UCLM
UNIVERSIDAD DE CASTILLA-LA MANCHA

Computer Networks II

Course 18/19 :: Test 1

Escuela Superior de Informática

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This exam has 12 questions with a value of 20 points. Three wrong answers substract a point. Only an answer is correct if otherwise not stated. Calculator use is forbidden. The maximum duration of this exam is 60 minutes.
Regarding the ANSWER SHEET:

- *Fill in your personal data in the form above.*
- *Enter* Computer Networks II *in the field EVALUATION.*
- *Indicate your ID in the side box (also marking the corresponding cells).*
- *Check the box «**1**» in the TYPE OF EXAMINATION box.*

Check your answers only when you are completely sure. The scanner does not support corrections or deletions of any kind. It will automatically cancel them. You must only deliver the answer sheet.

Surname: _____ Firstname: _____ Group: _____

1 [1p] An application generates a message of 512 bytes each minute for one hour period. At minute 25, in addition to the corresponding message, the application sends 1024 bytes during the first 100 ms. Indicate the descriptors of this traffic:

- ☐ **a**) Average data rate = 70.2 bps; Peak data rate = 253952 bits; Maximum burst size = 100 ms
- ☐ **b**) Medium data rate = 68.2 bps; Peak data rate = 100 ms; Maximum burst size = 1024 bytes
- ☐ **c**) Constant data rate = 512 bytes per minute; Variable data rate = 1024 bytes in 100 ms
- ☐ **d**) Average data rate = 70.5 bps; Peak data rate = 8192 bits; Maximum burst size = 100 ms

2 [1p] What network load value maximizes its productivity?

- ☐ **a**) Load value close to the network capacity, without exceeding it.
- ☐ **b**) Minimum load value.
- ☐ **c**) Load value that minimizes delay.
- ☐ **d**) Load value that minimizes the retransmission timer.

3 [1p] A sender and a receiver agree on a MSS=200 bytes. The sender announces a number of sequence SEQ=8113 and the receiver a window size WINDOW=1000 bytes. It is known that the value of the CWND congestion window equals 400 bytes. The sender has sent the first data segment and has not received acknowledgement. What parameters define the sender window (swnd)?

- ☐ **a**) swnd=400 bytes; Ptr not-ack data = Null; Ptr not sent data = 8113
- ☐ **b**) swnd=400 bytes; Ptr not-ack data = 8113; Ptr not sent data = 8313
- ☐ **c**) swnd=1000 bytes; Ptr not-ack data = 8113; Ptr not sent data = 8313
- ☐ **d**) Swnd=1000 bytes; Ptr not-ack data = Null; Ptr not sent data= 8413

4 [1p] To which node does a router announce its congestion when using the backward pressure technique?

- ☐ **a**) To the immediately preceding node in the opposite direction to the data flow.
- ☐ **b**) To the next node in the same direction as the data flow.
- ☐ **c**) To the sender node.
- ☐ **d**) To the neighbor nodes.

5 [1p] Which of the following alternatives is not used to calculate the TCP retransmission timer value?

- ☐ **a**) TCP 'Timestamp' option.
- ☐ **b**) Round Trip Time (RTT).
- ☐ **c**) α*previous RTT + (1-α)*current RTT.
- ☐ **d**) TIME_WAIT of TCP.

6 [1p] A TCP segment carries 2000 bytes of data with a sequence number 10125, ACK=2000, urgent pointer equal to 1000 and ACK and URG flags enabled. Select correct option:

- ☐ **a**) Urgency data begin at byte 10125 and non-urgency data begin at 11125.
- ☐ **b**) Urgency data begin at byte 11125 and non-urgency data begin at 10125.
- ☐ **c**) Urgency data begin at byte 1000 and non-urgency data begin at 10125.
- ☐ **d**) Urgency data start at byte 10125 and the segment is sent without non-urgency data.

7 [1p] A TCP application sends data with the 'Nagle' option disabled. If the application generates 5 messages each with 50 bytes of data. What is the payload and what headers does this application generate? Assume that TCP has no options and that the data-link header size is 16 bytes.

