Installing, Configuring, and Troubleshooting Display and Multimedia Devices

CompTIA

Installing, Configuring, and Troubleshooting Display and Multimedia Devices

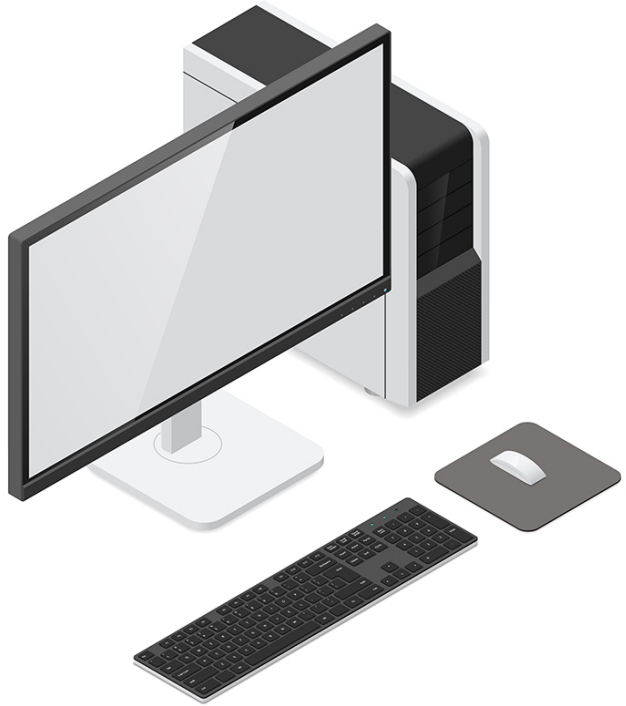
- Install and Configure Display Devices
- Troubleshoot Display Devices
- Install and Configure Multimedia Devices

Display Device Types

- Monitors
- Projectors
- Virtual reality (VR) headsets

Monitors

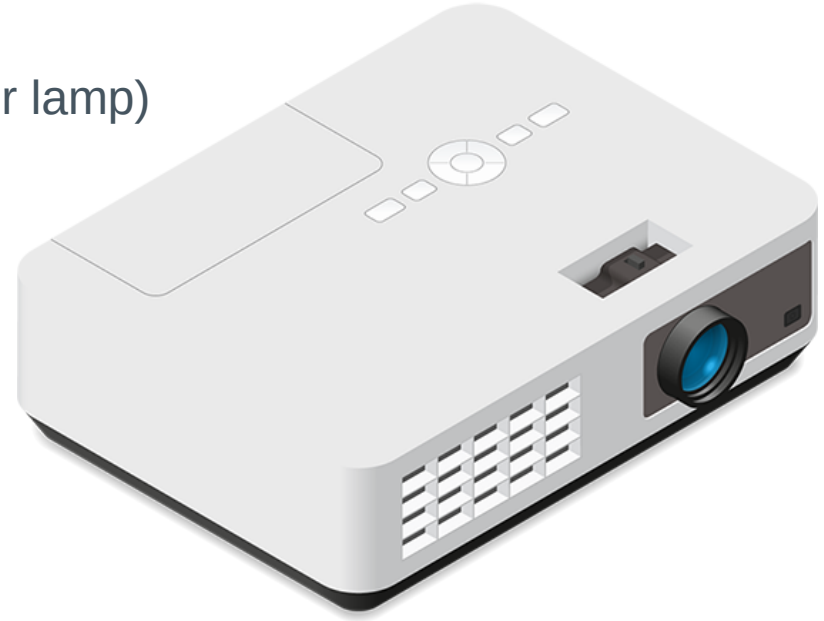
- Legacy display devices: CRT (bulky)
- Flat panel LCDs:
  - Digital signaling
  - Thinner and lighter than CRT
  - Use less power
- LCD and Thin Film Transistor (TFT)
  - TN (twisted nematic) high refresh rate
  - IPS (in plane switching) better color
- LCD backlighting
  - Edge lit
  - Backlit
  - Color temperature (colored backlight, different shades of RGB)
- OLED displays (common in smartphones)



Digital Projectors

Video projector: A large format display in which the image is projected onto a screen or wall using a lens system.

- CRT (legacy)
- LCD (same as screens with a stronger lamp)
- DLP (Digital Light Processing).
  - Pixels are represented by
  - rotating mirrors



VR Headsets

VR headset: A headset worn like goggles to interact with images displayed in the headset.

- Sensory input from computer applications.
- Handheld controllers for moving your avatar and interacting with the VR environment.
- Uses:
  - Gaming
  - Meetings
  - Social networking
- Tethered and mobile.

Display Device Settings and Physical Features

- Resolution and analog/digital output
- Screen size and aspect ratio
- Refresh rate
- Brightness, contrast ratio, and illuminance (different object brightness contrast)
- Viewing angle and privacy filters
- Coatings (gloss is richer but reflective, other option matte)
- XGA and HD standards:
  - Resolution
  - Color depth
  - Aspect ratio

VGA Standards

Standard	Resolution	Aspect Ratio
WXGA	1280x800	16:10
SXGA	1280x1024	5:4
HD	1366x768	16:9
WSXGA	1440x900	16:10
HD+	1600x900	16:9
Full HD	1920x1080	16:9
QHD	2560x1440	16:9
4K UHD	3840x2160	16:9

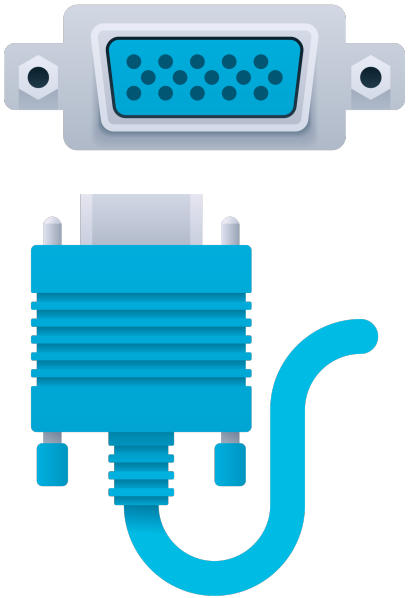
Display Device Connections and Cables

- There are a lot of types of connectors and cables.
- Video adapters and devices can support multiple cable types.
- TFT displays use digital signals, but some support legacy analog signals, too.
  - Analog to digital conversion.
  - Digital to analog conversion.

