Cable Types

USB

Universal Serial Bus

Longer cables have higher chances of resistance and speed and signal deterioration

Type A – Most commonly used on desktops and laptops

Type C – Modern connector

Type B 2.0 and 3.0 are NOT interchangeable

USB 2.0

Name | Standard | Speed | Max Cable Length | Power

LowSpeed | USB 1.0 | 1.5 Mbps | 5M / 15Ft | 0.5amps

FullSpeed | USB 1.1 | 12 Mbps | 5M / 15Ft | 0.5amps

HiSpeed | USB 2.0 | 480 Mbps | 5M / 15Ft | 0.5amps

USB 3.0

Name | Standard | Speed | Max Cable Length | Power

Super Speed USB | USB 3.2 Gen 1 | 5Gbps | 3M / 9Ft | 4.5W

Super Speed USB | USB 3.2 Gen 2x1 | 10Gbps | 3M / 9Ft | 4.5W

Super Speed USB | USB 3.2 Gen 2x2 | 20Gbps | 3M / 9Ft | 4.5W

USB 4

40Gbps | 3M / 9Ft | 7.5W

Video Cables

HDMI

High-Definition Multimedia Interface

- 1080p up to 4K and 8K with 60, 120 or 144 Hertz
- HDMI Digital Content Protection (HDCP) – Allows a device to validate the connection

- Type A – Full-size Connector
- Type C – Mini Connector
- Type D – Micro Connector

Category 1

- Standard – Used for video content – 1080P @ 60 Hertz

Category 2

- High Speed – Has great length of distance and high resolution
  - Premium High Speed up to 18Gbps
  - Ultra-High Speed up to 48 Gbps

DisplayPort

Has the same capabilities as HDMI

- Full Size DisplayPort – FDP
- Mini DisplayPort – MDP
- Can support data transfer up to 20 Gbps

DVI

Digital Visual Interface – Supports analog and digital outputs

DVI A – Analog only

DVI D – Digital only

DVI I – Both analog and digital

VGA

Video Graphics Array – Uses a 15-pin standard analog video interface port

Thunderbolt

Acts like a display interface and can data transfer

Thunderbolt 1 & 2

- Use a physical connector that's backwards compatible with MDP

Thunderbolt 3

- Changed the physical interface to use the same port connector as USB-C
- USB-C does not always support Thunderbolt 3, but all Thunderbolt 3 supports USB-C

- Thunderbolt 3 – 1.6 Ft up to 40 Gbps

Lightning

- Specific proprietary created by Apple for mobile devices

Storage Cables

SATA

Serial Advanced Technology Attachment – Standard method of connecting a storage device to a motherboard

SATA 7-Pin Data Cable – Does not supply power

SATA 15-Pin Power Connector – Provides power

SATA 1 – up to 1Gbps | 150 MBps

SATA 2 – up to 3Gbps | 300 MBps

SATA 3 – up to 6Gbps | 600 MBps

Limitation will usually be the Hard Drive, not the cable

eSATA

external Serial Advanced Technology Attachment – Cable outside of the case

eSATA2 – 3Gbps

eSATA3 – 6Gbps

Parallel Advanced Technology Attachment (PATA) – Uses IDE cables and connectors and standards but is differentiated from SATA – 40-Pin ribbon cable/MOLEX Power Connector 4-Pin

Motherboards

Motherboard – Printed circuit board that contains computer components and provides connectors

Input – Process of accepting data in a form that the computer can use

Output – Process of displaying the processed data or information

Processing – Actions performed by the CPU when receiving information

Storage – Process of saving or retaining digital data, temporarily or permanently

Installing the Motherboard and CPU

1. Review the motherboard's documentation
2. Position the motherboard to align with rear of the case
3. Insert the standoffs to match the hole locations for the motherboard
4. Install the processor and memory modules before installing the motherboard
5. Verify the standoffs are properly aligned prior to installing the motherboard
6. Secure the standoffs using the appropriate screw type
7. Install the power supply, disk drives, add-on cards and other components

Form Factors

ATX – Advanced Technology eXtended – Full-size motherboard and measures 12x9.6 in size

Mini ATX – Smaller than the ATX but contains the same features. 11.2x8.2

Micro ATX – 9.6 squared – Only has 4 expansion slots instead of up to 7

Mini ITX – Information Technology eXtended 6.7 squared only 1 expansion slot

Expansion Cards

PCI 32-bit – Support a max bus speed of 33MHZ or 133MBps

PCI-X – 64-bit expansion card 133MHz

PCI-X 2.0 266MHz up to 533 MHz

PCIe (Peripheral Component Interconnect Express) – replaces PCI, PCI-X and APG – Connects to the bus to get data to and from the motherboard for external devices

PCIe x1. PCIe x4, PCIe x8. PCIe x16

X1 – used for modems, network cards, wireless cards, input/output devices and audio cards

X16 – graphics cards

All PCIe slots provide 25 watts of power

PCIe x16 provides 75 watts of power

Up plugging – Putting a smaller card in a larger slot

Down plugging – Putting larger card in a smaller slot

Mini PCIe – Standard PCIe card with smaller form factor – used inside of laptops, specifically for wireless networking