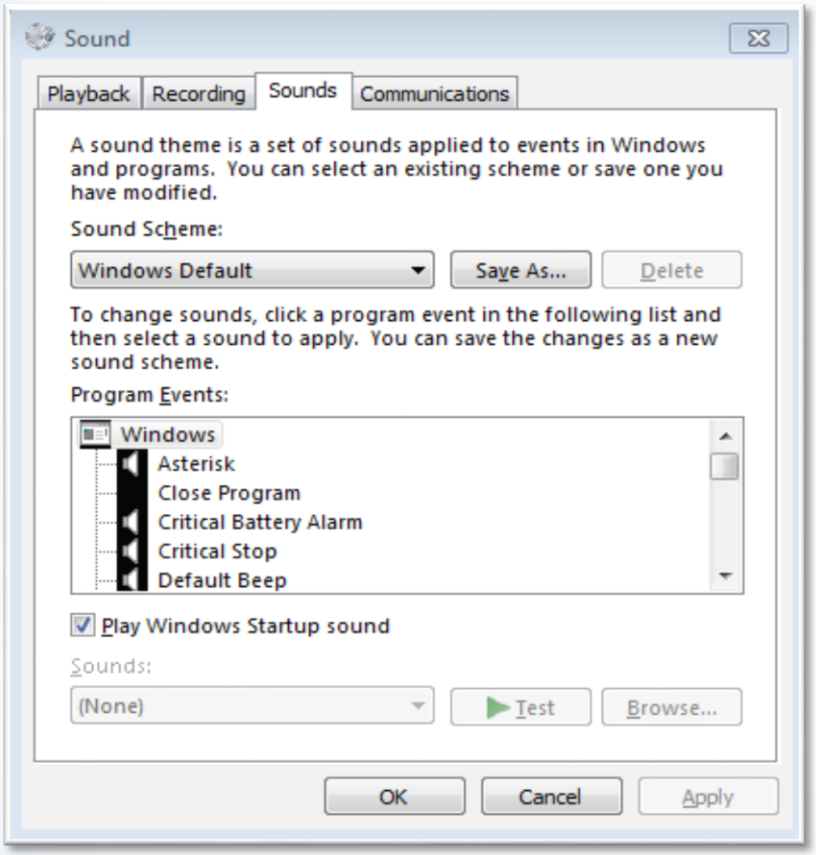
Sounds
Communications
Select a playback device below to modify its settings:
Speakers
High Definition Audio Device
Default Device
Configure
Set Default
Properties
OK
Cancel
Apply