VGA Ports and Connectors

VGA port: 15-pin connector used to connect monitors to PCs.

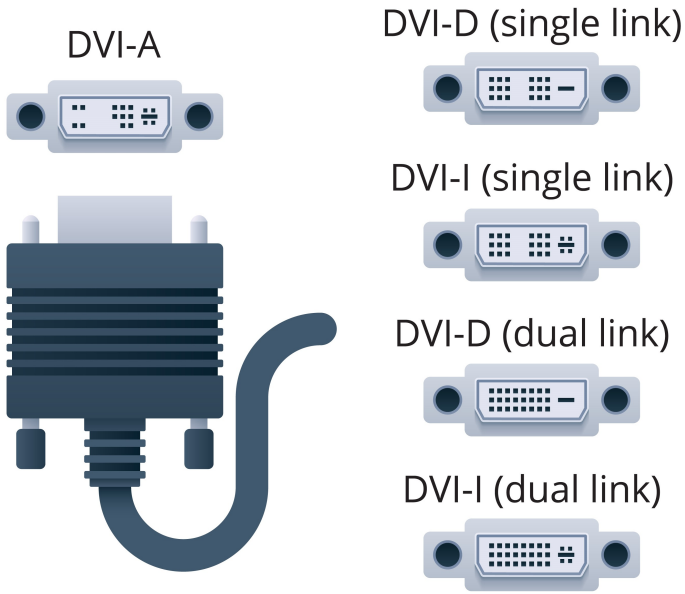
- Legacy standard analog video interface.
- 15-pin D-shell connector with screws.
- Analog interface carries continuous variable signals for RGB component video.
- Cabling is marketed according to supported resolutions.
  - Lower quality 800x600.
  - Higher quality 1600x1200.
- Cable length typically 5 m.
  - High quality cable might support up to 30 m.



DVI Ports and Connectors (Slide 1 of 2)

Digital Visual Interface: (**DVI**) Video adapter designed to replace VGA port. It supports digital only or digital and analog signaling. Dual link has greater FPS and resolution.

- Designed for use with flat panel displays.
- Being phased out for newer technology.
- Types:
  - DVI-A
  - DVI-D (single link)
  - DVI-I (analogue and digital, single link)
  - DVI-D (dual link)
  - DVI-I (dual link)



DVI Ports and Connectors (Slide 2 of 2)

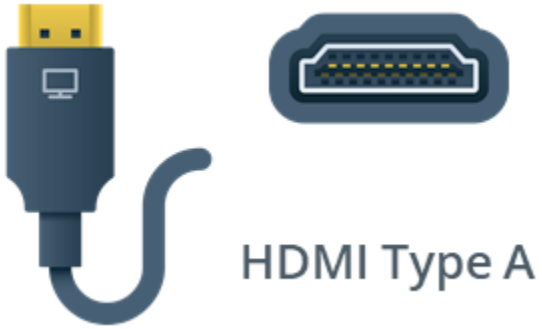
- Different types support analog and digital equipment.
  - DVI-A: analog only
  - DVI-D: digital only
  - DVI-I: analog and digital
- Bandwidth:
  - Single link: 3.7 Gbps, full HD resolution, 1920x1200, at 60 fps
  - Dual link: over 7.4 Gbps, HDTV, 2560x1600, at 85 fps

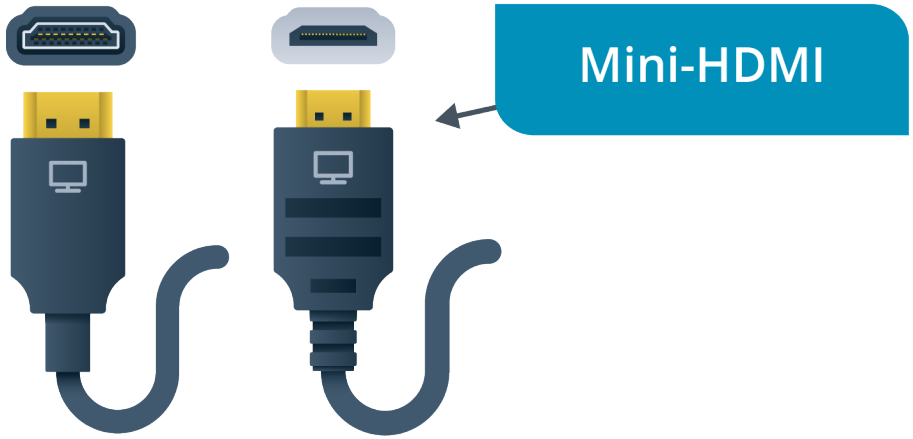
HDMI Ports and Connectors (Slide 1 of 2)

High Definition Multimedia Interface (**HDMI**): High-specification digital connector for audio-video equipment.

