Segon control de Xarxes de Computadors (XC), Grau en Enginyeria Informàtica		8/6/2015	Primavera 2015
NAME	**SURNAME**	**GROUP**	**DNI**

Duration: 1h15m. The quiz will be collected in 20 minutes. Answer in the same questions sheet.

Quiz. (3 points) All questions are multi-answer: The mark is half if one error, 0 if more.

1. Say which of the statements are true regarding SMTP:

- ☐ It can be used to send and download email.
- ☐ One of the SMTP commands is “subject”.
- ☐ It uses TCP.
- ☐ In order to send a message, even if the user sending and receiving the email use a web browser, it will be needed some SMTP transaction.

2. Assume that a client does an HTTP transaction of type POST with a web server. In the following there are how many TCP data segments (with more than 0 bytes of data) might have been sent by the client and the server. Way which one might be possible (assume that no segments are lost):

- ☐ 0, 1
- ☐ 1, 0
- ☐ 1, 1
- ☐ 1, 10
- ☐ 10, 10

3. Say which of the statements are true regarding Ethernet switches.

- ☐ It is possible that a switch transmits the same unicast frame into more than one port.
- ☐ It is possible that a switch transmits the same broadcast frame into ports that belong to different VLANs.
- ☐ There can be ports in half duplex and full duplex mode simultaneously.
- ☐ The MAC table is build using the destination addresses of the received frames.

4. Say which of the statements are true regarding CSMA/CD

- ☐ In a hub it is always used.
- ☐ If there is a transmission going on and 2 or more stations have new frames to transmit (which have been not transmitted before), then their transmission will always start with a collision..
- ☐ Assume a hub with 2 stations using CSMA/CD. If one of them has the network card defective, such that it always uses a backoff equal to 5, then it will not be able to transmit as long as the other card (working properly) has frames ready to transmit.
- ☐ In full duplex mode CSMA/CD is not used.

5. Say which of the statements are true regarding Ethernet and wifi

- ☐ All network cards are sold configured with a unique address.
- ☐ In the Ethernet header there are 2 addresses, in wifi 3 or 4.
- ☐ In the frame header there is always a field with the address of the network card sending the frame.
- ☐ The frames have a field to detect errors.

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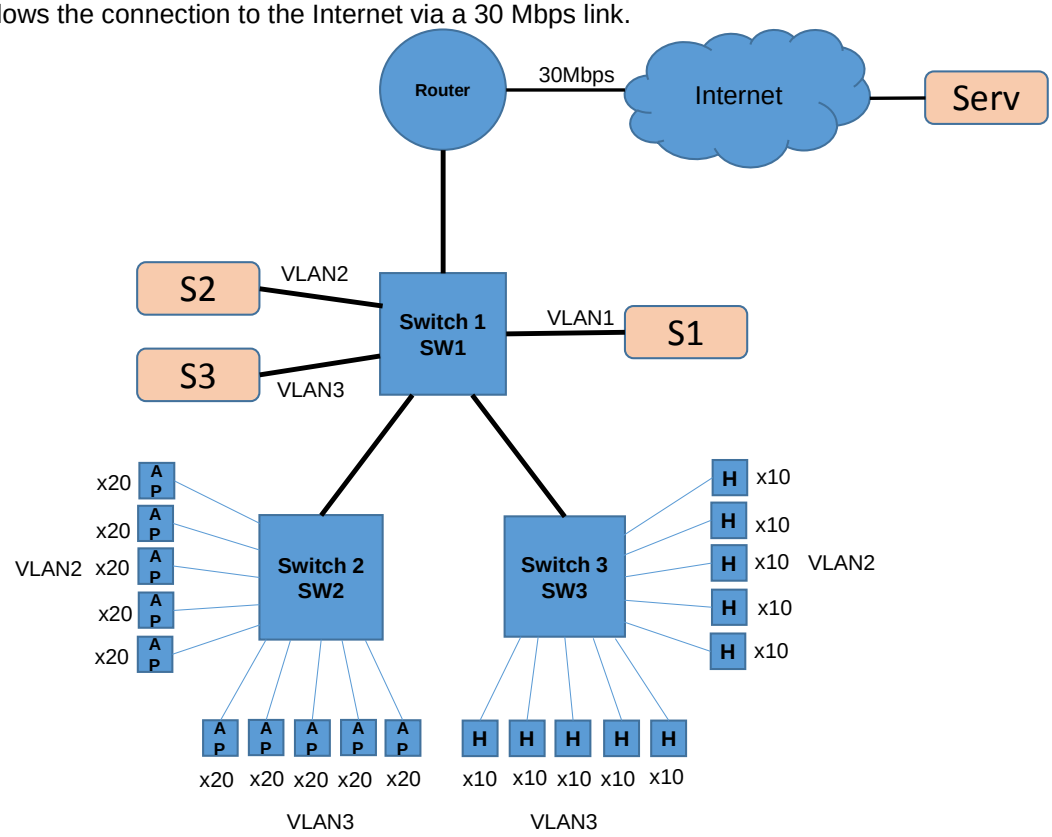
Pregunta 1. (4 points)

