

Quiz Sheet #4

Problem 4.1: TCP features

(1+1 = 2 points)

true false

- TCP supports half-closed connections.
- TCP does not preserve message-boundaries.

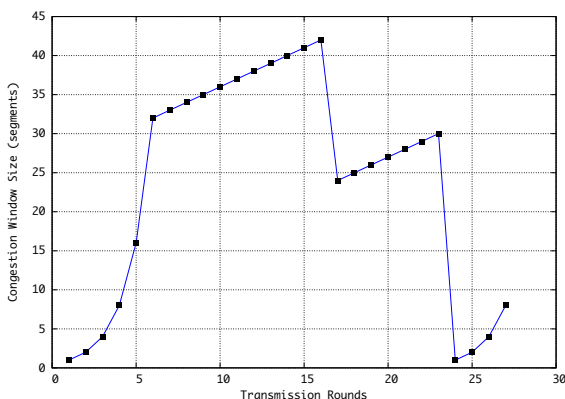
Solution:

true false

- TCP supports half-closed connections.
- TCP does not preserve message-boundaries.

Problem 4.2: TCP congestion control

(1+1+1+1 = 4 points)



x	y
01	01
02	02
03	04
04	08
05	16
06	32
07	33
08	34
09	35
10	36
11	37
12	38

x	y
13	39
14	40
15	41
16	42
17	24
18	25
19	26
20	27
21	28
22	29
23	30
24	01

x	y
25	02
26	04
27	08

Using the congestion window behavior of a TCP implementation as shown in the figure, answer the following questions:

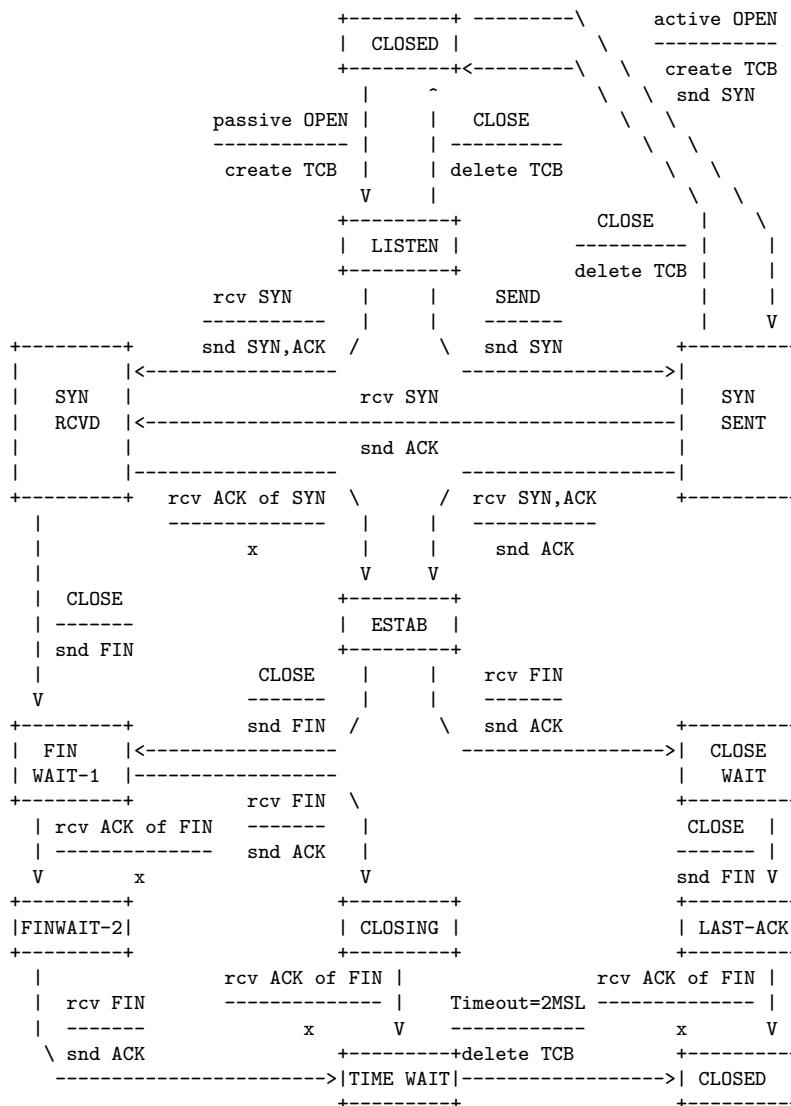
1. In which interval is:
 - (a) slow-start operating?
 - (b) congestion-avoidance operating?
2. In which transmission round is a segment loss detected due to a:
 - (a) timeout?
 - (b) three-duplicate ACK?
3. What is the value of `ssthresh` at:
 - (a) 1st transmission round?
 - (b) 24th transmission round?
4. During what transmission round is the 70th segment sent?

Solution:

1. (a) slow-start: [1-6] and [24-27]
 (b) congestion-avoidance: [7-16] and [17-23]
2. (a) timeout: 23th transmission round
 (b) three-duplicate ACK: 16th transmission round
3. (a) 1st transmission round: 32
 (b) 24th transmission round: 15
4. In the 7th transmission round

Problem 4.3: TCP state machine

(2+2 = 4 points)

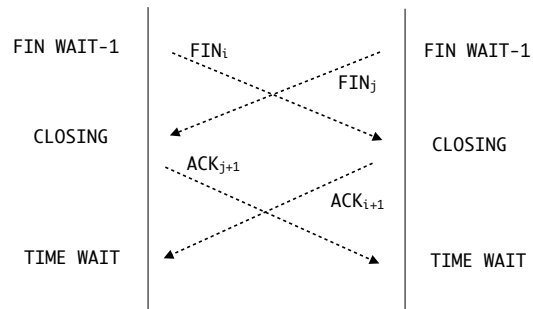


Using the TCP state diagram as shown in the figure, answer the following questions:

- a) Assume that a both endpoints of a TCP connection are in the ESTABLISHED state. Is it possible that both endpoints transition into the TIME WAIT state? If yes, show using a time sequence diagram how this can happen. If not, show why such a transition is impossible.
- b) What is the purpose of the TIME WAIT state?

Solution:

- a) Yes, it is possible in situations where both the endpoints initiate a simultaneous close. The time sequence diagram is shown below:



- b) The TIME WAIT state ensures that the TCP engine which started the connection teardown procedure remains alive until all TCP segments related to the connection being closed have left the Internet. This ensures that segments of an old TCP segments do not accidentally interfere with segments of a new TCP segment.