- ☐ **a)** 1 message with 270 bytes for headers and 250 data bytes.
- ☐ **b)** 1 message with 56 bytes for headers and 250 data bytes.
- ☐ **c)** 5 messages with a total of 270 bytes for headers and 250 data bytes.
- ☐ **d)** 5 messages with a total of 180 bytes for headers and 50 data bytes.

8 [1p] Which of the following primitives allows handling multiple connections?

- ☐ **a)** connect
- ☐ **b)** accept
- ☐ **c)** select
- ☐ **d)** send

9 [1p] A concurrent server invokes the `listen(5)` method and then the accept(). Later, it simultaneously receives 8 connection attemps from different clients. How do it manages concurrency?

- ☐ **a)** The server will accept 8 connections and create 8 child processes, one per each connected client, which will progress concurrently.
- ☐ **b)** The server will create 5 child processes to serve the first 5 customers who can connect, and the rest are enqueued.
- ☐ **c)** The server will not create any process: it serves sequentially the 8 clients that connect.
- ☐ **d)** The server will create 3 child processes to serve the first 3 customers who can connect, and the rest are enqueued.

10 [1p] Choose the wrong option for a connectionless protocol:

- ☐ **a)** There is no connection between sender and receiver before sending data.
- ☐ **b)** There is no relationship between consecutive PDUs that the sender sends to the receiver.
- ☐ **c)** It does not implement any kind of flow control.
- ☐ **d)** It does not implement any kind of reliability.

A [5p] Consider the next network parameters:

- MSS=400 bytes.
- Slow Start threshold (ssthresh) is 5 times maximum segment size (MSS).
- 3 duplicate ACKs are received after sending segment 5.
- A timeout is received after sending the segment 14.
- rwnd>cwnd

Assuming that TCP congestion control is used and that the sender sends 26 segments, answer the following questions:

> **11** (1p) Total number of rounds, Slow Start (SS) rounds and Congestion Avoidance (CA) rounds:

- ☐ **a)** Total=12, SS = 6, CA = 6
- ☐ **b)** Total=14, SS = 8, CA = 6
- ☐ **c)** Total=10, SS = 5, CA = 5
- ☐ **d)** Total=11, SS = 6, CA = 5

