Internal mass connectors

ATA (Advanced Technology Attachment)

- The IDE interface (Integrated Drive Electronics) is a connector developed on May 12, 1994 by ANSI to connect a hard drive to a PC.
- IDE is just a marketing term to describe the fact that the disk controller is built into the drive in ATA drives.

ATA (Advanced Technology Attachment)

- The controller is integrated into the reader, it does not come in the form of a separate card
- The IDE interface has come a long way from hard drive interfaces with separate controllers.
- Being virtually integrated into all motherboard chipsets, ATA is the primary storage interface used on PCs.

ATA (Advanced Technology Attachment)

- The success of this interface is due to its use for connecting not only hard drives, but also CD-ROM drives, DVD disk drives, high-capacity floppy disk drives, and tape drives.

ATA (Advanced Technology Attachment)

During its evolution, the parallel ATA interface has gone through several versions:

- ATA-1 (1988-1994);
- ATA-2 (1996, Fast-ATA ou EIDE);
- ATA-3 (1997);
- ATA-4 (1998, Ultra-ATA/33);
- ATA-5 (1999 jusqu’à aujourd’hui, Ultra-ATA/66);
- ATA-6 (2000 jusqu’à aujourd’hui, Ultra-ATA/100);
- ATA-7 (2001 jusqu’à aujourd’hui, Ultra-ATA/133);
- ATA-8 (Ultra-ATA/133 ou ATA série).

ATA (Advanced Technology Attachment)

- Each version is compatible with the previous ones.
- If the device version does not match the interface version, both can still work together.
- In this case, it is the weaker capacities of the two which will be taken into consideration.

ATA (Advanced Technology Attachment)

- Since the emergence of the Serial ATA standard (noted S-ATA or SATA), allowing data to be transferred serially, the term "Parallel ATA" (noted PATA or P-ATA) sometimes replaces the name "ATA" in order to mark the contrast between the two standards.

ATA (Advanced Technology Attachment)

- The parallel ATA interface connector has 40 pins, spaced 2.54 mm apart.
- It has a key to prevent it from being plugged in backwards;
- 2 and 1/2 inch drives use smaller 50 pin connectors, spaced 2mm apart.

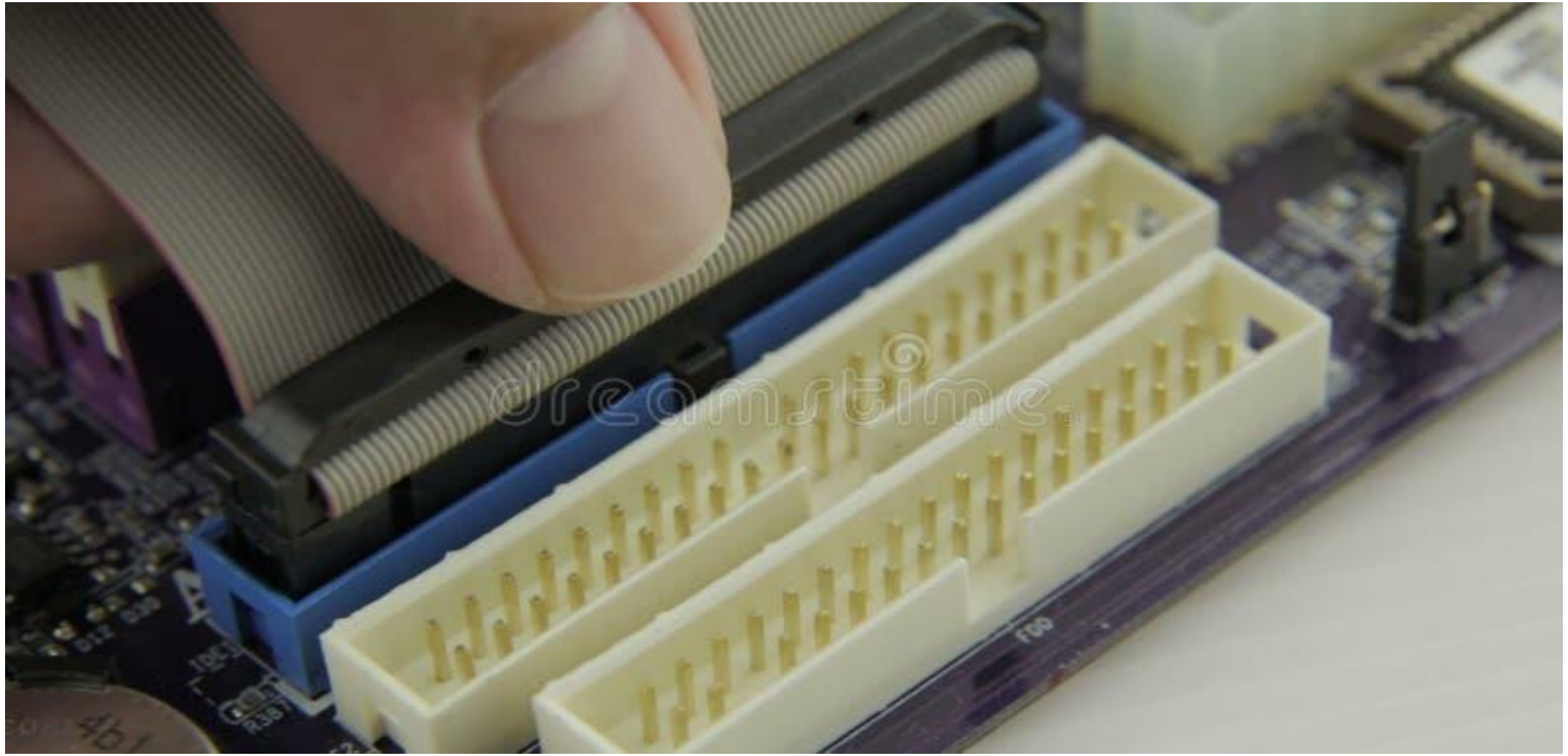
ATA (Advanced Technology Attachment)