Windows 7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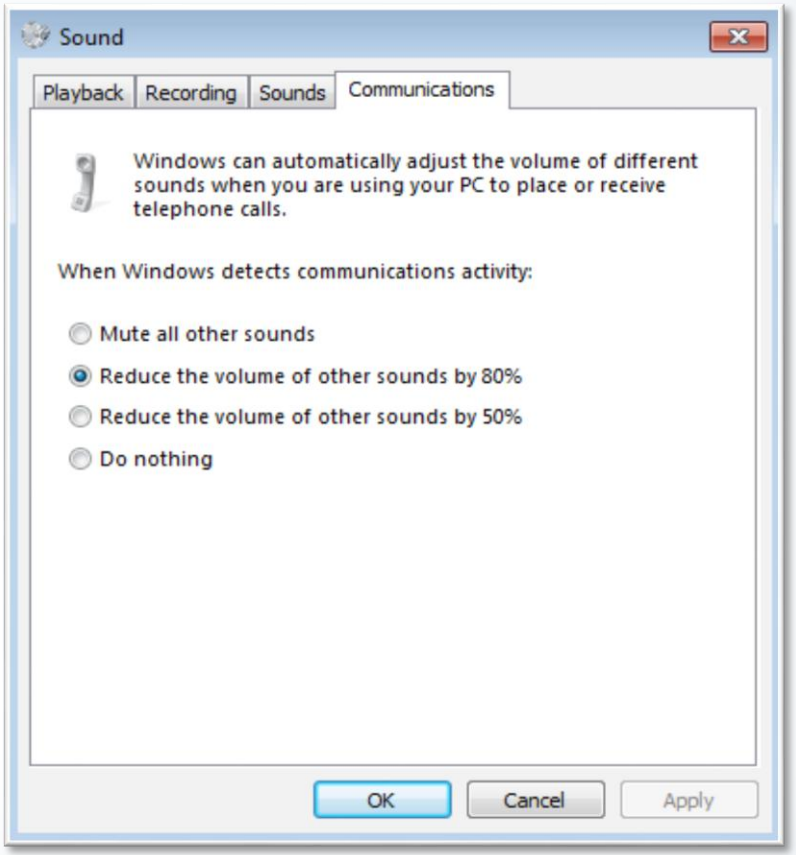
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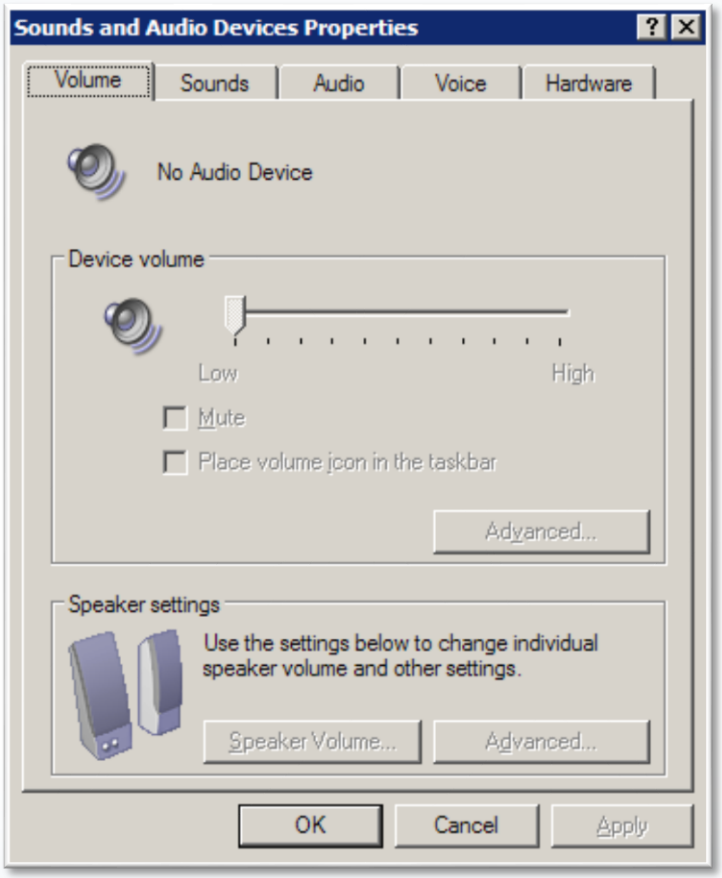
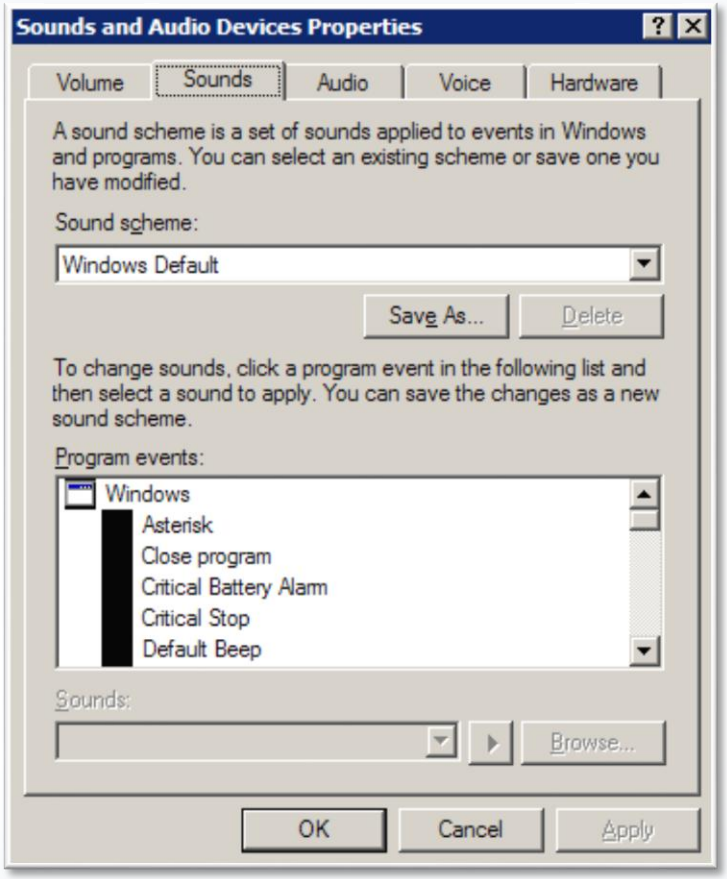
Reduce the volume of other sounds by 80%
Reduce the volume of other sounds by 50%
Do nothing
OK
Cancel
Apply

