

Miscellaneous Topics 1

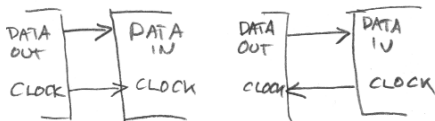
Escape Sequences

An escape sequence consists of a special character that is used as a prefix to indicate that the following character should not be treated as data but as a command to perform some action. For example, if the ASCII ESC (0x1B) character is used as the escape character, then ESC followed by another character is interpreted as a special command. For example, ESC followed by the character 'A' (ESC-A) might mean to move the cursor up one line. To send the escape character typically two escape characters are sent.

Exercise 1: By how much does the use of escape sequences slow down a link if random 8-bit characters are being transmitted? What is the overhead if a continuous stream of escape characters need to be sent over the link?

Synchronous vs Asynchronous Interfaces

Synchronous interfaces include both data and clock signals. A symbol (typically one bit but possibly multiple bits in parallel) is transferred over the interface on each clock edge. The clock can be supplied by either the source or the sink as shown below:



A synchronous interface does not require that the source and sink agree on the baud rate since the clock controls the transfer of data. In fact, in many cases the clock period can vary from bit to bit.

Exercise 2: What are the definitions of clock setup and hold times?

Flow Control

It is possible for the data to overflow the buffers available in the sink.

It is also possible, for a synchronous interface that uses a clock supplied by the sink, to have a data “underflow” when no data is available at the source.

To avoid underflows and overflows we can use “flow control” signals. For example, a “clear-to-send” signal output by the sink or a “data ready” signal output by the source.

Another flow control method is to use acknowledgement frames. The sink can output an ACK for the previous frame only when there is room for another frame.

Another flow control method is to use insert escape sequences that have no effect or null frames in the data stream if there is no data to send.

Exercise 3: Which of the above flow control methods can be used with asynchronous interfaces? With source-clocked synchronous interfaces? With sink-clocked synchronous interfaces?

Standards Organizations

There are various organizations that manage and publish telecommunications interoperability specifications. Among the more important ones are:

ITU The International Telecommunication Union is an agency of the UN that deals with telecommunications standards that require international coordination. This includes radio frequency allocations and international telephony standards. The ITU is divided up into ITU-R for radio communications and ITU-T for wired communications. The ITU publishes various series of standards. Each series begins with a different letter. For example, G (speech coders such as G.729), T (telephony standards such as T.4 fax), V (voice-band modems such as V.34).

IEEE The Institute of Electrical and Electronic Engineers is a professional society that sponsors the development of telecommunications standards. These include the 802 series of speci-

cations that includes 802.3 LAN, 802.11 WLAN and 802.15 WPAN.

ETSI The European Telecommunications Standards Institute is a Europe-based telecommunications standards organization. ETSI has published some 2G (GSM) and 3G (WCDMA) cellular standards.

There are also many industry-sponsored organizations that promote a particular standard and provide conformance-testing services. Example include the WiFi Alliance that test for conformance with a subset of the IEEE 802.11 standard and if the product passes, allows the use of a “WiFi” logo with the product. Similar groups exist for many other telecom standards.

Standards development is primarily driven by telecommunications manufacturers. The companies that participated in the development of a standard often form a “patent pool” that allows these manufacturers to use each others patents without paying licensing fees. This is an important incentive for companies to participate in standards development and to have their intellectual property (IP) included in a standard.

Since many standards organizations will only approve one standard for each application (e.g. one WLAN standard), manufacturers with competing ideas sometimes go to other standards organizations to have their standard formalized. This is one reason for the proliferation of standards organizations with overlapping coverage.

In general, the success of any standard is determined by manufacturer and customer acceptance rather than by government mandate. In fact, the large majority of standards are never widely implemented.

Some people distinguish between a “standard” (something most people agree to) and a “specification” (a document specifying requirements) but in popular use the two words are used interchangeably.