Segon control de Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		9/5/2016	Primavera 2016
NAME:	**SURNAME**	**GROUP**	**DNI**

Duration: 1h15m. The quiz will be collected in 25 minutes. Answer in the same questions sheet.

Test. (4 points) All questions are multiple choice: Count as half if there is one error, 0 if more.

1. Mark the correct answers about the TCP protocol:
- ☐ El checksum field is calculated only from data coming fromt the TCP header itself.
- ☐ The ACK field is optional
- ☐ The validity of the ACK field is optional, and defined by the ACK flag
- ☐ The TCP header carries the value of the congestion window

2. To calculate the optiomal window for a communication betwen two nodes connected through a trasmission line in which there is only one active TCP connection, the following parameters have to be taken into account:
- ☐ Only the bitrate of the line
- ☐ Only the bitrate of the line and the size of the reception buffer
- ☐ Only the bitrate of the line, the size of the reception buffer and the RTT of the communication
- ☐ Only the bitrate of the line, the size of the reception buffer, the RTT of the communication and the probability of error in the line

3. Which of the following statements refering to the connection establishment process are true?
- ☐ If tge third one of the connection establishment segments is lost, one of the ends of the connection will stay in state LISTEN
- ☐ The Initial Sequence Number (ISN) is explicitly acknowledged in the establishment process, causing an increment of 1 in the sequence numbers expected by the other end of the communication.
- ☐ During this phase, the MSS value is negotiated
- ☐ During this phase, the initial value of the congestion window is negotiated.

4. To get one user application blocked in the process of writing data through a TCP cmmunication because no more data can be accepted by the TCP layer, considering an scenario in which the bitrate of all links found between the transmitter and the receiver and in which no othera active communitacions take place in the linnke, it is required that the following conditions hold:
- ☐ The application uses TCP in blocking mode according to the flags used in the connection establishment
- ☐ The value of the congestion window must be higher than the value of the advertised window
- ☐ The TCP transmission buffer in the side of the data sender must be full
- ☐ The TCP reception buffer in the side of the data receiver must be full

5. Which ones of the following situations are possible in TCP?
- ☐ After sending a full window (cwnd) of segments, all the segments of the window are acknowledged and the size of the window doubles
- ☐ After sending a full window (cwnd) of segments, all the segments of the window are acknowledged and the size of the window approximately increases in 1 segment
- ☐ After sending a full window (cwnd=4) of segments, all 4 segments of the window are acknowledged and the size of the window increases in more than 2 segments but less than 4 (approximately 2.5)
- ☐ After sending a full window (cwnd) of segments, all the segments of the window are acknowledged and the size of the window quadruples

6. Which ones of the following situations are possible in UDP?
- ☐ One UDP datagram is sent, and after being lost it is not sent again
- ☐ One UDP datagram is sent, and after being lost the application sends it again
- ☐ At the destination, the datagrams are ordered at the UDP level to be able to rebuild the original sequence of datagrams
- ☐ At the destination, the checksum of all datagrams is verified and based on this datagrams that are identified as corrupted are discarded

7. What value of RTT is needed in a transmission of segments between two systems to avoid any of them to get blocked over a transmission? You can assume that no other active connections use the same line that interconnects the two systems, that the value of cwnd is large enought to be negligible, that the bitrate of the line is 1000bytes per second, and that the value of awnd is 400 bytes.
- ☐ 0<= RTT <= 0.4s
- ☐ 0.4s < RTT <= 0.6s
- ☐ 0.6s < RTT <=1s
- ☐ 1s < RTT <= 400s

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Pregunta 1. (6 points)

The following 29 lines show information about part of a TCP dump involving a Client machine (C, from now on) and a Server machine (S, from now on).

