Methods of parallel data transfer (contd…..)

Handshaking

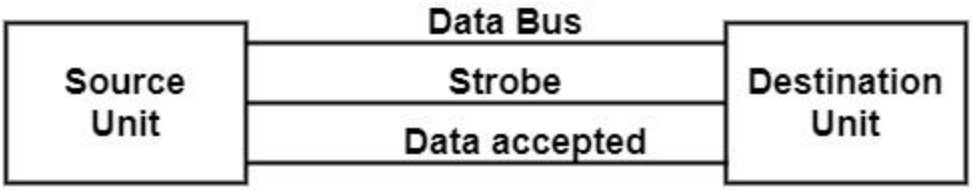
Handshaking is an I/O control approach to synchronize I/O devices with the microprocessor. As several I/O devices accept or release data at a much lower cost than the microprocessor, this technique is used to control the microprocessor to operate with an I/O device at the I/O devices data transfer rate.

The drawback of the strobe approach is that the source unit that starts the transfer has no method of knowing whether the destination unit has received the data element that was located in the bus. A destination unit that initiates the transfer has no method of knowing whether the source unit has located the information on the bus.

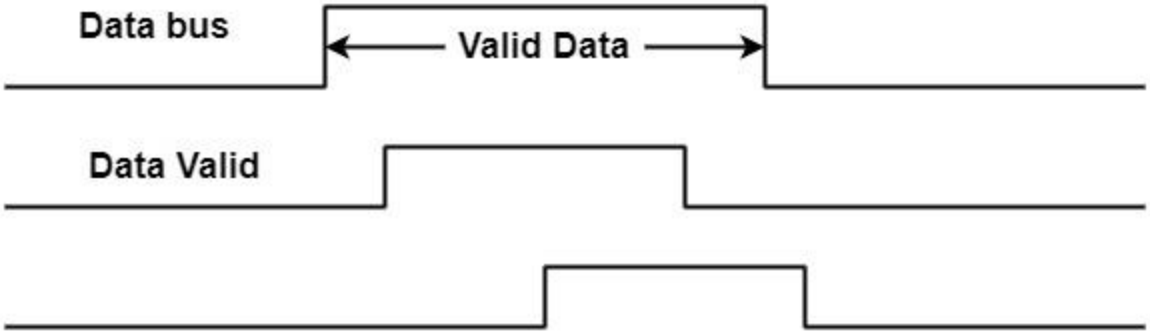
The handshake approach solves this issue by introducing a second control signal that supports a response to the unit that initiates the transfer. The basic feature of the two-wire handshaking approach of data transfer is as follows. One control line is in an equal direction as the data flow in the bus from the source to the destination.

It is used by the source unit to update the destination unit whether there are true data in the bus. The other control line is in the other direction from the destination to the source. It is used by the destination unit to update the source whether it can accept information. The sequence of control during the transfer is based on the unit that initiates the transfer.

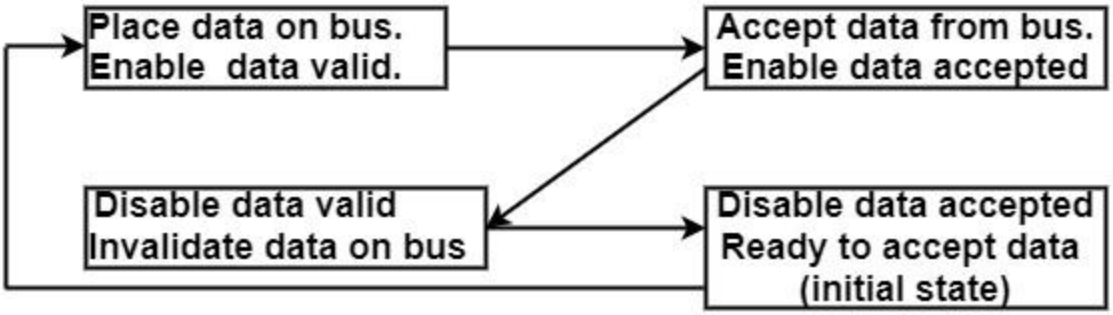
The diagram shows the data transfer process when initiated by the source. The two handshaking lines are data valid, which is created by the source unit, and data accepted, created by the destination unit. The timing diagram displays the exchange of signals between the two units.



