

Handshaking



Handshaking is a way for data communication equipment to control the flow of data between connected equipment. It becomes necessary when there is a part of the system that is slower than the rest.

There are two common forms of handshaking. Hardware handshaking referred to as (RTS/CTS) which uses separate status lines to control data flow and software handshaking referred to as (Xon/Xoff) which uses extra characters in the data flow to achieve the control.

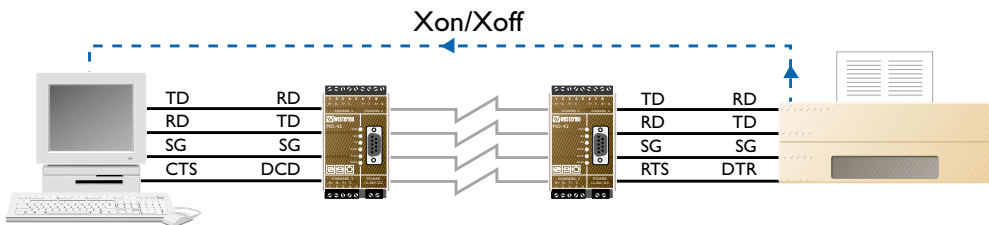
If we have a computer connected to a serial printer and the computer is capable of transmitting its data to the printer faster than the printer is able to print, it is normal for the printer to have a small buffer to store this extra data whilst printing, however under certain circumstances this buffer will fill up. This is why software or hardware handshaking is needed to tell the computer that it must stop sending data until the buffer is empty.

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Another example is a computer attached to a modem. The data rate between computer and modem is sometimes much higher than the telephone line can support so the modem must use handshake signals to tell the computer to slow down.

Software handshaking.

With software handshaking the printer for example will send a character to be computer -Xoff when its buffer is full. When the data in the buffer is processed then the printer will transmit an Xon Character to the computer. The actual characters used have to be defined in some kind of protocol however ASCII 17 (Xon) and ASCII 19 (Xoff) are commonly used.



Hardware handshaking.

Instead of using extra characters in the data flow, RS-232 provides additional hardware lines to control communication. The most common lines used are RTS(Request to Send) and CTS (Clear to Send), typically when a computer wishes to communicate with a modem.

1. A computer wishes to transmit data so it raises RTS (+3V to +15V).
No data is transmitted
2. The connected modem registers the RTS. When it is ready to receive data it raises its signal CTS.
3. The computer waits until it sees the CTS line go high and then transmits its data.

If at any point CTS is dropped by the modem the computer will stop transmitting.

Other hardware lines are sometimes used, for instance serial printers often raise the DTR line to tell the computer to stop sending data because they have run out of paper.

Hardware signals are not always used just for handshaking and can be employed for a number of purposes within data communications. It is also possible that when connecting two pieces of equipment together a special combination of crossovers is required to ensure that each piece of equipment sees the right signals at the right times to ensure reliable data communication.