The columns represent: 1) Line number of the interchange, 2) Sending machine identifier and port, 3) Receiving machine identifier and port, 4) Active flags (S, P, F, .), 5) Indication if ack with no data, 6) Sequence number **:** sequence number of the following segment **(**data size**)**, 7) ACK number, 8) Advertised window size. Answer the following questions justifying briefly your answer.

```
1.  10.1.0.3.1059 > 10.2.0.1.80: . ack 1 win 32120
2.  10.1.0.3.1059 > 10.2.0.1.80: P 1:93(92) ack 1 win 32120
3.  10.2.0.1.80 > 10.1.0.3.1059: P 1:213(212) ack 93 win 32120
4.  10.1.0.3.1059 > 10.2.0.1.80: . ack 213 win 23168
5.  10.2.0.1.80 > 10.1.0.3.1059: . 213:1661(1448) ack 93 win 32120
6.  10.1.0.3.1059 > 10.2.0.1.80: . ack 1661 win 32120
7.  ....................................................
8.  10.1.0.3.1059 > 10.2.0.1.80: . ack 26277 win 23168
9.  10.2.0.1.80 > 10.1.0.3.1059: . 26277:27725(1448) ack 93 win 32120
10. 10.2.0.1.80 > 10.1.0.3.1059: . 27725:29173(1448) ack 93 win 32120
11. 10.2.0.1.80 > 10.1.0.3.1059: . 30621:32069(1448) ack 93 win 32120
12. 10.2.0.1.80 > 10.1.0.3.1059: . 32069:33517(1448) ack 93 win 32120
13. 10.1.0.3.1059 > 10.2.0.1.80: . ack 29173 win 23168
14. 10.2.0.1.80 > 10.1.0.3.1059: . 33517:34965(1448) ack 93 win 32120
15. 10.2.0.1.80 > 10.1.0.3.1059: . 34965:36413(1448) ack 93 win 32120
16. 10.2.0.1.80 > 10.1.0.3.1059: . 36413:37861(1448) ack 93 win 32120
17. 10.1.0.3.1059 > 10.2.0.1.80: . ack 29173 win 23168
18. 10.1.0.3.1059 > 10.2.0.1.80: . ack 29173 win 23168
19. 10.1.0.3.1059 > 10.2.0.1.80: . ack 29173 win 23168
20. 10.2.0.1.80 > 10.1.0.3.1059: . 29173:30621(1448) ack 93 win 32120
21. 10.1.0.3.1059 > 10.2.0.1.80: . ack 37861 win 23168
22. 10.2.0.1.80 > 10.1.0.3.1059: . 37861:39309(1448) ack 93 win 32120
23. ....................................................
24. 10.2.0.1.80 > 10.1.0.3.1059: FP 499773:500213(440) ack 93 win 32120
25. 10.1.0.3.1059 > 10.2.0.1.80: . ack 493981 win 23168
26. 10.2.0.1.80 > 10.1.0.3.1059: . 493981:495429(1448) ack 93 win 32120
27. 10.1.0.3.1059 > 10.2.0.1.80: . ack 500214 win 23168
28. 10.1.0.3.1059 > 10.2.0.1.80: F 93:93(0) ack 500214 win 23168
29. 10.2.0.1.80 > 10.1.0.3.1059: . ack 94 win 32120
```

1.A (0.5 points) Which are the IP addresses of C and S?

1.B (0.5 points) Justify from the dump who initiates the connection.

1.C (0.5 points) Why there is no sequence number in line 4?

1.D (0,5 points) How many segments are interchanged in the disconnection phase? Which are their corresponding lines?

1.E (0,5 points) If there are no losses, how many segments (with MSS bytes) seem that S has sent during line 7?

1.F (0,5 points) Before line 9, what is at least the value of the congestion window?

1.G (0,5 points) In which side has the dump been taken? How do we know?

1.H (1 point) Draw (vertical axis for the window and horizontal axis for the time) the evolution of the transmission window since line 9 until line 22, assuming that in line 9 the transmission window is equal to the advertised window. **Clearly indicate the moment of changes between SS and CA phases, and the threshold value.**
NOTE: Do not worry about the scale for the time axis, just use the dump lines.

1.I (0,75 points) Assuming there are no losses (even though they may appear in the dump) and that during all the connection time the TCP window is equal to the advertised window (i.e., the time spent in getting to the advertised window is negligible), calculate approximately the effective speed and the duration of the transmission. Assume RTT = 10 ms.

1.J (0,75 points) Assuming there are no losses (even though they may appear in the dump) and that the initial congestion window is equal to 1 segment with MSS bytes, how many RTT happen until the moment in which the TCP window reaches the value of the advertised window? Calculate again the effective speed and the duration of the transmission without neglecting the time needed to get to the advertised window.