CSE360-Computer Interfacing
BRAC University

Serial and Parallel Interface

Inspiring Excellence

Computer - Ports

- A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet.
- A port has the following characteristics −
  - External devices are connected to a computer using cables and ports.
  - Ports are slots on the motherboard into which a cable of external device is plugged in.
  - Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.

Serial and Parallel Ports

- All interface elements, from your keyboard to your mouse, eventually transport digital information from the external world to the CPU. There are two obvious ways to do this –

- 1) Serial 2) Parallel Communication

- Here Serial ports and parallel ports are used for Serial and Parallel communication respectively.

Let us now discuss a few important types of ports –

1. Serial Port
2. Parallel Port
3. PS/2 Port
4. USB Port
5. VGA Port
6. Power Connector
7. Firewire
8. Modem Port
9. Ethernet Port
10. Game Port
11. DVI Port
12. Socket

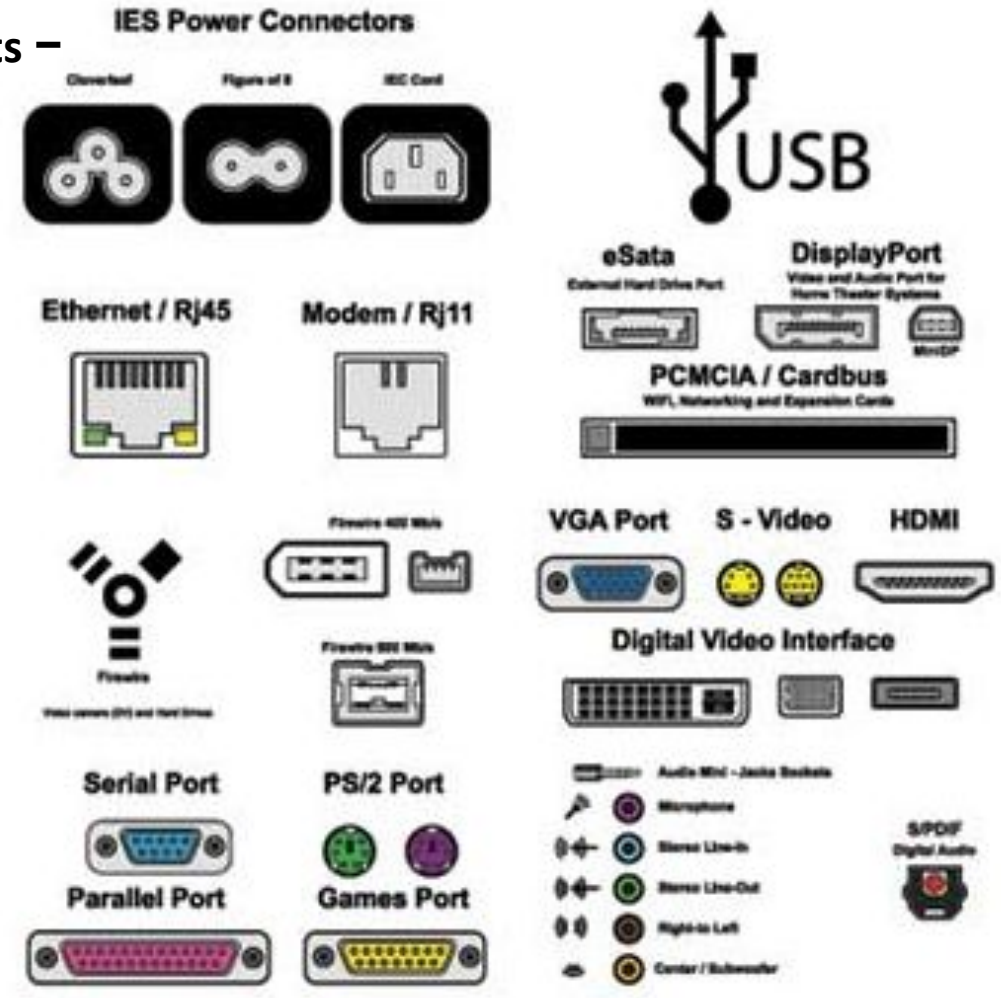

Figure: Different types of ports

Serial Transmission

When data is sent or received using serial data transmission, the data bits are organized in a specific order, since they can only be sent one after another. The order of the data bits is important as it dictates how the transmission is organized when it is received. It is viewed as a reliable data transmission method because a data bit is only sent if the previous data bit has already been received.