Windows XP

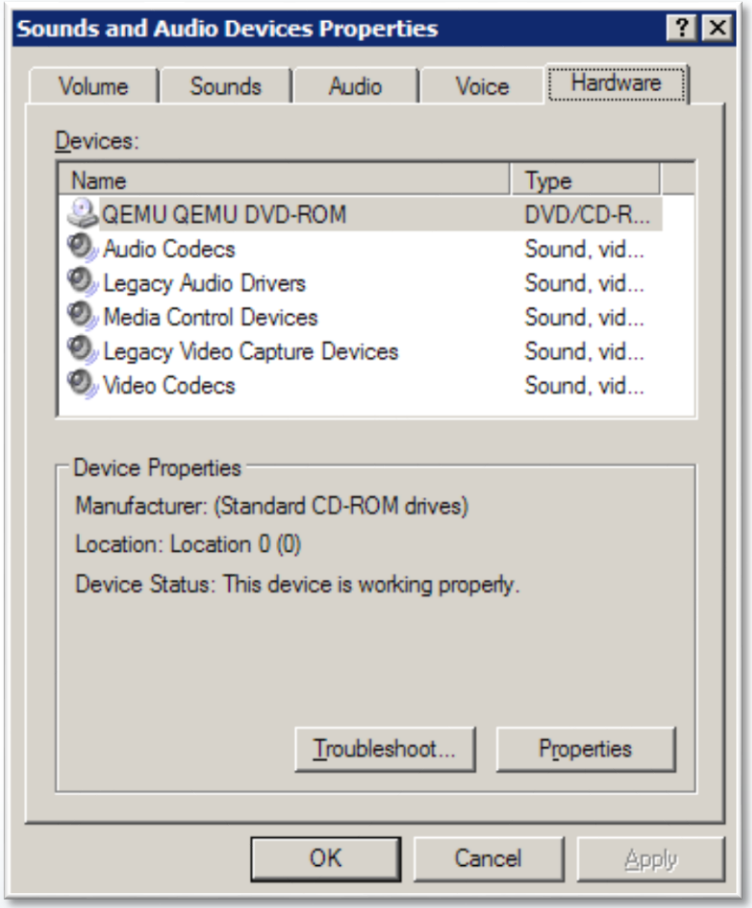
- Control Panel → Sounds and Audio Devices
  - Volume tab
  - Sounds tab
  - Audio tab
  - Voice tab
  - Hardware tab