The figure shows the configuration of a network with three VLAN. VLAN 1 hosts the server S1. VLAN 2 contains the server S2, five hubs (H) and five WLAN access points (AP). VLAN 3 contains the server S3, five hubs (H) and five WLAN access points (AP). Each hub connects 10 terminals via Fast Ethernet (100Mbps) and each access point connects 20 terminals at 120 Mbps. The efficiency of the hub is 80% and that of the WLAN AP is 66.66% (2/3).
All ports in Switch 1 are at 1Gbps. Switch 2 connects all AP with Fast Ethernet ports (100Mbps). Switch 3 connects all the hubs (H) with Fast Ethernet ports (100 Mbps).
The Router allows the connection to the Internet via a 30 Mbps link.



a) (0.25 points)
Which links must be configured in “trunk” mode, which are Full Duplex (FDX) and which are Half Duplex (HDX)?

For the following scenarios, identify the bottlenecks and explain how the flow control applies. Use the following notation for the transmission speed of the terminals: **VLAN2fix**, **VLAN2wifi**, **VLAN3fix** and **VLAN3wifi.**
b) (0.75 points)
All terminals in VLAN2 transmit to server S2 and all terminals in VLAN3 towards S3.
Assess the maximum effective speed that may achieve each terminal (VLAN2fix, VLAN2wifi, VLAN3fix, and VLAN3wifi) and the aggregated speed at the servers (S2 y S3).

c) (1 point)
Server S2 transmits to the terminals in VLAN2 and server S3 towards the terminals in VLAN3.
Asses the transmission speed from server S2 and S3, and the received speed by the terminals (fixed and wifi at each VLAN).

d) (1 point)
All terminals in VLAN2 and VLAN3 transmit towards server S1.
Asses the maximum effective speed each terminal may achieve (VLAN2fix, VLAN2wifi, VLAN3fix, VLAN3wifi) and the aggregated speed at server S1.

e) (1 point)
All terminals in VLAN2 and VLAN3 transmit towards the external server SERV.
Asses the maximum effective speed each terminal may achieve (VLAN2fix, VLAN2wifi, VLAN3fix, VLAN3wifi.
How flow control applies in the Ethernet switches?

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Problem 2 (3 points)
We write a new URL in the browser using HTTP to download a Web page from the same server with three embedded images. For simplicity, suppose a simple browser that only opens TCP connections on demand and a DNS server co-located with the web server.
a. Draw a timing diagram representing interactions between client and server (DNS considering, TCP, HTTP) using HTTP non-persistent, persistent HTTP without pipelining and persistent HTTP with pipelining.

How many client-server interactions (RTT) are needed to connect and download the complete website with all images? (Assuming for simplicity consecutive requests, not parallel)
b. Non-persistent HTTP.

c. With persistent HTTP without pipelining.

d. With persistent HTTP with pipelining.

e. Some websites have large images while other pages have small images. In which case it is better to use persistent HTTP connections, compared to establish a new connection per HTTP request? (Give two brief reasons)

f. Many browsers do not have HTTP pipelining enabled by default. Apart from the complexity of its implementation, describe the reasons why "HTTP pipelining" does not provide the best performance. (Briefly define the specific reason)