- On the table, one of the peripherals must be declared as master, the other as slave.
- By convention the connector at the end (black) is reserved for the master device and the middle connector (gray) for the slave device.

ATA (Advanced Technology Attachment)

- A mode called select cable (denoted CS or C/S) allows you to automatically define the master device and the slave so that the computer BIOS supports this functionality.

ATA (Advanced Technology Attachment)



Cable

- The cable is a set of flat, gray wires that are stuck to each other and form a strip of flat wires.
- The cable used by the P-ATA interface to carry signals contains 40-80 wires.
- To eliminate as much noise as possible, the length of the cable has been limited to 45cm for a number of 40 wires and to 69cm for a cable with 80 wires.

Cable

- ATA drives can support very high speeds, which makes them particularly exposed to data integrity problems which risk being corrupted by the appearance of reception errors.
- There is a cable for hard drives and CD-ROMs (they are the same) and one for floppy drives.

Cable

Serial ATA (*S-ATA* ou SATA)

- The IDE standard faced the same problems as the AGP port.
- Sending data at speeds above 133 MB/s via a parallel cable poses a lot of concern due to integrity problems generated mainly by electromagnetic interference.

Serial ATA (*S-ATA* ou **SATA**)

- To remedy this problem, engineers moved towards serial interfaces and, identical to the PCI-E slot, the serial ATA seems the solution intended to replace the physical P-ATA interface while ensuring backward compatibility with existing software, which works without any modification with the new architecture.