Windows XP

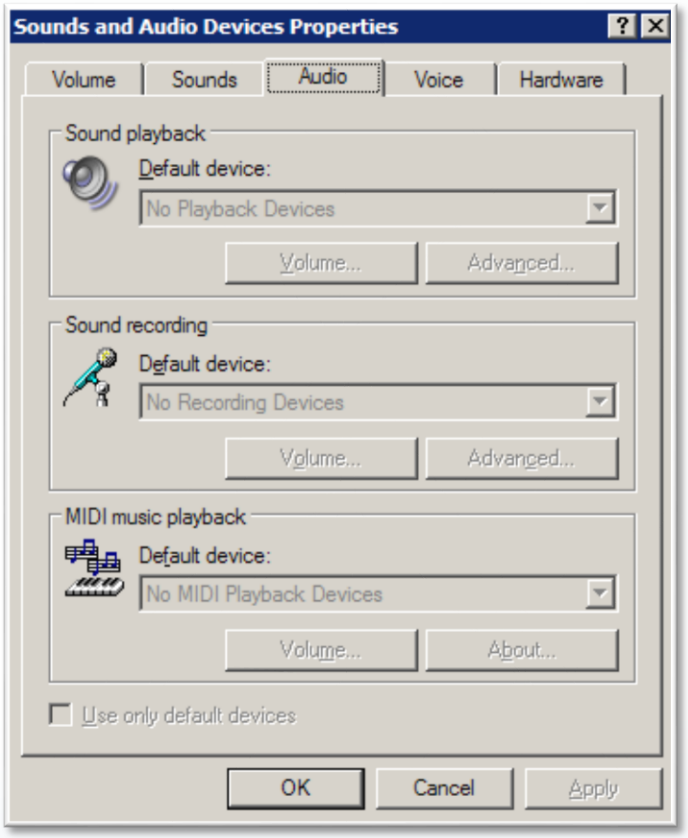

Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
No Audio Device
Device volume
Low
High
Mute
Place volume icon in the taskbar
Advanced...
Speaker settings
Use the settings below to change individual speaker volume and other settings.
Speaker Volume...
Advanced...
OK
Cancel
Apply

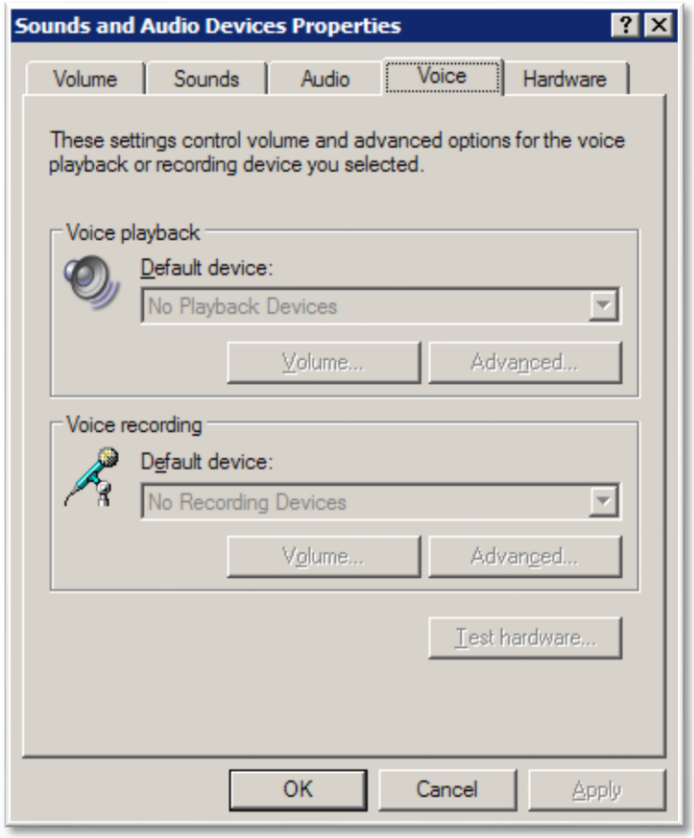

Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
A sound scheme is a set of sounds applied to events in Windows and programs. You can select an existing scheme or save one you have modified.
Sound scheme:
Windows Default
Save As...
Delete
To change sounds, click a program event in the following list and then select a sound to apply. You can save the changes as a new sound scheme.
Program events:
Windows
Asterisk
Close program
Critical Battery Alarm
Critical Stop
Default Beep
Sounds:
Browse...
OK
Cancel
Apply

