

Lecture 15

Exercise 1: What sequence of characters is transmitted when an escape character appears in the frame? If the ASCII character X-OFF (0x13) were to be escaped?

$$\begin{array}{r} \text{escape } 0x7d = 0111\ 1101 \\ \oplus 0x20 \quad 0010\ 0000 \\ \hline 0101\ 1101 \end{array} \Rightarrow 0x7d, 0x5d$$

$$\begin{array}{r} \text{xoff } 0x13 = 0001\ 0011 \\ \oplus 0x10 \quad 0010\ 0000 \\ \hline 0011\ 0011 \end{array} \Rightarrow 0x7d, 0x33$$

Exercise 2: What are the first four bytes of a PPP-encapsulated IP frame? What bytes would be transmitted for an IP address field with value 127.126.0.1? If the IP frame was 60 bytes long, no bytes needed to be escaped and the default PPP link options were being used, what would be the length of the PPP frame? Can an encapsulated IP frame distinguish between data and padding?

first 4 bytes: $\underbrace{0x7e}_{\text{flag}} \quad \underbrace{0xff}_{\text{address}} \quad \underbrace{0x03}_{\text{control}} \quad \underbrace{0x21}_{\text{IP}}$

127 . 126 . 0 . 1 : $127 = 0x7f$
 $126 = 0x7e \rightarrow$ flag byte

to escape the second byte need to send:

$0x7f, \underbrace{0x7d, 0x5e}_{\text{escape sequence for } 0x7e}, 0x00, 0x01$

PPP encapsulation adds 7 bytes:
2 flag + 1 address + 1 control + 1 protocol (for IP) + 2 for FCS = 7
 \therefore would transmit $60 + 7 = 67$ bytes

An IP frame includes a length field that can be used to remove any padding added by PPP.

Exercise 3: Would LCP or NCP be used to negotiate compression (e.g. zip)? To configure a DNS server? To set the baud rate on the serial interface?

- compression is a link feature & would be negotiated by LCP.
- DNS server is a network (IP) feature and would be configured by NCP.
- baud rate is a link-layer parameter and would be negotiated by the LCP.