Example of Serial Data Transmission

Serial Transmission

When is serial transmission used to send data?

Serial transmission is normally used for long-distance data transfer. It is also used in cases where the amount of data being sent is relatively small. It ensures that data integrity is maintained as it transmits the data bits in a specific order, one after another. In this way, data bits are received in-sync with one another.

Parallel Transmission

When data is sent using parallel data transmission, multiple data bits are transmitted over multiple channels at the same time. This means that data can be sent much faster than using serial transmission methods.

Example of Parallel Data Transmission

This communication comes for rescue when speed rather than space is the main objective. The transfer of data is at high speed owing to the fact that no bus buffer is present.

Serial and Parallel Ports

2) Parallel communication transfers 8, 16, or 32 bits one each clock pulse.

- Clearly this is much faster, but it requires many simultaneous data lines.
- This is really the only choice for very fast processes, like sending data from the CPU to external Random Access Memory (RAM).
- The number of data lines could quickly become ridiculous if you have many separate devices that communicate with the CPU. .

Why Serial Communication is slower than parallel?

- For a 8 bit data transfer in Serial communication one bit will be sent at a time. The entire data is first fed into the serial port buffer. From this buffer one bit will be sent at a time. Only after the last bit is received the data transferred can be forwarded for processing. While in the Parallel Communication a serial port buffer is not required. According to the length of the data, the number of bus lines are available plus a synchronization line for synchronized transmission of data.
- Thus we can state that for the **same frequency** of data transmission Serial communication is *slower* than parallel communication

Why Serial Communication is preferred over parallel?

- While parallel communication is faster when the frequency of transmission is same, it is cumbersome when the transmission is long distance. Also with the number of data channels it should also have a synchronous channel or a clock channel to keep the data synchronized.
- In Serial the data is sent sequentially and latched up at the receiving end thus procuring the entire data from the data bus using USART/UART (Universal Synchronous Asynchronous Receiver Transmitter) without any loss in synchronization but in parallel even if one wire takes more time to recover the received data will be faulty.

Why Serial Communication is preferred over parallel?

- The length of the wire for parallel interface is usually small. It is due to a phenomenon called crosstalk. ***"In electronics, crosstalk is any phenomenon by which a signal transmitted on one circuit or channel of a transmission system creates an undesired effect in another circuit or channel."***

- **Parallel transmission** requires multiple lines to send data. There are fewer errors and **less** noise in serial **transmission**, since the **transmission** is done one bit at a time. There are more errors and noise in **parallel transmission**, since the **transmission** is done multiple bits at a time.

When Parallel Communication is used?

Parallel transmission is used when:

- a large amount of data is being sent;
- the data being sent is time-sensitive;
- and the data needs to be sent quickly.

A scenario where parallel transmission is used to send data is video streaming. When a video is streamed to a viewer, bits need to be received quickly to prevent a video pausing or buffering. Video streaming also requires the transmission of large volumes of data. The data being sent is also time-sensitive as slow data streams result in poor viewer experience.

Examples

- Examples of parallel mode transmission include connections between a computer and a printer (parallel printer port and cable). Most printers are within 6 meters or 20 feet of the transmitting computer and the slight cost for extra wires is offset by the added speed gained through parallel transmission of data.
- Examples of serial mode transmission include connections between a computer and a modem using the RS-232 protocol . Although an RS-232 cable can theoretically accommodate 25 wires, all but two of these wires are for overhead control signaling and not data transmission; the two data wires perform simple serial transmission in either direction. In this case, a computer may not be close to a modem, making the cost of parallel transmission prohibitive—thus speed of transmission may be considered less important than the economical advantage of serial transmission

The End