(a) Block Diagram



(b) Timing Diagram



(c) Sequence of events

Source -Initiated transfer using Handshaking

iii) Single handshake I/O

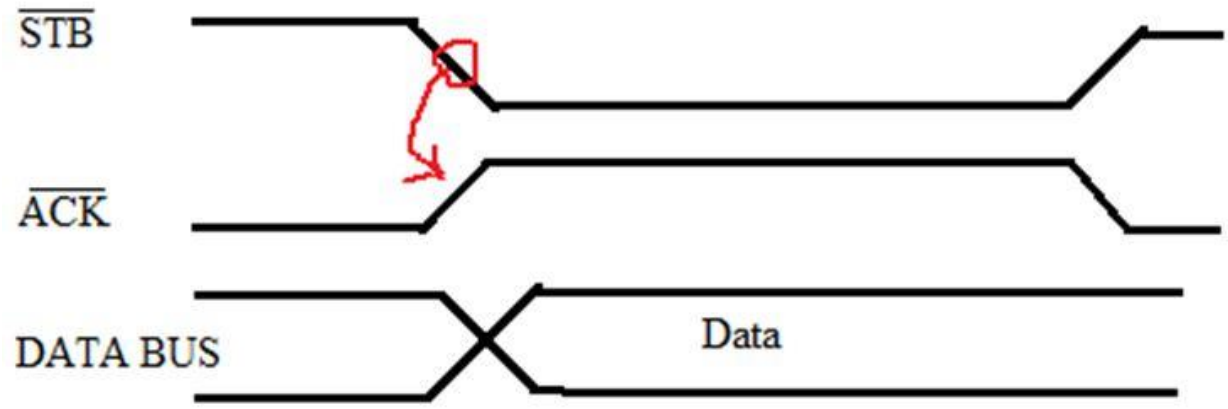


Fig: Single Handshake I/O

- It shows the timing waveform for a handshake data transfer from a peripheral device to a MP.
- The peripheral outputs some parallel data and sends an STB signal to the MP.
- The MP detects the asserted STB signal on a polled or interrupts basis and reads in the bytes of data.
- Then, the MP sends ACK (acknowledge) signal to the peripheral to indicate that the data has been read and that the peripheral can send next byte of data.
- The point of this method is that the sending device or system is designed so that it does not send the next byte until the receiving device or system indicates with an ACK signal that it is ready to receive the next byte.

iv) Double handshake I/O

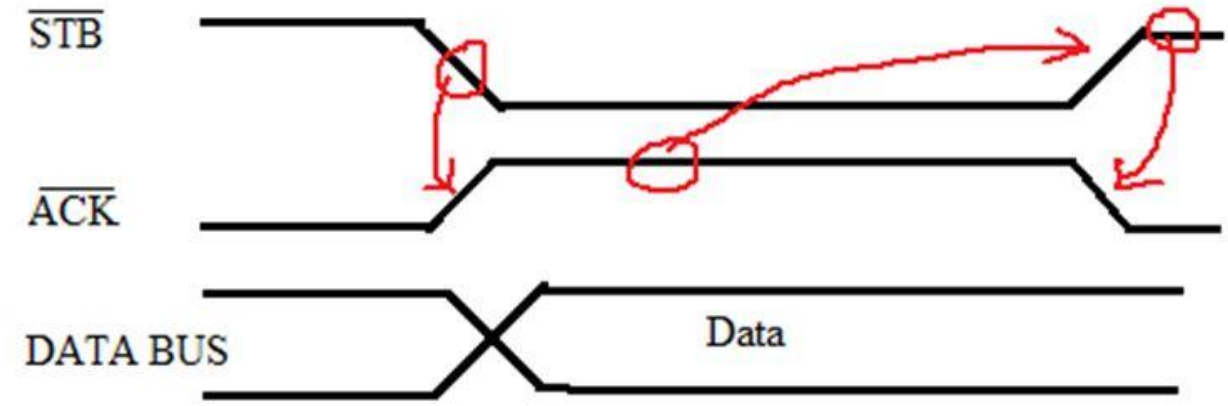


Fig: Double Handshake I/O

- For data transfer where even more coordination is required between the sending system and the receiving system, a double handshake is used.
- The sending (peripheral) device asserts its STB line low to ask the receiving device whether it is ready or not for data reception.
- The receiving system raises its ACK line high to indicate that it is ready.
- The peripheral device then sends the byte of data and raises its STB line high to assure that the valid data is available for the receiving device (MP).
- When MP reads the data, it drops its ACK line low to indicate that it has received the data and requests the sending system to send next byte of data.