- Used in consumer electronics and computing.
- Supports digital video and audio streams.
- Versions support different bandwidths.
  - Version 1.4 added 4K support (4096x2160 at 24 Hz).
  - Version 2.1 supports up to 10K at 120 Hz.
- Connectors:
  - Type A 19-pin
  - Type B 29-pin for dual link (less commonly used)
  - Type C Mini HDMI
  - Type D Micro HDMI

HDMI Ports and Connectors (Slide 2 of 2)





- Cable ratings:
  - Standard (Category 1)
  - High Speed (Category 2)
  - Premium High Speed
  - Ultra High Speed
- Backwards compatible with DVI-D

DisplayPort Ports and Connectors (Slide 1 of 2)

DisplayPort: Digital A/V interface developed by VESA. DisplayPort supports some cross-compatibility with DVI and HDMI devices.

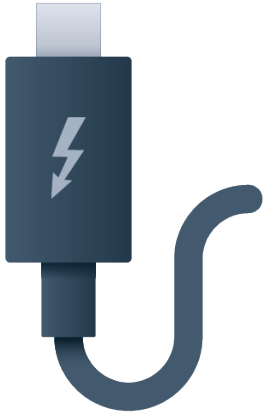
- Royalty-free HDMI alternative.
- Packetized data transfer.
  - Similar to PCIe.
  - Lanes can have different data rates.
- Each lane can be allocated a 1.62, 2.7, or 5.4 Gbps data rate.
- Maximum data rate for a 4-lane link is 17.28 Gbps.
- Support for 48-bit color, 3D, 4K/UHD, and HDCP.

DisplayPort Ports and Connectors (Slide 2 of 2)

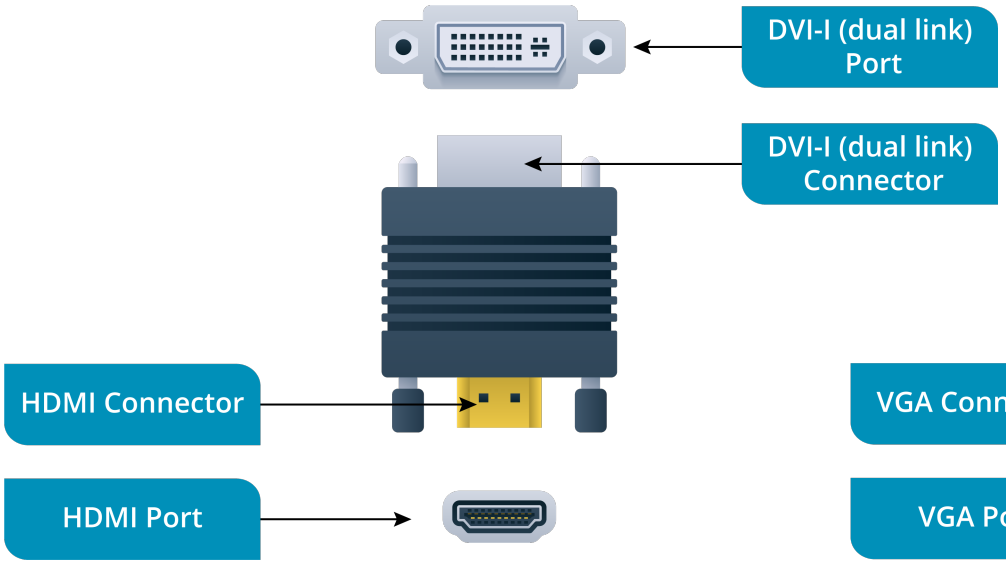
- Supports copper and fiber-optic cables.
  - Copper: 2560x1600
- Connectors:
  - 20-pin
  - DP++ enables connection to DVI-D and HDMI devices
  - Mini DP

Thunderbolt and USB-C Ports and Connectors

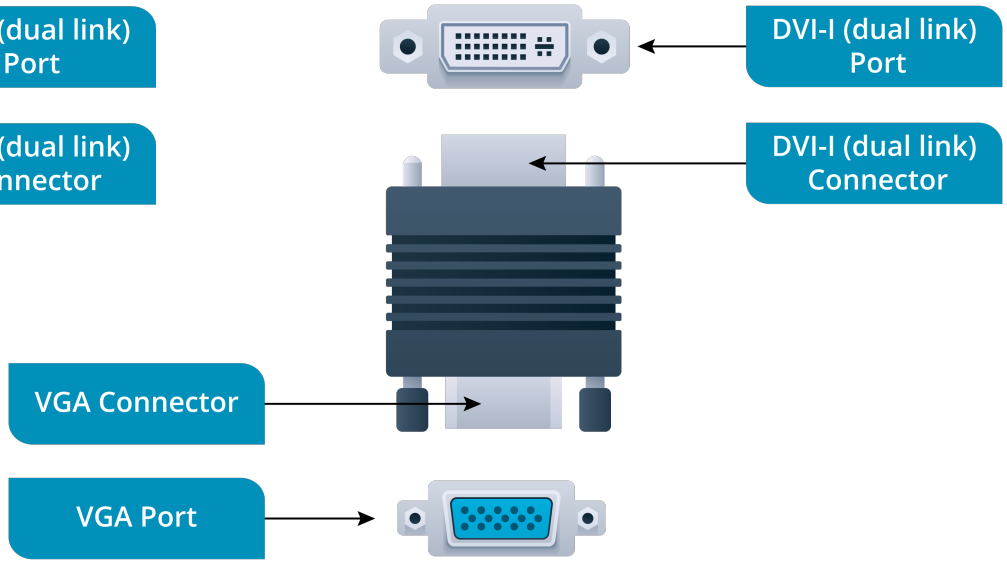
- Emerging trend is to use USB-C.
- Can carry HDMI and DisplayPort signaling, but most often seen in use with Thunderbolt 3.