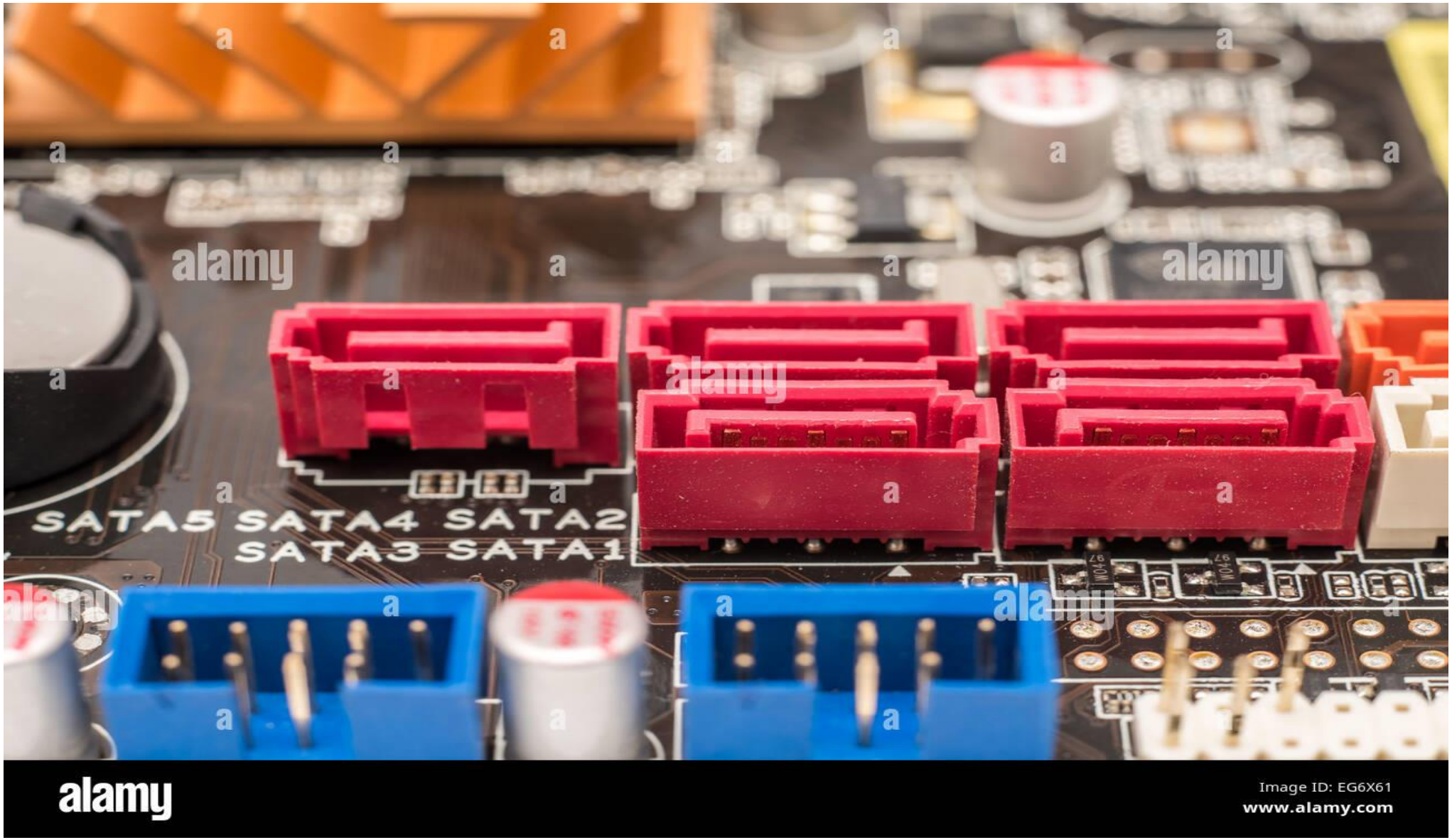
Serial ATA (*S-ATA* ou SATA)

- The S-ATA interface is based on serial communication.
- One data channel is used to transmit data and another channel is used to transmit acknowledgments.
- On each of these channels, data is transmitted with a lower voltage.

Serial ATA (*S-ATA* ou SATA)

- Control data is transmitted on the same channel as the data using a particular bit sequence to distinguish them.
- Thus communication requires two transmission paths, each carried out via two wires, for a total of four wires for transmission.

Serial ATA (*S-ATA* ou **SATA**)



Serial ATA (*S-ATA* ou **SATA**)

- The cable used by the Serial ATA is a round cable made up of seven wires and terminated with an 8mm connector
- Three wires are used for ground and the two pairs are used for data transmission.
- The power connector is made up of 15 pins allowing the device to be supplied with 3.3V, 5V or 12V.

Serial ATA (*S-ATA* ou SATA)

- Serial ATA cables can measure up to 1 meter long (compared to 45 cm for IDE cables).
- The low number of wires in a round sheath allows more flexibility and better air circulation in the case than with IDE cables (even if round IDE cables exist).

Serial ATA (*S-ATA* ou **SATA**)

Serial ATA (*S-ATA* ou **SATA**)

- Unlike the ATA standard, Serial ATA devices are alone on each cable and it is no longer necessary to define "master devices" and "slave devices“
- The Serial ATA standard allows hot plugging of peripherals.

Serial ATA (*S-ATA* ou **SATA**)

- Serial ATA makes it possible to obtain speeds of around 187.5 MB/s (1.5 Gb/s.
- The Serial ATA II standard should make it possible to reach around 375 MB/s (3 Gb/s)
- SATA III with 750 MB/s (6 Gb/s).

Input-output connectors (Ports)

USB

- USB (Universal Serial Bus) is a bus for external devices designed to provide Plug and Play functions when connecting these devices.
- The goal of USB is to reduce the number of specialized expansion cards by providing a universal interface that requires no configuration when adding a new device to the computer.

