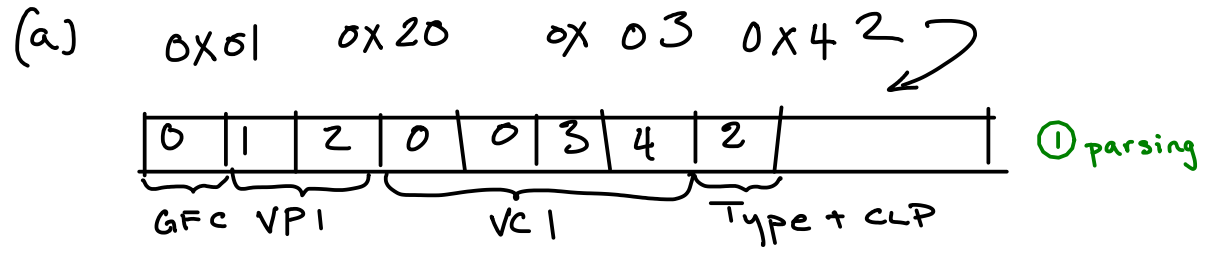


# ELEX 4550 Final Exam Solutions

Q.1 (a) received power = transmitted power - losses  
 1:8 splitter loss =  $3 \times \log_2 \frac{1}{8} = 3 \times 3 = 9 \text{ dB}$  ① splitter loss  
 cable loss =  $0 \text{ km} \times 0.3 \text{ dB/km} = 0 \text{ dB}$   
 connector loss + margin =  $9 \text{ dB}$   
 transmit power =  $0 \text{ dBm}$   
 received power =  $0 - 9 - 0 - 9 = \underline{\underline{-18 \text{ dBm}}}$  ①

(b) for link length =  $d$  ( $\neq 0$ )  
 received power =  $0 - 9 - 0.3d - 9 = -24$   
 $d = \frac{-24 + 9 + 9}{-0.3} = \frac{-24 + 18}{-0.3} = \frac{-6}{-0.3} = \underline{\underline{20 \text{ km}}}$  ①

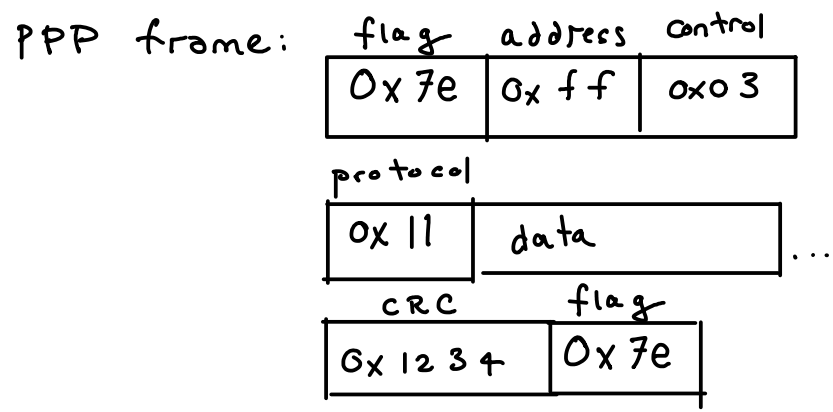
Q.2



VPI =  $0x12 = 18$  VC1 =  $0x34 = 52$  ① convert to decimal

(b) from diagram path is:  
 from switch 2  $\Rightarrow$  switch 3 ① route  
 from switch 3  $\Rightarrow$  switch 4

Q.3



raw data = 0x7d 0x10

0x7d is escape character, needs to be sent as:

0x7d, 0x7d ⊕ 0x20 = 0x5d

escaped data = 0x7d, 0x5d, 0x10

∴ full PPP frame, in hex, is:

7e, ff, 03, 11, 7d, 5d, 10, 12, 34, 7e  
① flags                      ① header/trailer                      ① escaping

Q.4

traceroute 160.16.0.1

(a) ① TTL = 1: (to get response from first router along the path)  
1 byte = 0x01

① destination = 160.16.0.1 :

4 bytes = 0xA0, 0x10, 0x00, 0x01

(b) response = ICMP TTL exceeded

① ICMP protocol = 1 :

1 byte = 0x01

Q.5

(a) to close connection sets the FIN flag bit ①

(b) to acknowledge the close request the ACK flag bit should be set, the FIN bit may also be set. ①

Q.6

1 HTTP/1.1 200 OK ①

2 Content-Type: text/html ①

3 ①

4 <b>Hello </b> ①

Q. 7

(a) HFC

(b) PON

(c) POTS

(d) ADSL

(e) CATV

(f) PDH

(g) SONET

(h) DOCSIS

(i) IP

(j) DNS

(k) DHCP

(l) ICMP

$\left(\frac{1}{2}\right) \times 12$