Video Adapters and Converters (Slide 1 of 2)

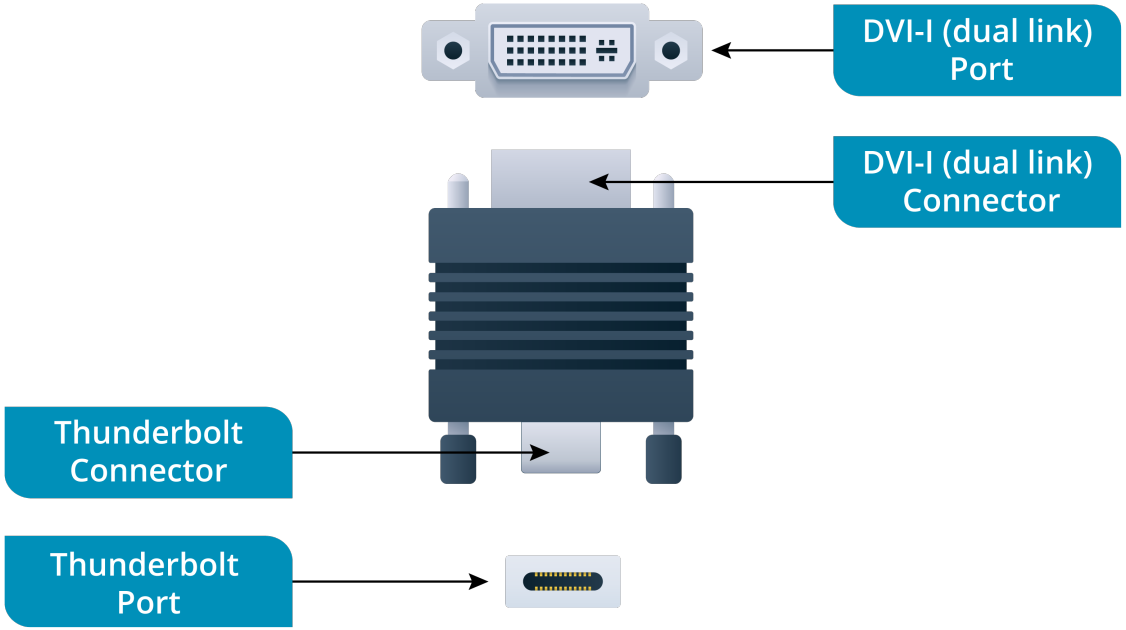


HDMI to DVI-I



VGA to DVI-I

Video Adapters and Converters (Slide 2 of 2)



Thunderbolt to DVI

Video Cards

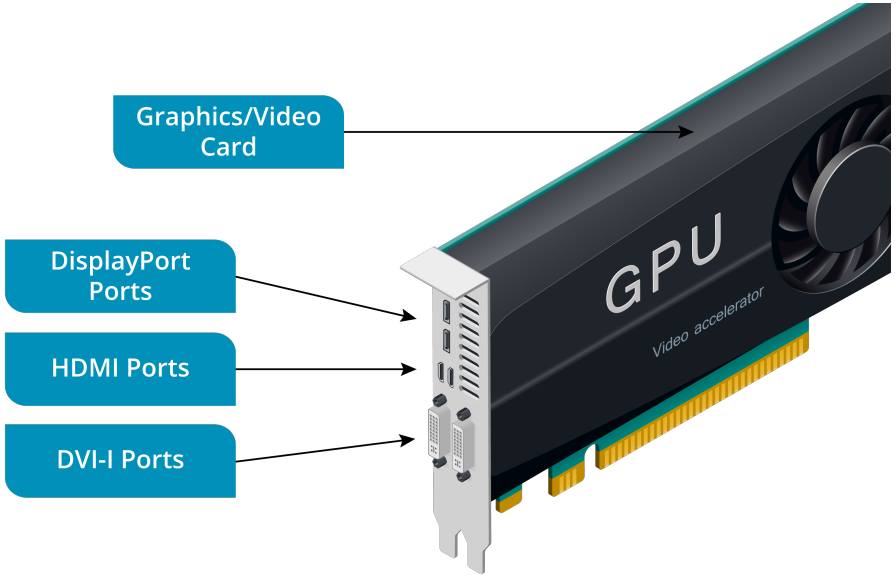
Video card: Interface between graphics components of a PC and the display device.

- Either use system CPU and memory (compact computers) or have onboard processor and memory (desktop computers)
- Integrated cards: onboard adapter.
  - Usually on low-end PCs.
- Add-on cards in PCIe slots.

Adapter Components

Graphics Processing Unit (GPU): Type of microprocessor used on dedicated video adapter cards or within a CPU with integrated graphics capability.

- Clock speed
- Shader units
- Frame rate
- 3D cards need more memory
  - Onboard AM: from 2 to 12 GB
- PCIe x16 interface
- At least 1 digital video interface supported
- Graphics APIs: DirectX and OpenGL



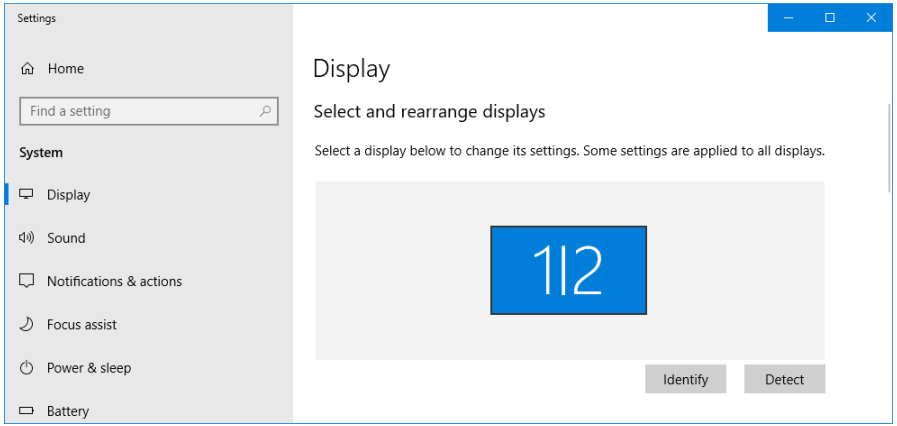
Configuration Tools for Display Devices

- Automatic detection and installation via Plug-and-Play.
- System firmware setup program to disable onboard video adapter.
- Settings such as resolution, etc.
  - OS tools like Windows Settings or Control Panel.
  - Vendor configuration utility.
  - Monitor controls or onscreen menus.