USB

- The USB bus also allows for reduced consumption of system resources, as it consumes fewer IRQs (Interrupt ReQuest).
- PCs equipped with a USB port allow automatic recognition of peripherals and their configuration as soon as the link is established.
- The USB standard accepts up to 127 peripherals simultaneously on the same computer.

USB

- USB 1.0 and 1.1: The first USB standard introduced in the mid-1990s. USB 1.1 improved upon the original USB 1.0 standard.
  - Speed: 1.5 Mbps (USB 1.0), 12 Mbps (USB 1.1)
- USB 2.0: Introduced in the early 2000s, USB 2.0 significantly increased the data transfer rate, making it popular for various devices such as flash drives.
  - Speed: 480 Mbps.

USB

- **USB 3.0:** also known as SuperSpeed USB, was introduced in 2008. It increased the data transfer rate and introduced full-duplex data transmission.
  - **Speed:** 5 Gbps
- **USB 3.1:** also known as SuperSpeed+ USB, doubled the data transfer rate of USB 3.0. It's backward compatible with USB 3.0 and 2.0.
  - **Speed:** 10 Gbps

USB

- **USB 3.2:** introduced in 2017, doubled the data transfer rate of USB 3.1 by using two lanes for data transmission.
  - **Speed:** 20 Gbps (2 lanes at 10 Gbps each)
- **USB4:** introduced in 2019, integrated Thunderbolt 3 technology, offering a maximum data transfer rate of 40 Gbps. It is backward compatible with USB 3.2, USB 3.1, and Thunderbolt 3.
  - **Speed:** 40 Gbps

USB

Types of USB Connectors:

- **USB Type-A:** The rectangular-shaped standard USB connector used in most computers and devices.
- **USB Type-B:** Typically used for larger devices like printers and scanners.
- **USB Micro-B:** Typically used for smaller devices like smart phones and cameras.
- **USB Type-C:** Reversible, compact, and widely used in modern devices. It supports faster data transfer and power delivery.