Windows XP

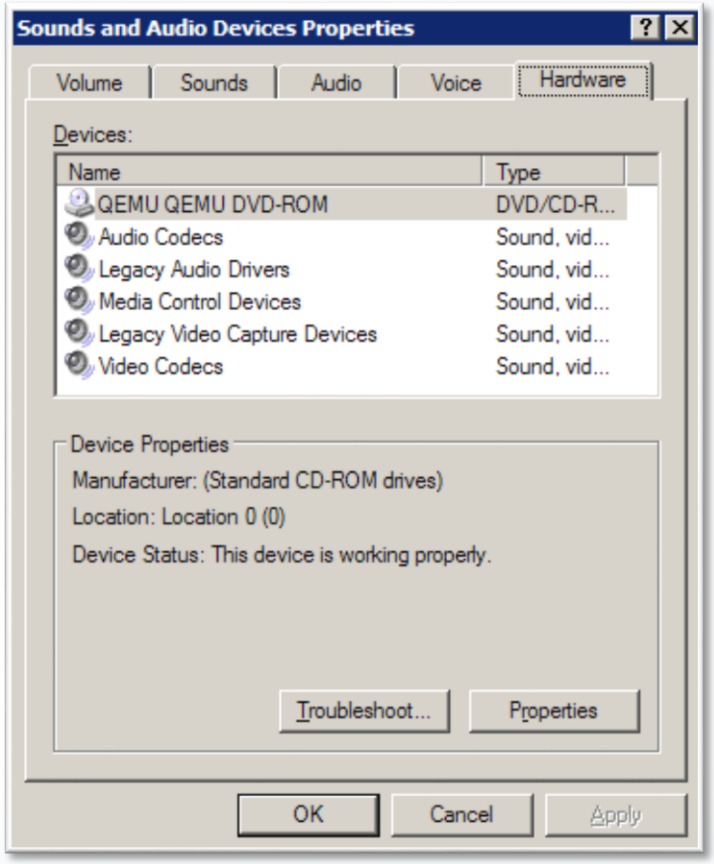

Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
Devices:
Name
Type
QEMU QEMU DVD-ROM
DVD/CD-R...
Audio Codecs
Sound, vid...
Legacy Audio Drivers
Sound, vid...
Media Control Devices
Sound, vid...
Legacy Video Capture Devices
Sound, vid...
Video Codecs
Sound, vid...
Device Properties
Manufacturer: (Standard CD-ROM drives)
Location: Location 0 (0)
Device Status: This device is working properly.
Troubleshoot...
Properties
OK
Cancel
Apply

Windows XP


Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
Sound playback
Default device:
No Playback Devices
Volume...
Advanced...
Sound recording
Default device:
No Recording Devices
Volume...
Advanced...
MIDI music playback
Default device:
No MIDI Playback Devices
Volume...
About...
Use only default devices
OK
Cancel
Apply


Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
These settings control volume and advanced options for the voice playback or recording device you selected.
Voice playback
Default device:
No Playback Devices
Volume...
Advanced...
Voice recording
Default device:
No Recording Devices
Volume...
Advanced...
Test hardware...
OK
Cancel
Apply

Windows XP


Sounds and Audio Devices Properties
Volume
Sounds
Audio
Voice
Hardware
Devices:
Name
Type
QEMU QEMU DVD-ROM
DVD/CD-R...
Audio Codecs
Sound, vid...
Legacy Audio Drivers
Sound, vid...
Media Control Devices
Sound, vid...
Legacy Video Capture Devices
Sound, vid...
Video Codecs
Sound, vid...
Device Properties
Manufacturer: (Standard CD-ROM drives)
Location: Location 0 (0)
Device Status: This device is working properly.
Troubleshoot...
Properties
OK
Cancel
Apply

- 2400 – 2483 Mhz ISM band
- PAN – personal area network and connection for faxes, mobile phones, telephones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, and video game consoles
- V1.2 – 2005, 1 Mb/s

- V2+EDR - 2004, 3 Mb/s, easier pairing
- V3+HS – 2009, 24 Mb/s, enhanced power control
- V4 – 2010, BLE Bluetooth low energy
- Range - Class 1 ~100 m, Class 2 ~10 m, Class 3 ~ 1m

- IrDA – Infrared Data Association
- Used with mobile phones, laptops, cameras, printers, medical devices
- Line of sight
- Speed : 2.4Kb/s – 1 Gb/s
- Angle: +- 15 degrees
- Range: 1 m

THANK YOU