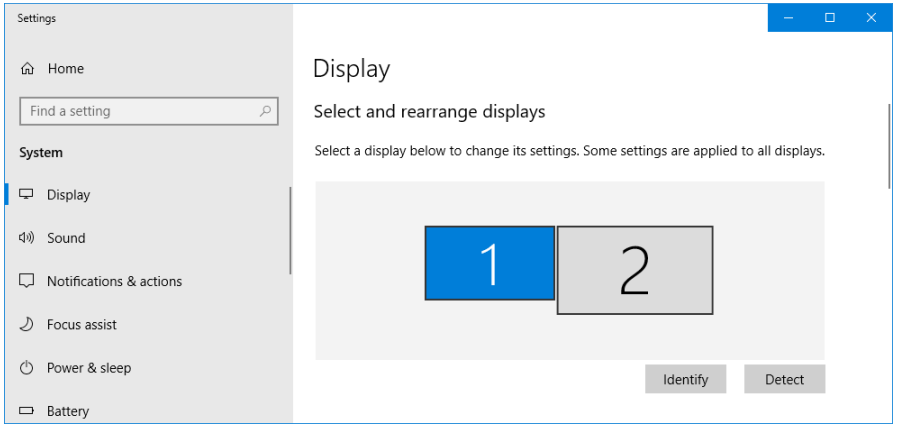
Multiple Displays (Slide 1 of 2)

- Configuration options:
  - Graphics adapter with multiple display ports.
  - Multiple graphics adapters.
  - Daisy-chaining DP or Thunderbolt monitors.
- Windows display modes:
  - Duplicated display.
  - Extended display.
  - Show only on 1/2.

Multiple Displays (Slide 2 of 2)



Duplicated



Extended

Activity

Discussing Display Device Installation and Configuration

30Bird Lab 8

Activity

Installing a Graphics Adapter

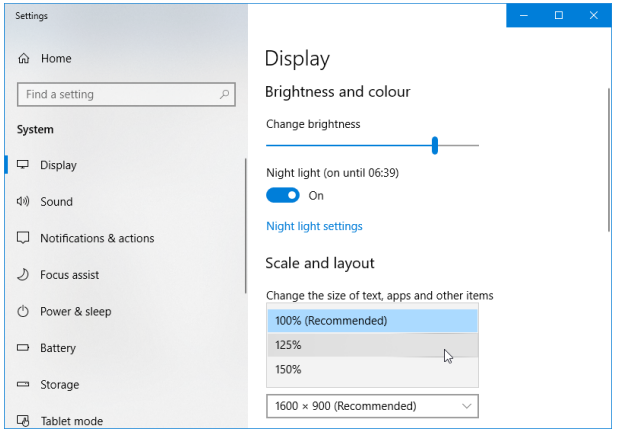
https://www.youtube.com/watch?v=YVbjl69z3HE

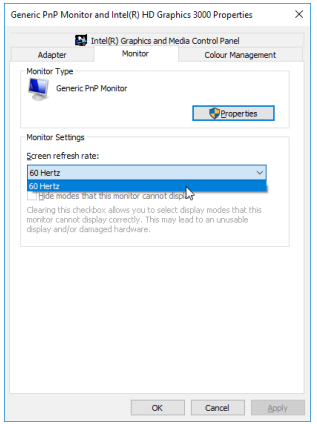
Common Display Issues

- No image is displayed on the monitor.
- Image is dim.
- Image flickers or is distorted.
- Images have low resolution or color depth.
- Images and icons are oversized.
- Incorrect color patterns.
- Dead pixels.
- Image is burned into the monitor.
- Unexpected objects or patterns appear on the monitor.
- Overheating.
- Protected content.

Guidelines for Troubleshooting Display Devices (Slide 1 of 3)

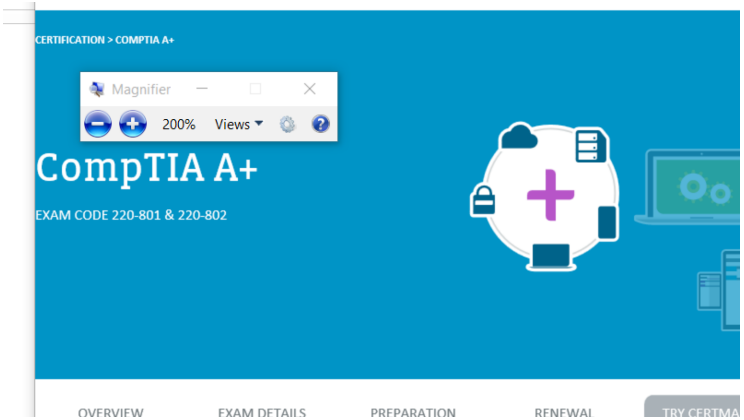
- Display configuration issues:
  - For no image:
    - Verify power to the monitor, and make sure it's not in standby mode.
    - Verify connection between video card and monitor.
    - Use OSD controls to verify display input.
    - Try using the monitor with another PC.
  - For a dim image, adjust brightness and contrast controls, and check for power-save mode.
  - For image quality issues:
    - Check the video cable and connector.
    - Adjust hardware acceleration.
    - Adjust resolution.
    - Adjust refresh rate.
    - Adjust image controls.
    - Verify no physical damage

