

final Exam Solution - CPE348 - Spring '20

1. a)

$$\begin{array}{r}
 1011000001 \\
 \hline
 10101 \overline{) 1001011010000} \\
 \underline{10101} \\
 11111 \\
 \underline{10101} \\
 10101 \\
 \underline{10101} \\
 0000 \\
 \underline{0101} \\
 \boxed{0101} \rightarrow \text{CRC}
 \end{array}$$

b)

$$\begin{array}{r}
 1101111 \\
 \hline
 10101 \overline{) 1110010010} \\
 \underline{10101} \\
 10011 \\
 \underline{10101} \\
 11000 \\
 \underline{10101} \\
 11011 \\
 \underline{10101} \\
 11100 \\
 \underline{10101} \\
 10011 \\
 \underline{10101} \\
 \boxed{110} \rightarrow \text{remainder, Error}
 \end{array}$$

2. a) $t = t_{tx} \times 3 + t_{prop} \times 3 + t_{delay} \times 2$

$$= \frac{4000}{20 \times 10^6} \times 3 + 20 \times 10^{-6} \times 3 + 10 \times 10^{-6} \times 2$$

$$\boxed{= 680 \mu s}$$

b) $r = \frac{4000}{680 \times 10^{-6}} = \boxed{5.88 \text{ Mbps}}$

c) $t' = (t'_{tx} \times 3 + t_{prop} \times 3 + t_{delay} \times 2) + (t'_{tx} + t_{tx-delay})$

$$= \left(\frac{2000}{20 \times 10^6} \times 3 + 20 \times 10^{-6} \times 3 + 10 \times 10^{-6} \times 2 \right) + \left(\frac{2000}{20 \times 10^6} + 5 \times 10^{-6} \right)$$

$$\text{d) } \boxed{= 485 \mu s}$$

$$\text{e) } \boxed{r' = \frac{4000}{485 \times 10^{-6}} = 8.25 \text{ Mbps}}$$

3.

message	In. Interface	In. VC1	Out. Interface	Out. VC1
A → Z	3	2	2	5
Z → A	2	1	3	4

S1

message	In. Interface	In. VC1	Out. Interface	Out. VC1
A → Z	4	5	2	2
Z → A	2	8	4	1

S2

message	In. Interface	In. VC1	Out. Interface	Out. VC1
A → Z	0	2	1	7
Z → A	1	3	0	8

S3

4. a)



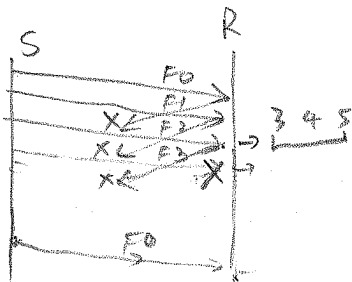
A & B are out of another's range.
RTS/CTS to solve it.

b)



drawback is efficiency

c)



Yes, there is no problem!