USB


The Difference Between USB 2.0 vs USB 3.0 vs USB4
USB 2.0
USB 3.0
USB4

USB

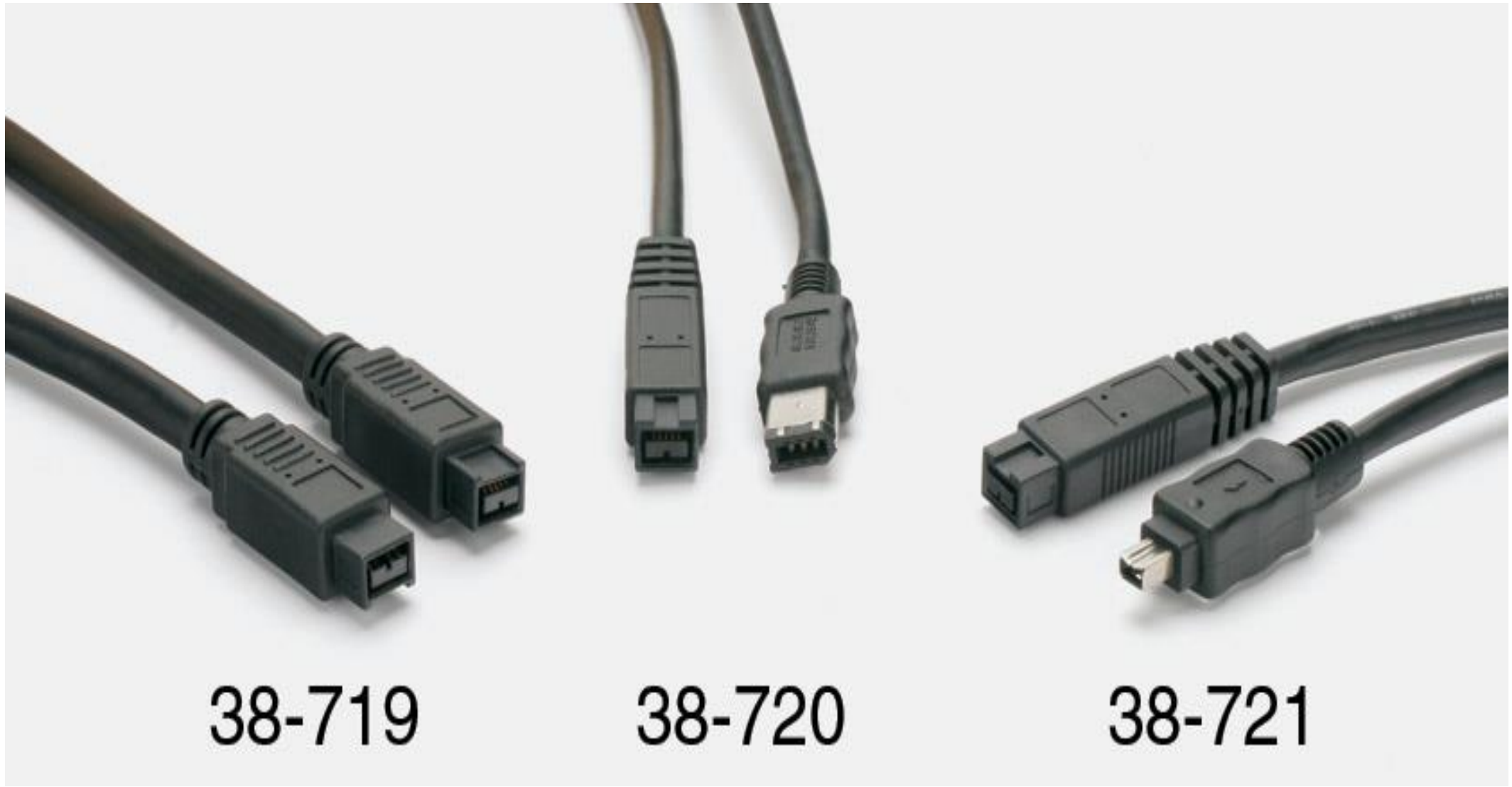
FireWire

- The IEEE 1394 bus was developed in late 1995 to provide an interconnection system for moving data at high speed in real time.
- It has several trade names:
  - The Apple company gave it the name Firewire,
  - Sony gave it the trade name iLink,
  - Texas Instrument preferred the name Lynx.

FireWire

- This is a port, fitted to certain computers, allowing peripherals (notably digital cameras) to be connected at very high speed.
- There are expansion cards (generally in PCI or PC Card / PCMCIA format) allowing you to equip a computer with FireWire connectors.

