

Data Communications and Networking

UNIT-2

Error Detection: Types of Error

- An error occurs when a bit is altered between transmission and reception
- Single bit errors
 - One bit is altered
 - Adjacent bits are not affected
 - Can occur in the presence of white noise (thermal noise)
- Burst errors
 - A cluster of bits with Length B
 - the first and the last and a number of intermediate bits in error (not necessarily all the bits in the cluster suffer an error)
 - More common and more difficult to deal with
 - Can be caused by impulse noise

Data Link Protocols

- Specifications to implement data link layer
- Asynchronous Protocols:
 - Primarily used in modems
 - Feature start and stop bits and variable length gaps between characters
- Synchronous Protocols:
 - Developed for higher speed networks
 - No start and stop bits, much lower overhead, faster transmission

Synchronous Protocols

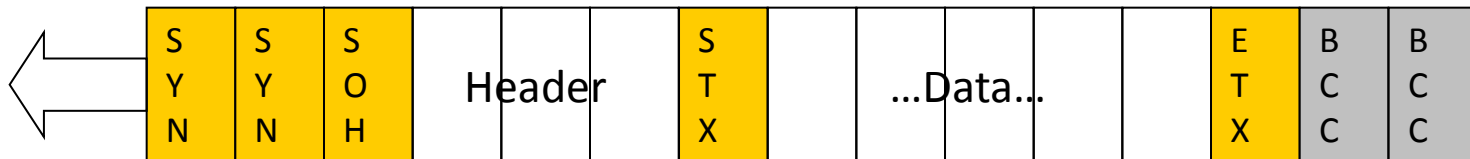
- Character-oriented protocols:
 - Frames are interpreted as a sequence of characters
 - Example: Binary Synchronous Communication (BSC)
- Character count-oriented protocols:
 - Frame length specified within the header
 - Example: Digital Data Communication Message Protocol, Count Type (DDCMP)
- Bit-oriented protocols:
 - Frames are interpreted as a sequence of bits
 - Example: High-Level Data Link Control (HDLC)

BSC

- Half duplex, can be used with ASCII, EBCDIC, and Six Bit Transcode
- Control information is in the form of code words taken from the character set
- Control information is carried in separate frames as well as within data frames
 - Line control, flow control, error control

BSC

- Data Frames:



- SYN = (0)0010110 (ASCII 26₈)
- Header:
 - Address, sequence number for stop-and-wait ARQ
 - Non-standardized
- BCC: Block Check Character
 - 1-character LRC
 - 2-character CRC

Difference between Bit-oriented protocol and byte oriented protocol?

- In bit oriented Protocol, a flag is used to frame the bits sent. Simply put, you have a flag (01111110) and the required bits are sent after the flag and you end the transmission again with a flag. Using this method you can send any number of bits of any length. Another important fact is the zero insertion method used. Say for example, you want to send the bit string 01111110. You cannot do this because it will be interpreted as a flag. However, by adding a zero after 5 consecutive 1's as a standard, this bit stream can be sent. The transmitter sends the string as 011111010 and the receiver removes the zero after 5 consecutive 1's and stores the data as 01111110

- In byte oriented protocol(character oriented protocol) the receiver considers 8 bits at a time and figures out the relevant character. This system is used when communicating with printers and keyboards which use ASCII characters exclusively. (All the ASCII characters can be covered by 8 bits (256 characters)). The main disadvantage of COP is that you cannot send 9 or 10 bits, arbitrary bits. Furthermore, in COP there are special characters - channel control characters, eg- SYN character which is used to synchronize the receiver and the transmitter. These characters cannot be transferred as data. They will be misread as control characters.