

DEVICES AND COMMUNICATION
BUSES FOR DEVICES NETWORK—
Lesson-3: Exemplary Protocol—HDLC

Exemplary Protocol – HDLC (High-level Data Link Control)

- One of the earlier period standard protocol for data link network
- Synchronous communication between two data link layers on a network

Two Formats of bits in a HDLC frame

- HDLC and
- Extended HDLC
- For 2^8 and 2^{16} destination devices or systems, respectively .

Sequence of bits in a HDLC frame

- Frame start signaling flag bits;
Compulsory- Flag bits at start are
(01111110)

- Address bits for destination compulsory; 8 bits in Standard HDLC Header format and 16 bits in extended format

- Control bits Case 1: Information Frame; Compulsory as per case 1 or 2 or 3
First bit 0, next 3-bits N(S), next bit P/F and last 3-bits N(R) in standard format

Note: N(R) and N(S) = 7-bits each in extended format. Explained later.

- Control bits Case 2: Supervisory Frame; First two bits (10), next 2-bits[#] RR or RNR or REJ or SREJ, next bit P/F and last 3-bits N(R) in standard format.

Note: N(R) and N(S) = 7-bits each in extended format

- Control bits Case 3: Un-numbered Frame; First two bits (11), next 2-bits $\wedge M$, next bit P/F and last 3-bit remaining bits for M. [8-bits are immaterial after M bits in extended format]

- Data bits; Compulsory; m frame bits transmitted; Each bit is at the serial line for time ΔT or, each frame is at the line for time $m.\Delta T$. [Note: Five consecutive 1s when present, then one additional 0 is stuffed in the data. This is to distinct the data from the start and ending bytes at the header and at the end. Number of frame bits extend.]

- FCS (Frame Check Sequence) bits; Compulsory; 16 bits in standard format and 32 in extended format

- Frame End flag bits; Compulsory;
Flag bits at end = (01111110)

Notes

P/F when 1 then it means a primary (command) device is polling a secondary station. Polling means to detect through an acknowledgement from that; when 0 then receiving device has no data to transmit; it is just responding.

$N(R)$ sequence number of frame received earlier from a device to which this HDLC frame is being sent

$N(S)$ sequence number of frame sending now to that device

This facilitates indirectly an acknowledgement of the past in the new frame sending now.

RR- A message in control bits in case 2,
which conveys 'Receiver Ready'

RNR - 'Receiver Not Ready'

REJ – Reject (Sent when a message rejects). Note there is no Accepted message as HDLC follows negative ACK protocol method. Like a child, who cries when milk not received, if given no need to cry!

SREJ – ‘Selectively Reject’ Frame received out-of-sequence, repeat suggested.

Summary

We learnt

Formats and sequences of bits in HDLC protocol

End of Lesson 3 of Chapter 5
on
Example of Protocol
HDLC