FireWire



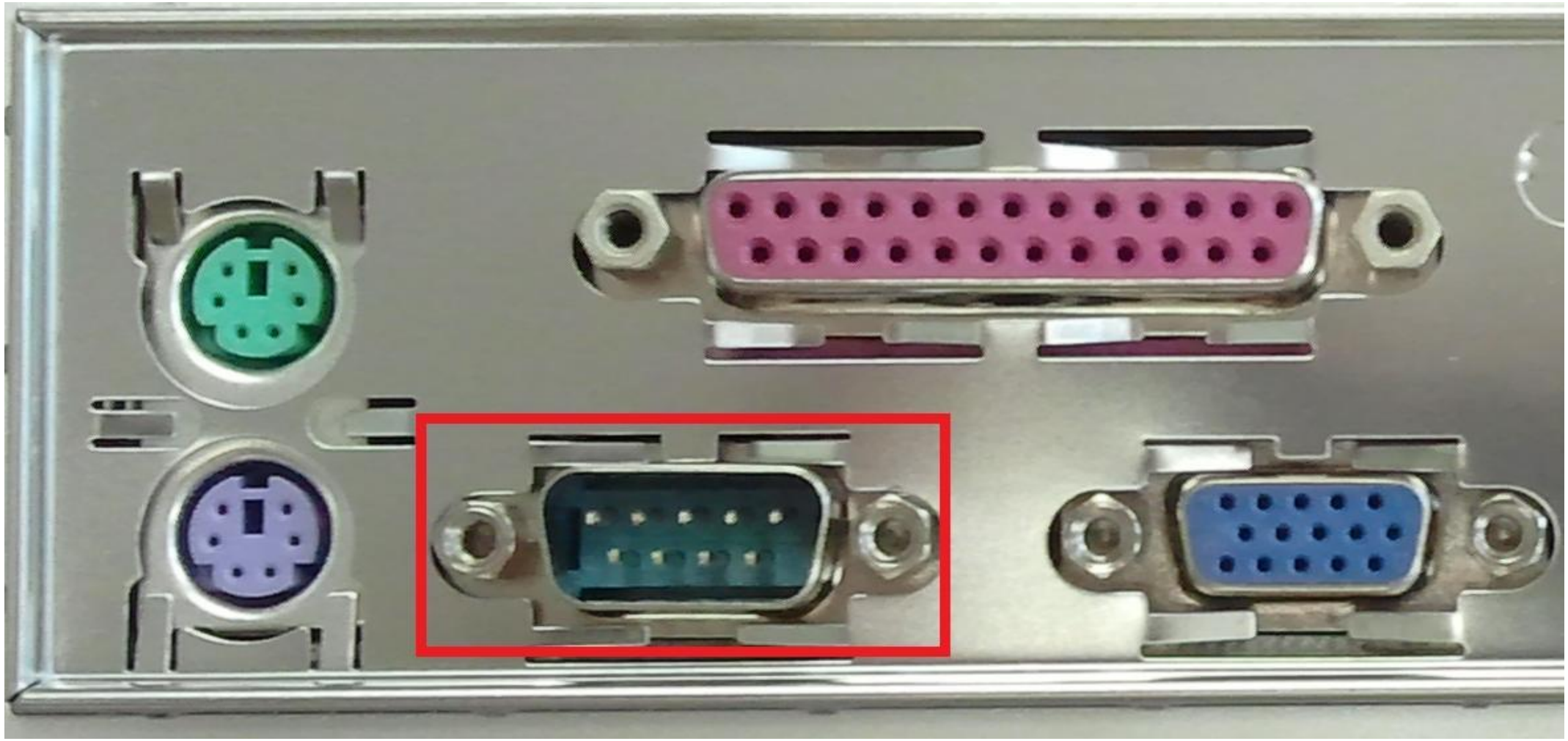
RJ45 / Rj11

- The RJ45 cable is a cable that has the same appearance as the telephone cable but larger.
- The bandwidth is 100 Mbps (around 10MB/s) for good quality cables.
- The RJ11 telephone cable has 4 wires instead of 8 for RJ45.

Serial Port

- As the name suggests the data flowing on this port is sent serially over a wire, i.e. one behind the other.
- This port is quite slow and not very suitable for multimedia and is suitable for the use of a mouse, a modem or this type of device requiring very low bandwidth.

Serial Port



Parallel Port (//)

- Data flowing on this port is sent in parallel, i.e. that multiple wires in parallel are used to carry data.

- This results in a theoretical maximum speed approximately X times higher than the serial port (X the number of wires).

Parallel Port (//)

- Despite this, this speed remains too low and the parallel port is set to disappear in favor of the USB port.

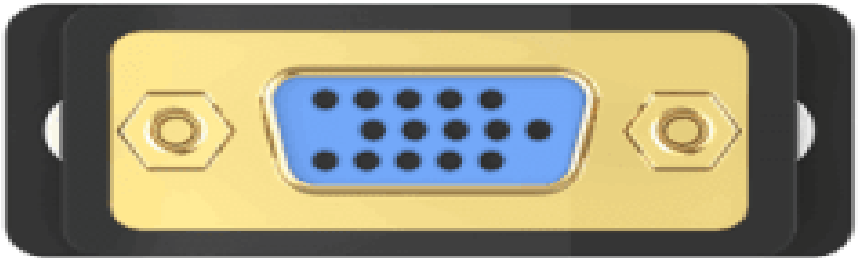
- It is commonly used to connect printers and to a lesser extent certain scanners and backup units.

VGA connector

- The VGA (Video Graphics Array) connector, also known as D-sub 15 or DE-15, is a popular analog video connector.
- Commonly used for connecting computers, laptops, and other devices to monitors, projectors, and high-definition television sets.
- VGA supports various resolutions, including 640x480 (VGA), 800x600 (SVGA), 1024x768 (XGA), 1280x1024 (SXGA)

VGA connector

VGA cable



VGA connector

HDMI connector

- The High Definition Multimedia Interface (HDMI) is a completely digital audio/video interface for transmitting encrypted streams, generally uncompressed.
- HDMI allows to use different digital video formats (SD, ED, HD) as well as multi-channel sound, conveying the complete data using a single cable.

HDMI connector

- **HDMI 1.0 to 1.2:** Basic support for HDTV, DVD players, and early HD devices.

  - **Maximum Resolution:** 1080p (1920x1080 pixels)
  - **Audio:** Supports up to 8 channels of audio.

HDMI connector

- **HDMI 1.3 and 1.4:** Enhanced color support (Deep Color), higher refresh rates, and introduction of Ethernet channel for internet-enabled HDMI devices (HEC - HDMI Ethernet Channel).
  - **Maximum Resolution:** 1080p (1.3), 4K (1.4)
  - **Audio:** Introduces support for Dolby TrueHD and DTS-HD Master Audio.
  - Also supports audio return channel (ARC) and 3D video.

