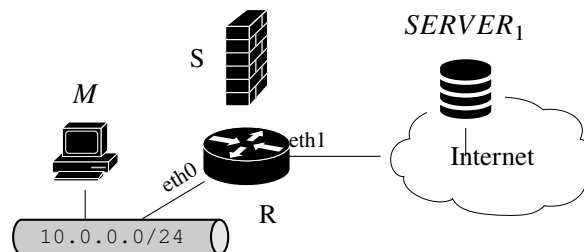


Duration : 1h30 — Permitted access to documents

1– Write a program to control the **redirection of HTTPS connections** of a given machine, using the following protocol :

5pts

- ▷ the UDP-based control server  $S$  runs on the router  $R$  waiting on port 6677 ;
- ▷ a machine  $M$  sends a UDP packet to  $S$  with the IP address of the server to which it wants to be redirected (for example to  $SERVER_1$ ) :
- ▷  $S$  retrieves the UDP packet :
  - ◊ it gets the IP address of  $M$  from the original TSAP of the packet ;
  - ◊ it extracts the IP address of  $SERVER_1$  from the content of the packet ;
- ▷ configure the firewall on  $R$  to redirect HTTPS connections from  $M$  to  $SERVER_1$ .
- ▷ the machine  $M$  launches a connection to  $R$  and this connection is redirected by the firewall to  $SERVER_1$ .



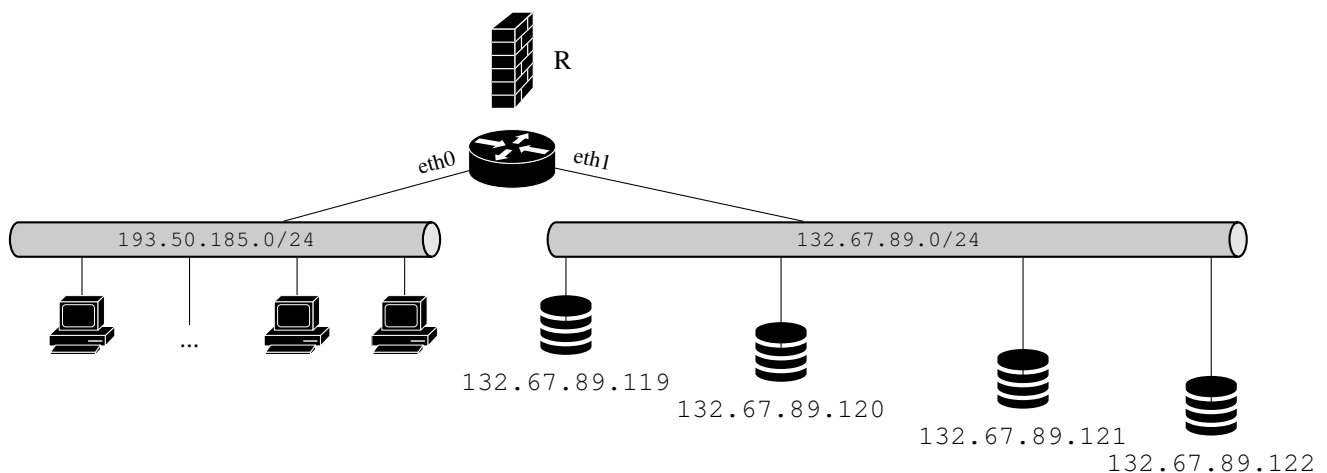
Questions :

- a. Give the initial configuration of the firewall present on  $R$  to block all connections to the outside from the network 10.0.0.0/24. (1pt)
- b. Give the configuration of the firewall allowing the redirection of HTTPS connections from the machine 10.0.0.25 to  $R$  to the server 164.81.2.34. (1pt)
- c. Write the Python program of the  $S$  server performing the UDP-based firewall configuration protocol described above. (3pts)

2– We want to perform **load balancing** by configuring the firewall on the router  $R$  :

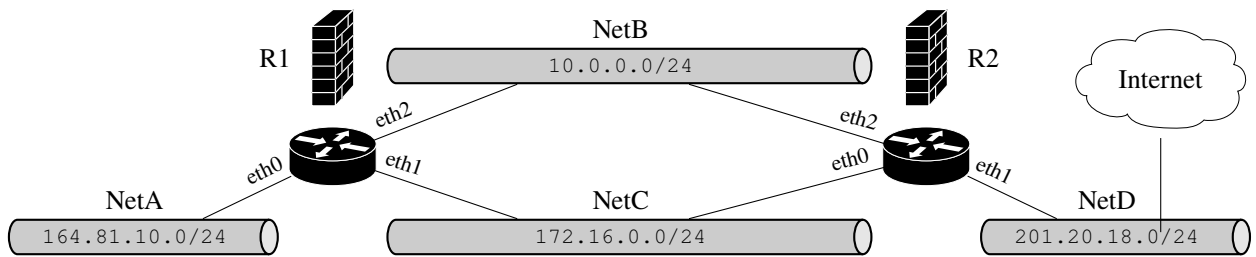
3pts

- ▷ divide the network 193.50.185.0 into 4 groups of addresses of the same size ;
- ▷ redirect HTTP connections to the 132.67.89.118 server from one machine in each group to one of the following 4 server addresses :
  - ◊ 132.67.89.119
  - ◊ 132.67.89.120
  - ◊ 132.67.89.121
  - ◊ 132.67.89.122



Give the configuration of the firewall performing this work.

3– Let be the following network :  
4pts



Router configuration :

	R1	R2
eth0	164.81.10.254	172.16.0.253
eth1	172.16.0.254	201.20.18.35
eth2	10.0.0.254	10.0.0.253

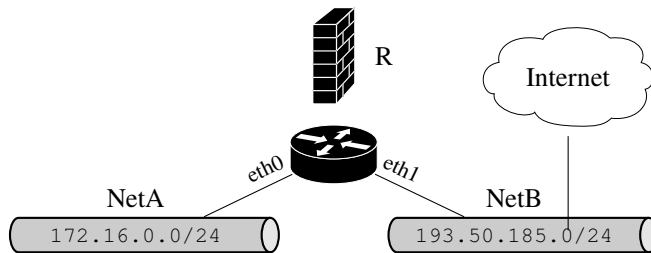
- ▷ the network NetC is **faster** than the network NetB ;
- ▷ network traffic from NetA defaults to NetB ;
- ▷ Internet access is through the NetD network ;
- ▷ only TCP traffic is allowed from NetA to NetD and Internet ;

The ISP router is 201.20.18.254

Questions :

- a. Give the routing table and the firewall configuration of R1 and R2. (2pts)
- b. Give a method using the firewall to allow TCP traffic from NetA to NetD to go through NetB and back through NetC. (2pts)

4– Let be the following network :  
8pts



Router configuration :

	R1
eth0	172.16.0.254
eth1	193.50.185.42

The ISP router is 193.50.185.254

The **security policy** is as follows :

- i. the router must be accessible in SSH only from the NetA network ;
- ii. traffic from NetA in HTTP, HTTPS and SMTP is allowed to the Internet ;
- iii. all DNS traffic must be redirected to 1.1.1.1 ;
- iv. everything else is blocked.

Questions :

- a. Give the routing configuration of router R ; (1pt)
- b. Give the configuration of the firewall of R in accordance with the security policy. (4pts)  
*You will indicate the rule number of the security policy processed by your firewall rules.*
- c. We want to limit the general traffic out of NetA to 100Mbits by default and to 40Mbits for the SMTP traffic, how should we do ? (3pts)