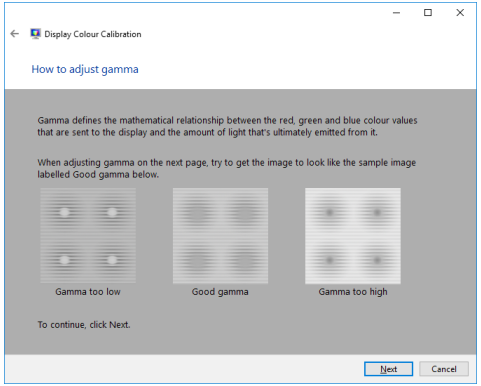




Guidelines for Troubleshooting Display Devices (Slide 2 of 3)

- Display configuration issues (continued):
  - For low resolution or color depth, verify that the driver is current.
  - For oversized images and icons:
    - Increase resolution.
    - Increase DPI scaling.
    - Verify no zoom tool in use.
  - For color quality issues:
    - Calibrate to scanners and printers.
    - Check connectors and cabling.





Guidelines for Troubleshooting Display Devices (Slide 3 of 3)

- Adapter and monitor faults:
  - For dead pixels, try software utilities designed to reactivate them, or gently tapping the affected area of the screen.
  - Use screen savers and power-saving modes to avoid burn-in.
  - For unexpected objects or patterns being displayed:
    - Static artifacts are often caused by a faulty adapter.
    - For persistent images on TFT monitors, try shutting off the monitor for several hours.
    - Verify the graphics card, driver, and API version support the application or game.
    - Try disabling video effects or adjusting to a lower resolution.
    - Check for and install updated device drivers.
  - For unexpected shutdowns:
    - Check the display adapter and driver if you experience BSoD.
    - Verify that the graphics adapter is adequately cooled.
  - For unauthorized content or HDCP errors:
    - Verify that DRM and HDCP are not disabling the display subsystem.

Activity

Discussing Display Device Troubleshooting (flash cards)

Activity

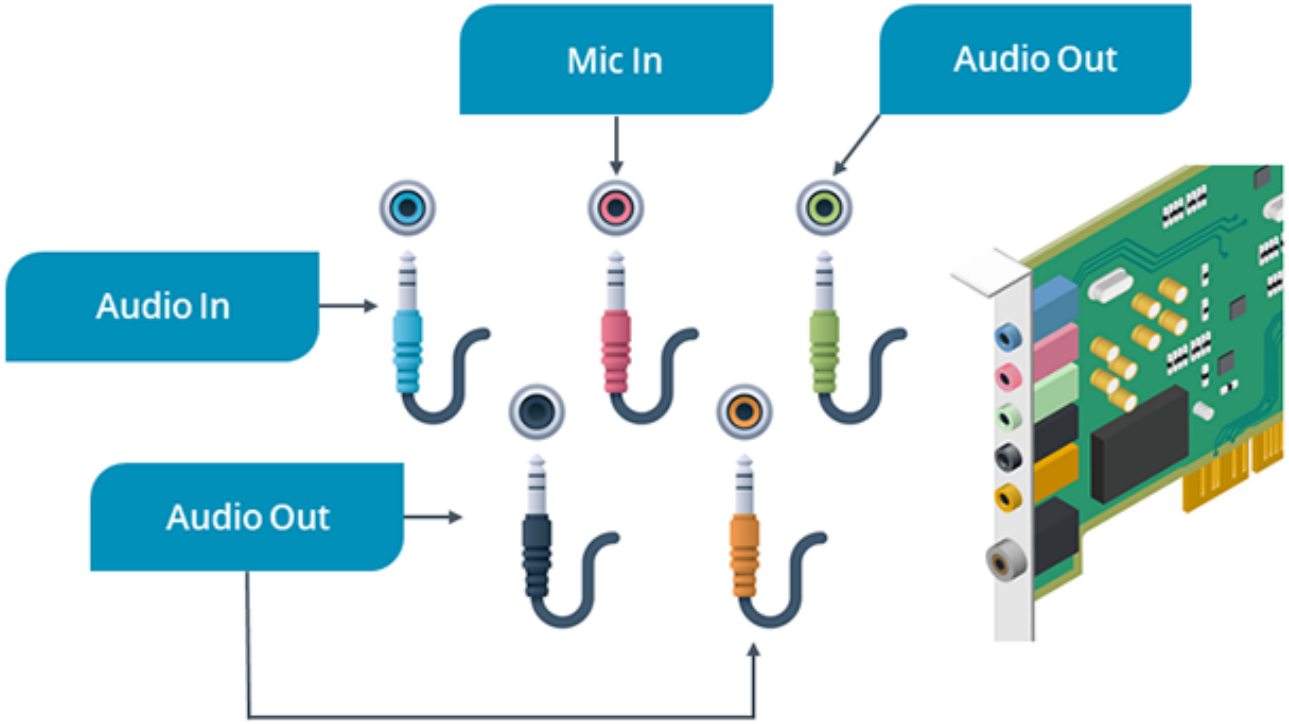
Troubleshooting Monitor Issues

Audio Subsystems (Slide 1 of 4)

Audio subsystem: Made up of sound card and one or more input and output devices.

- DSP and DACs
- Onboard audio chip for basic sound capabilities
- Expansion cards have more and better features
  - Onboard RAM
  - Wave tables
  - Multiple jacks
- Support sound APIs
  - DirectSound3D
  - OpenAL
  - EAX

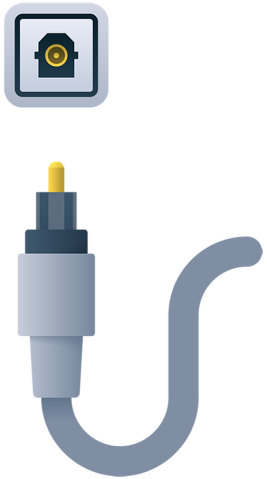
Audio Subsystems (Slide 2 of 4)



Audio Subsystems (Slide 3 of 4)

Jack	Description
Audio in (light blue)	A low-level (1V) stereo signal as supplied by most tape decks, video players, tuners, CD players, and so on.
Mic in (pink)	A mono-only analog input.
Audio out (lime)	A low-level (1V) analog stereo signal suitable for feeding into amplified speakers or headphones.
Audio out (black)	Carries the signal for rear speakers in a surround sound system.
Audio out (orange)	Carries the signal for the subwoofer in a surround sound system.