HDMI connector

- **HDMI 2.0:** Increased bandwidth for higher resolutions and refresh rates, dynamic auto lip-sync, and improved 3D capability. Also introduced support for the Consumer Electronics Control (CEC) feature.
  - **Maximum Resolution:** 4K (3840x2160 pixels) at 60Hz, and 1080p at 240Hz.
  - **Audio:** Supports up to 32 channels of audio, including support for 7.1.2 Dolby Atmos.

HDMI connector

- **HDMI 2.0a and 2.0b:** Introduced support for High Dynamic Range (HDR) video and wide color gamut (Rec. 2020 color space), allowing for more vibrant and lifelike images.
  - **Maximum Resolution:** 4K at 60Hz

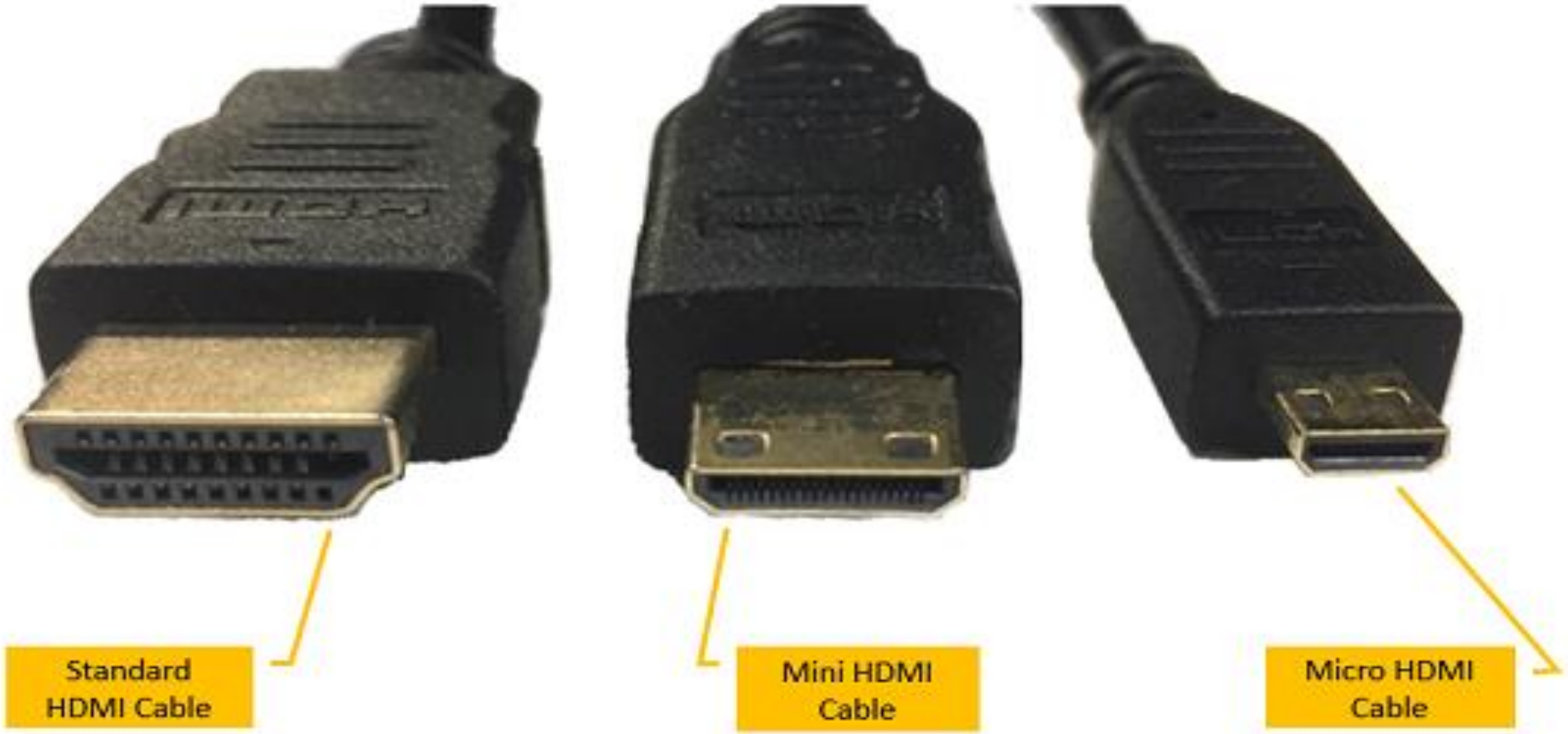
HDMI connector

- **HDMI 2.1:** Significantly increased bandwidth, refresh rates, and color depths.
  - Variable Refresh Rate (VRR) for smoother gameplay
  - Quick Frame Transport (QFT) for reduced latency
  - Quick Media Switching (QMS) for faster content changes.
  - Supports eARC for advanced audio formats via a single cable.
  - Maximum Resolution: 8K (7680x4320 pixels) at 60Hz, and 4K at 120Hz.
  - Audio: 3D audio and 32 channels of audio.

HDMI connector

- **Types of HDMI Connectors:**
  - **Standard HDMI:** Regular HDMI connector used in most consumer electronics devices.
  - **Mini HDMI:** Smaller than standard HDMI, often found in smaller devices like camcorders and some tablets.
  - **Micro HDMI:** Even smaller than mini HDMI, commonly used in smartphones and tablets.

HDMI connector



Audio jacks

- Line-In input, Line-Out output and microphone for connecting loudspeakers or a hi-fi system, as well as a microphone.
- This connector corresponds to the integrated sound card.

Ports


Optical Audio "Toslink"
USB A 1.0/1.1/2.0
Firewire 4 pin iLink
Firewire 400 1394a
Firewire 800/3200 1394b/c
Ethernet 8P8C common:RJ-45
Modem RJ-11
Apple Desktop Bus - ADB
Mac Serial
PS/2
Future
USB A 3.0
DE-9F
DB-25 Serial/Com Port
DE-9 Serial RS232
e-SATA
Centronics Parallel 36pin
Centronics SCSI 50pin
AT Keyboard
50 pin SCSI 2
Surround sound
stereo/ Headphones
Line In
Mic
Digital Audio RCA plug style
AAUI
Composite Audio/Video
S-Video
Component Video
F-Connector RF/COAX
Parallel Port/SCSI 1/DB-25F
Mac Video/MIDI /gameport/AUI/DA-15
Mini DisplayPort
Mini-DVI
Mini-VGA
Apple Hi-Density Video HDI-45
Apple Display Connector - ADC
LFH60 (dual DVI-D)
DMS59 (dual DVI-D)
HDMI
Micro-DVI
DisplayPort
DVI Video
DE-15/HD-15 VGA/SVGA

The chipset

Definition