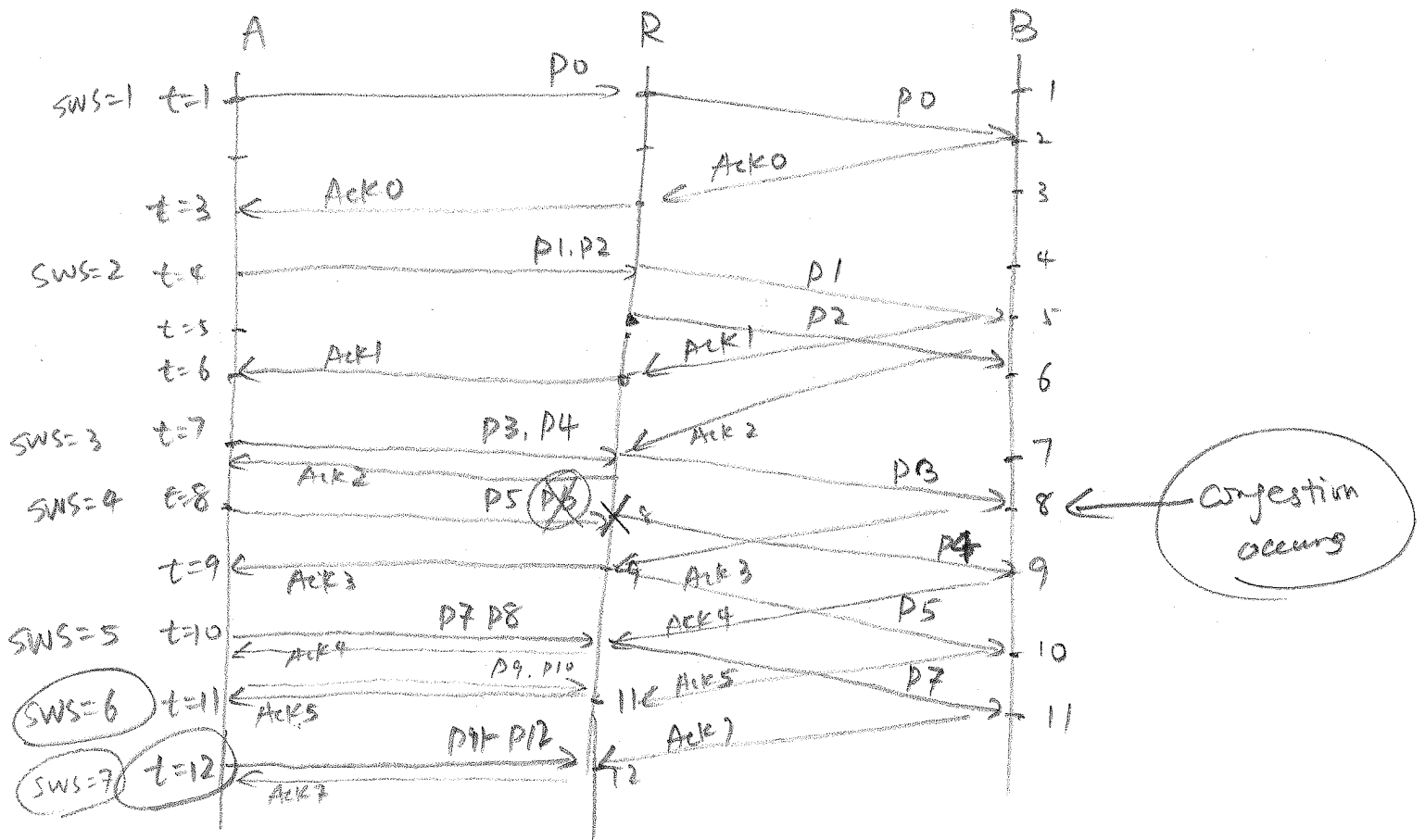
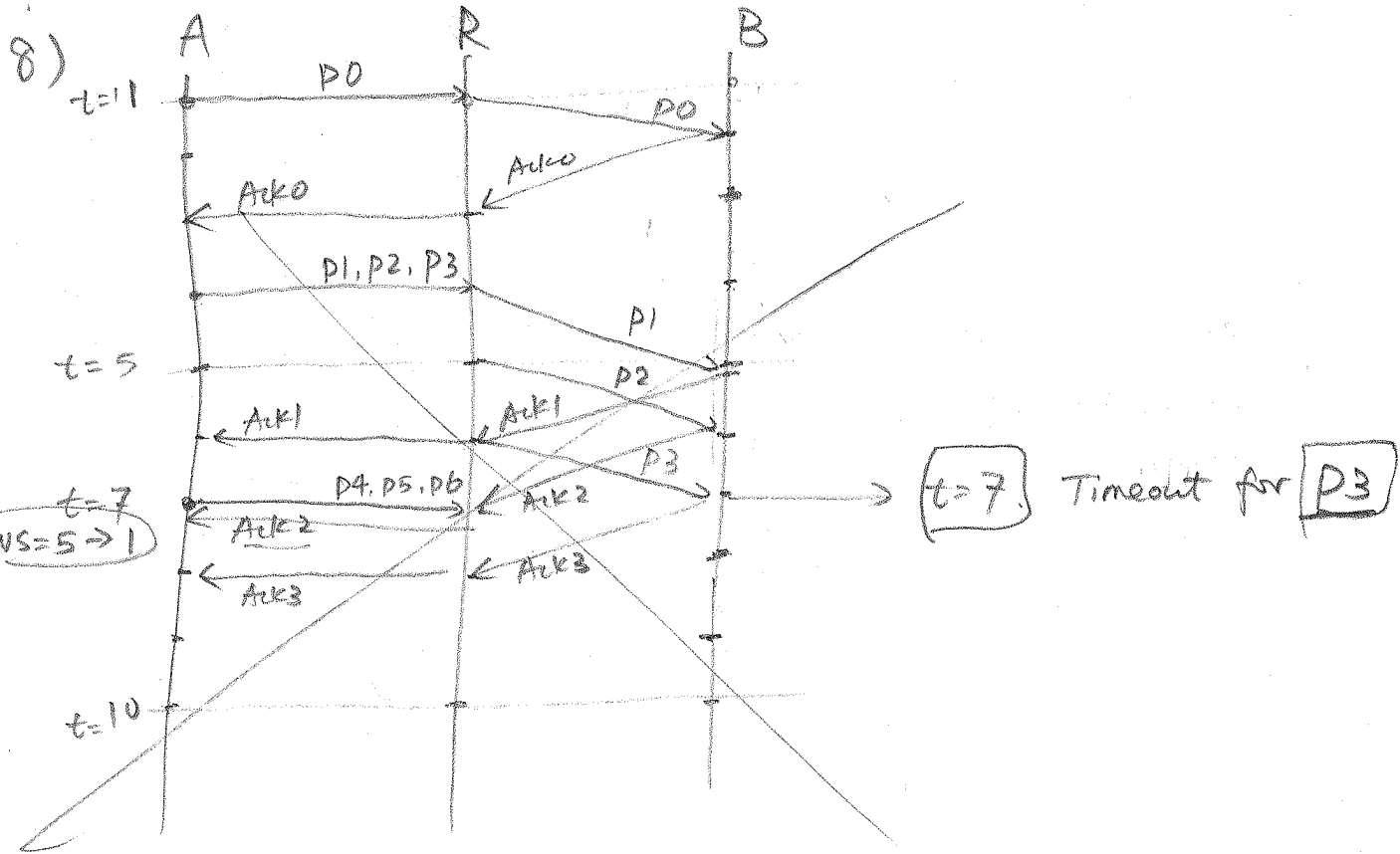
d) flow control: avoid receiver's buffer overflow
congestion control: avoid router's buffer overflow

e) when # of subscribers is significant.

f) < M. C. Enc, Dec, Key >

g) BGP

h) round-robin



a) $t = 12$ sec b) $t = 8$ sec c) $SWS = 7$.