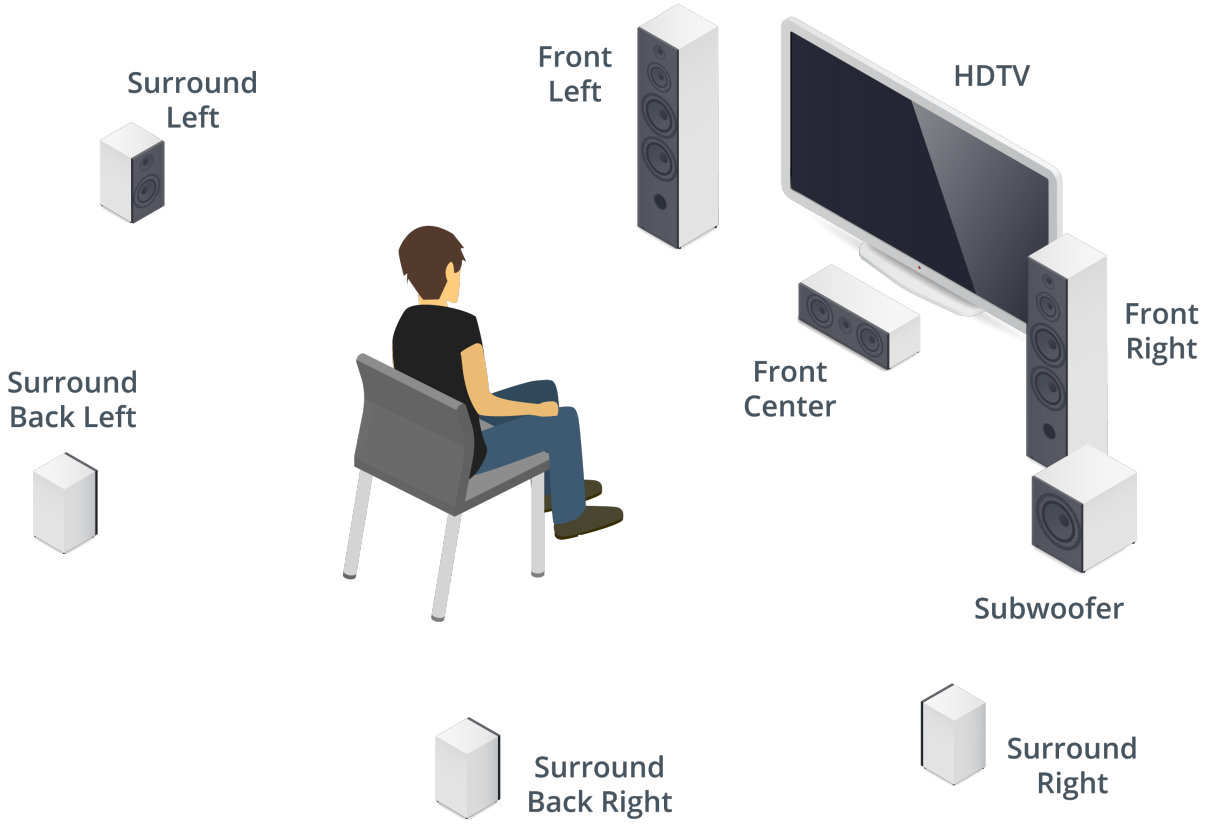
Audio Subsystems (Slide 4 of 4)



Audio Output Devices (Slide 1 of 2)

- Playback through speakers or headphones.
  - Can be analog or digital sound.
- Mono, stereo, and surround sound.
  - 5.1 Dolby Digital/DTS: 3 front speakers, 2 rear speakers, and a subwoofer (the .1).
  - 7.1 Dolby Digital Plus/DTS-HD: 3 front speakers, 2 side speakers, 2 rear speakers, and a subwoofer.
- Connection to optical drive.
- Playback quality depends on frequency response.

Audio Output Devices (Slide 2 of 2)



MIDI Equipment

Musical Instrument Digital Interface (MIDI): Allows a computer with a sound card to drive MIDI-compatible musical instruments, or for a synthesizer to drive a computer audio application

- Synthesizers and electronic drum sets.
- Information about a sound is shared, not the sound itself.
  - Sample
  - Volume
  - Pitch
  - Tempo
- MIDI devices use 5-pin DIN connectors or USB connectors.

Sound Recording Equipment

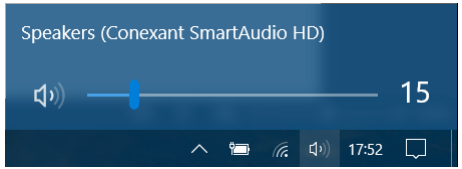
- Sampling and resolution.
  - Higher sampling rates and resolutions provide more accurate sound.
- Distortion (noise).
  - THD and SNR.
- Multiple ports connect different types of recording gear.