- A chipset is a crucial component on a computer's motherboard or a mobile device's logic board.
- It acts as the communication hub between the central processing unit (CPU), memory, storage devices, and various other hardware components.
- Chipsets are designed to manage data flow between these components, ensuring they work together harmoniously to execute tasks and run applications.

Définition

- Some chipsets sometimes include a graphics chip or an audio chip, which means that there is no need to install a graphics card or sound card.
- However, it is recommended to deactivate them (when possible) in the BIOS setup and install quality expansion cards in the slots provided for this purpose.

Définition

- The chipset determines in particular the performance, the support for this or that memory technology and this or that processor.
- The chipset is responsible for directing information between the different buses of the computer in order to allow all the constituent elements of the computer to communicate with each other.

Les types des chipsets

Le NorthBridge (Northern Bridge)

- Also called memory controller
- Manages high-speed components such as RAM and the CPU.
- It is responsible for controlling the exchanges between the processor and the RAM, which is why it is located geographically close to the processor.
- It is sometimes called GMCH, for Graphic and Memory Controller Hub.

Les types des chipsets

Le SouthBridge (Southern Bridge)

- Also called input-output controller or expansion controller
- Manages slower-speed components like hard drives, USB ports, and audio/video interfaces.
- The south bridge is also called ICH (I/O Controller Hub).

Le BIOS (Basic Input/Output System)

- A basic program serving as an interface between the operating system and the motherboard.
- The BIOS is stored in a ROM
- It uses the data contained in the CMOS to know the hardware configuration of the system.

Le BIOS (Basic Input/Output System)

- It is possible to configure the BIOS using an interface (called BIOS setup) accessible when starting the computer by simply pressing a key

- In reality, the BIOS setup only serves as an interface for configuring the data found in the CMOS.

CMOS (

- When you turn off the computer, it retains the time and all settings that allow it to start correctly.
- CMOS is a slow memory, but it consumes little energy.
- Removing the battery will restore the BIOS to default settings.