

<b>Second Midterm Xarxes de Computadors (XC), Grau en Enginyeria Informàtica</b>		<b>28/11/2016</b>	<b>Fall 2016</b>
<b>GIVEN NAME (in CAPITAL LETTERS):</b>	<b>FAMILY NAME (in CAPITAL LETTERS):</b>	<b>GROUP:</b>	<b>DNI (NIE):</b>

Duration: 1h 15 minutes. The quiz will be collected in 25 minutes. Answer in this sheet.

### Test (4 points).

More than one answer per question may be correct. One mistake counts as half and more mistakes count as zero.

1. In a window protocol the size of the optimal window

- ☐ Depends on the value of the RTT
- ☐ Fixes the amount of memory of the transmission buffer for the optimal transfer speed
- ☐ Depends on the value of the retransmission timer
- ☐ Does not depend on the size of the data packets

2. Two hosts communicate using a "Stop-and-Wait" protocol. The size of the packet is 1000 bits, the line bitrate is 1 Mbps, the transmission time for the "ack" is negligible and the end-to-end propagation time is 50ms. The efficiency of the protocol is:

- ☐ 50%
- ☐ 10%
- ☐ 1%
- ☐ It cannot be calculated because it depends on the end to end distance

3. About UDP protocol

- ☐ The header field "ack" includes the acknowledgement of the previous datagrams
- ☐ Provides a reliable transmission
- ☐ The protocol header includes a sequence number
- ☐ It does not include any flow control mechanism

4. About TCP protocol

- ☐ The protocol header includes a sequence number
- ☐ The header field "awnd" (advertised window) notifies the number of bytes that have not been confirmed yet
- ☐ The ACK bit (Flag) indicates that the ACK field has to be processed
- ☐ The TWH (Three Way Handshaking) lasts 2 RTT

5. About TCP protocol

- ☐ A TCP connection starts applying the "Congestion Avoidance" mechanism and transmit a maximum of 2 segments
- ☐ During the establishment of the connection the maximum size for the transmission window is set
- ☐ During the establishment of the connection the MSS (Maximum Segment Size) is set
- ☐ During the Congestion Avoidance state the transmission window may be incremented by 1 segment (MSS octets) each RTT at most

6. About LAN IEEE 802

- ☐ The maximum size of the frame is 1500 octets
- ☐ IP Datagrams are carried in the payload (data field) of the Ethernet frame
- ☐ The Ethernet frame includes a CRC as error detection code
- ☐ There are different local area networks technologies and each one has its own Medium Access Control (MAC)

7. About CSMA/CD

- ☐ A station does not transmit if it detects that the medium is busy
- ☐ Collisions are detected because no ACK comes back
- ☐ The probability of collision depends on the maximum propagation time
- ☐ When a collision is detected all involved stations transmit a JAM signal

8. An Ethernet switch

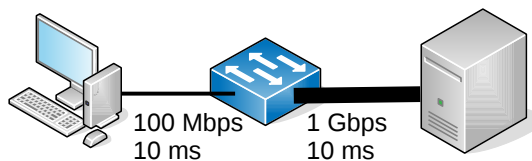
- ☐ All ports must have the same bitrate
- ☐ May apply the flow control by discarding frames to avoid congestion at the output link
- ☐ May have Full Duplex ports and Half Duplex ports
- ☐ Retransmits all the frames from the input port to all the other ports

Second Control de Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		28/11/2016	Autumn 2016
Name:	Surname:	Group	DNI

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

### Problem 1 (3 points)

We have a network composed of a client-switch-server.  
Both links are full duplex and MSS = 1440 bytes.  
Justify the answers. They are not valid without brief justification.  
The server sends the client a file of unlimited length using TCP.



What is the optimal receiver window?

Wopt =            KB

If the buffer of the receiver is 100 KB, what effective speed (throughput) Vef can be reached?

Vef =            Mbps

After transferring more than 50 segments (MSS), at what stage will TCP be?

SS o CA?

If instead the receiver buffer were 1 MB.  
What mechanism would be responsible for flow control?

:

Now we switch the switch over a router with a 50 KB queue in each direction.  
What RTT will be achieved?

RTT =            ms

After transferring more than 50 segments (MSS), at what stage will TCP be?

SS or CA?

What effective speed (throughput) Vef can be achieved?

Vef =            Mbps

If we now change the link from 100 Mbps to one of 1 Gbps.  
What effective speed (throughput) Vef can be achieved?  
(Receiver buffer = 100 KB)

Vef =            Mbps

After transferring more than 50 segments (MSS), in what phase will TCP be?

SS or CA?

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### Problem 2 (3 points)

In the figure all the stations are connected with Fast Ethernet (100 Mbps) while between switches and between SW2 and the router the links are of 1 Gbps.

All PC in VLAN1 (networks A and B) are downloading data from server S1.

a) (0'5 point) List the MAC addresses that are registered in the MAC table of the following switch ports:

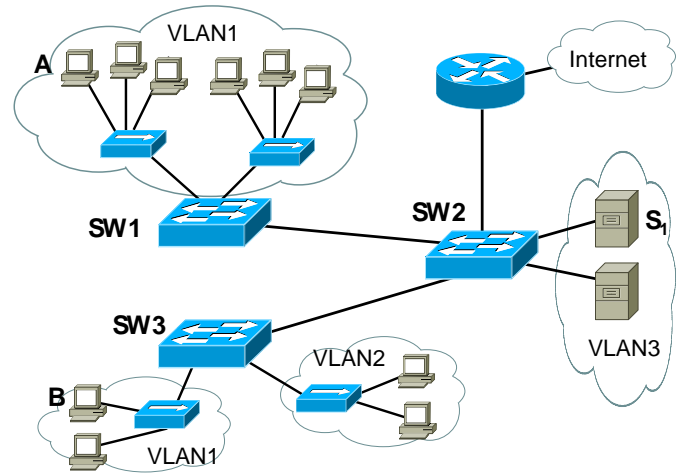
a1) SW2: port S1

a2) SW2: port SW1

a3) SW2: port SW3

a4) SW2: port Router

a5) SW1: port SW2



b) (0'5 point) Which are the links that should be configured in “trunk” mode and which VLANs should include each “trunk” link?

All PC are downloading data from server S1. The efficiency of the “hub” is 80% and that of the switches is 100%.

c) (1 point) Identify the bottlenecks, explain how the flow control is applied at the switches, and what is the downloading speed for each of the 10 PC (8 in network A, 2 in B and 2 in C).

In order to improve the overall performance the link of the server S1 is changed to 1Gbps.

d) (1 point) Identify the bottlenecks, explain how the flow control is applied at the switches, and what is the downloading speed for each of the 10 PC (8 in network A, 2 in B and 2 in C).