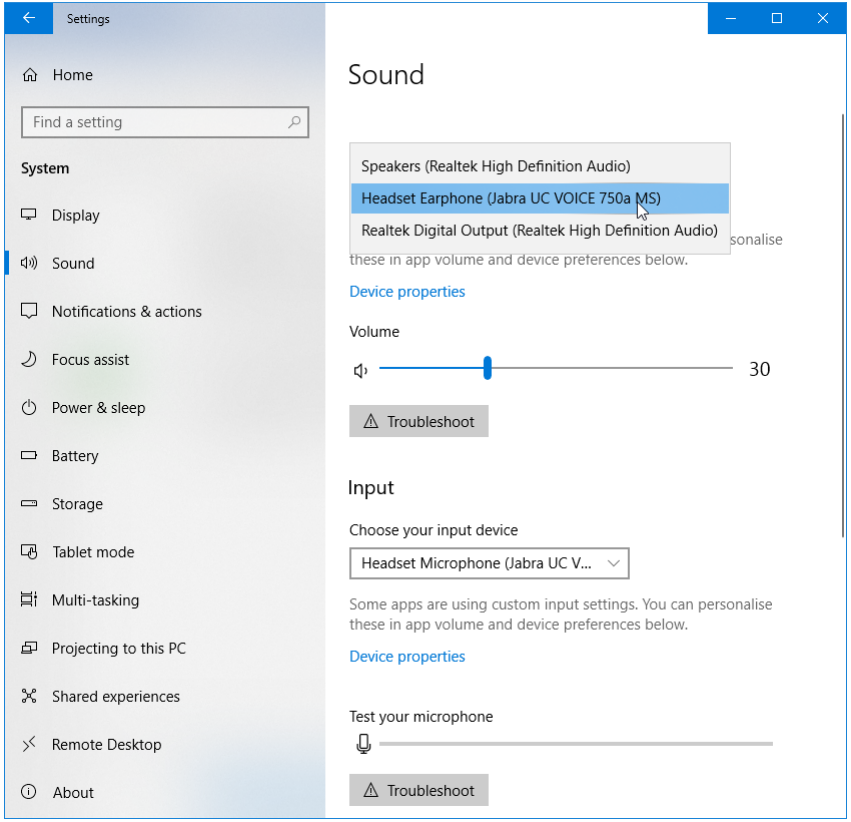
Headsets

- Headsets contain headphones and a microphone.
- Used for VoIP calls, and meeting and conferencing applications.
- Connections are usually USB or wireless (Bluetooth).

Audio Settings

- OS tools:
  - Windows Sound Control Panel
  - Windows Sound Settings
- Hardware volume controls:
  - MM keyboards
  - Laptop buttons and function keys





Webcams (Slide 1 of 2)

Webcam: A digital camera connected to a computer that can be used to stream and record video.

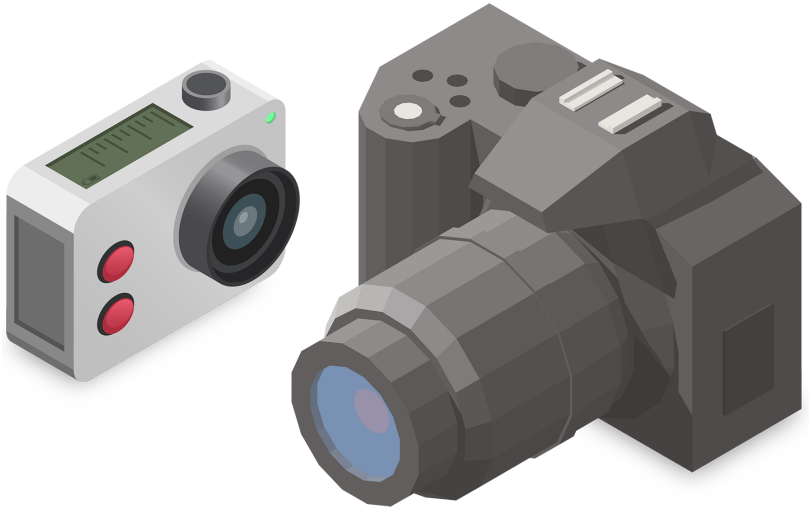
- Records video and audio.
- Relatively low quality video.
- Used for online video conferences, website feeds, and surveillance.
- Integrated or external peripheral.

Webcams (Slide 2 of 2)

Digital Cameras (Slide 1 of 2)

Digital camera: A version of a 35 mm film camera where the film is replaced by light-sensitive diodes and electronic storage media.

- Still pictures and video recording.
- Images stored on flash memory cards.
- Photo properties adjusted via software.
- No viewfinder.
- Available in many models.
- Primary quality metric is resolution (megapixels).



Digital Cameras (Slide 2 of 2)

Resolution	Uses
Less than 1 MP	Onscreen viewing.
1 to 2 MP	Onscreen viewing and prints up to around 7 inches.
3 MP	Larger prints up to around 12 inches.
4 to 8 MP and higher	Poster prints 30 inches and larger.

- Generally limited to one memory card type.
- Images compressed to JPEG format,

Activity

Discussing Multimedia Device Installation and Configuration

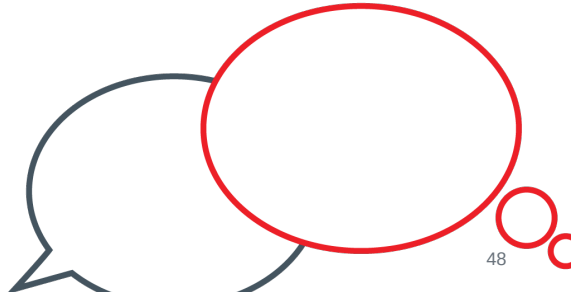
PBQ Section 2

Speakers: https://www.youtube.com/watch?v=rZ62sqKpV34

Reflective Questions

1. What types of monitors do you have experience with? What types of connections have you used to connect those monitors to computers?

2. In your current job role, have you had to troubleshoot display device problems? If so, what did you do and how did you resolve the issues?



Read

- Chapter 1-3
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