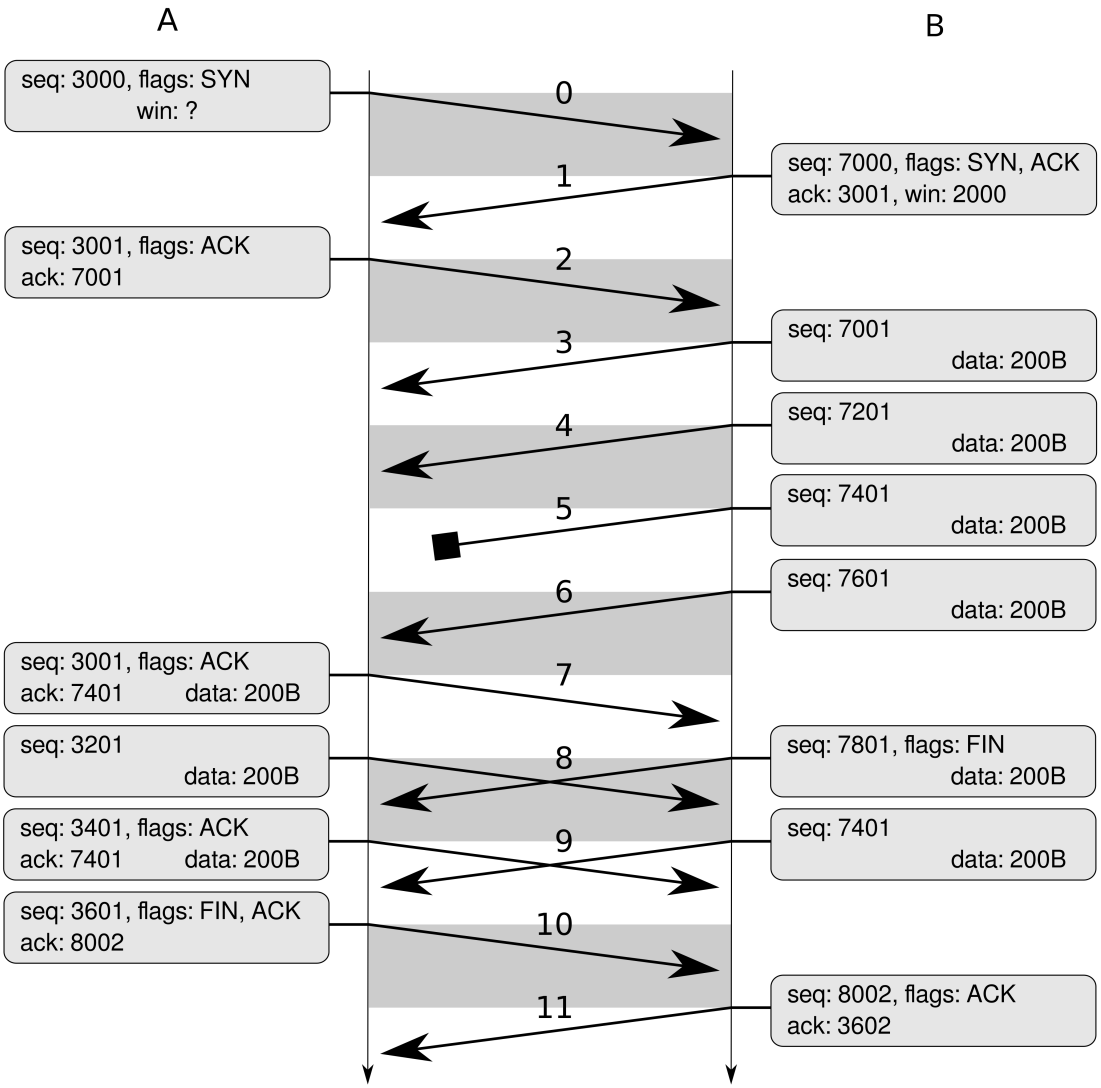
> **12** (2p) What is the value of ssthresh, cwnd and swnd after receiving the 3 duplicate ACKs?

- ☐ **a)** ssthresh=3MSS, cwnd= 2MSS, swnd=4MSS
- ☐ **b)** ssthresh=2MSS, cwnd=2MSS, swnd=2MSS
- ☐ **c)** ssthresh=2MSS, cwnd= 4MSS, swnd=3MSS
- ☐ **d)** ssthresh=4MSS, cwnd= 2MSS, swnd=2MSS

> **13** (2p) Which segments are sent in round 6? Enter the order number of the segments?

- ☐ **a)** 14, 15
- ☐ **b)** 13, 14, 15, 16
- ☐ **c)** 12, 13, 14
- ☐ **d)** 17, 18

B [5p] According to the following figure, that shows a TCP flow, answer the related questions:



> **14** What are the retransmission timer length for A and B? (expressed in ticks):
CANCELLED: B' timeout changes during connection.

> **15** What was the A receiving window?

- ☐ **a)** Less than 200 bytes
- ☐ **b)** 400 bytes
- ☐ **c)** 600 bytes
- ☐ **d)** At least 800 bytes

> **16** How many effective bytes A sent to B?

- ☐ **a)** 200
- ☐ **b)** 600
- ☐ **c)** 3601
- ☐ **d)** 8002

> **17** How many effective bytes B sent to A?

- ☐ **a)** 400
- ☐ **b)** 800
- ☐ **c)** 1000
- ☐ **d)** 1200

> **18** What was the last value of B congestion window (cwnd)?

- ☐ **a)** 600
- ☐ **b)** 800
- ☐ **c)** 1000
- ☐ **d)** It's not performing congestion control.