

Exam – example - 2

Surname	
Name	
Student ID	

Total time 2:00

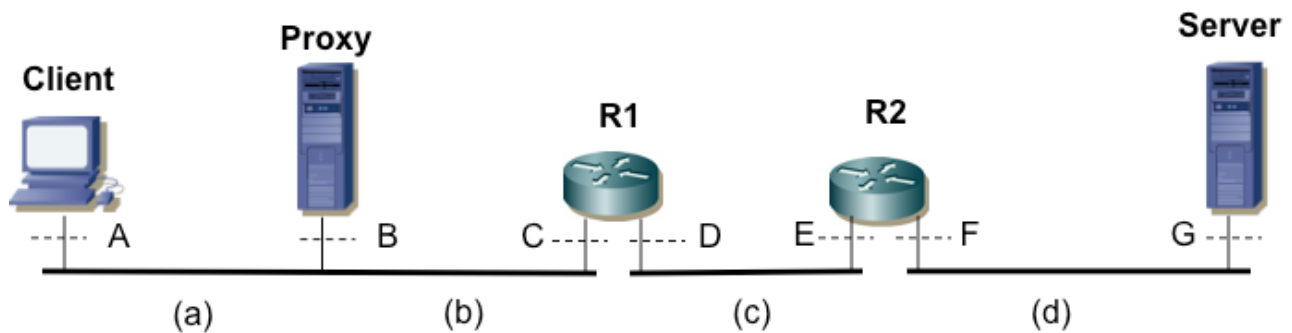
Ex1 (6pt)	Ex2 (6pt)	Ex3 (6pt)	Ex4 (6 pt)	Ques (8 pt)

1 - Exercise (6 points)

Consider the network in the figure where interfaces are indicated with capital letters and MAC-x and IP-x, x=[A,B,C,D,E,F,G], are MAC and IP addresses respectively. Assume ARP table of the Client and Proxy are empty while those of the others have already all mappings between MAC and IP addresses. In the Client host there is an http client active. The Client sends a request to the Server where there is a http server active; the Server then replies back to the Client. Consider the following two cases:

- 1) the http client has no proxy configured
- 2) the http client has the proxy configured and the proxy has no valid copy of the web content requested by the client

Indicate graphically the packets transmitted on network segments (a), (b), (c), and (d) for each of them the addresses/ports contained in the PDUs at layers 2, 3 and 4 (use port 80 for web server and port 8080 for the proxy).



2 - Exercise (6 points)

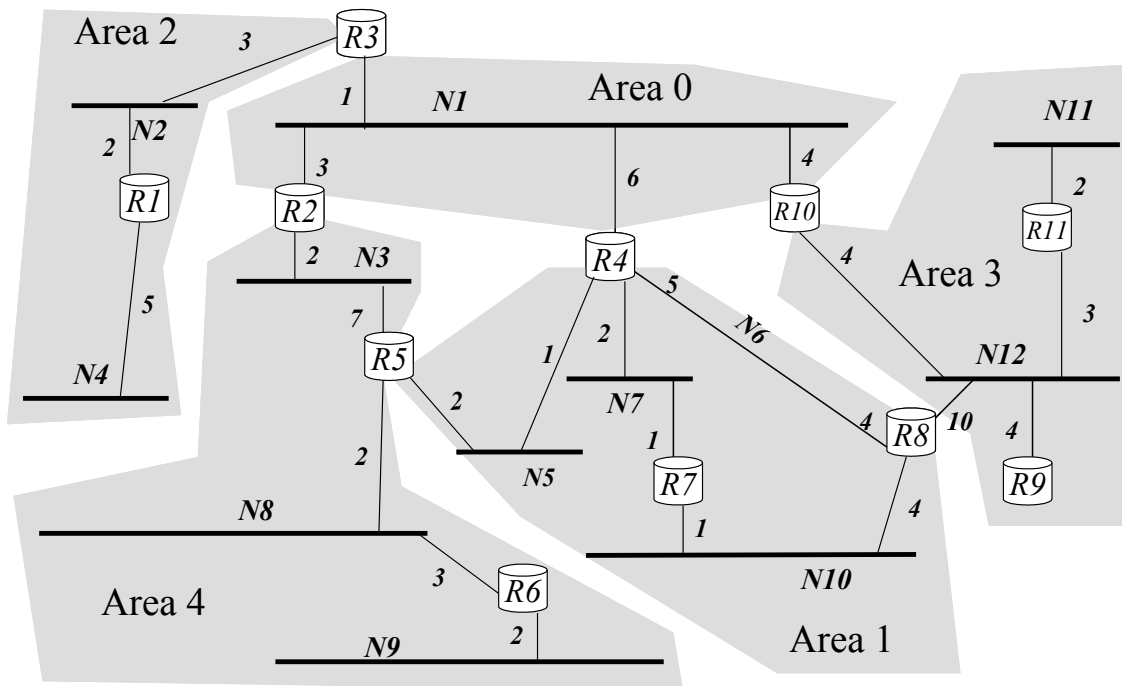
To the university of VeryFarAway the following addressing space is assigned: IP 165.107.140.0/22.
The university needs to divide the network in the following subnets:

- 1 subnet with at least 500 hosts
- 2 subnets with at least 120 hosts each
- 3 subnets with at least 56 hosts each
- 1 subnet with at least 25 hosts
- 5 point-to-point links

Define an addressing plan for the network indicating for each subnet: IP address and netmask, direct broadcast address, maximum number of hosts

3 - Exercise (6 points)

Consider the network shown in the figure where routers, networks, and costs associated with router interfaces are indicated. The network is configured to use the OSPF routing protocol. Divide the network in 5 areas as indicated in the figure and draw the graphs representing the network as seen by routers R1, R7, and R8.

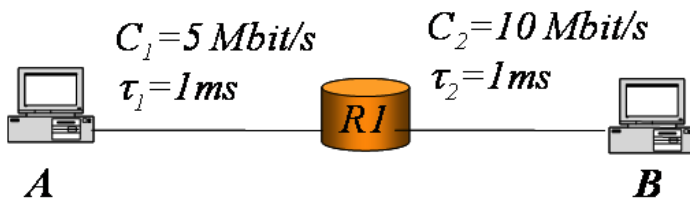


4 - Exercise (6 points)

In the network below, A wants to transfer a file of 2 [Kbytes] to B. Suppose that communication takes place via an end to end Go-Back-N approach with packets of 100 [bytes], negligible ACK length and transmission window of five packets ($N = 5$). The R1 device operates according to a store and forward paradigm:

1. Calculate the total transfer time for the file and the actual data rate on the link.
2. Repeat the count at point 1) assuming that second packet in transmission gets lost (minimum time out of the Go-Back-N).
3. In the case of point 2), how many packets are transmitted unnecessarily on the link (lost packets + packets received out of sequence)?

(1 [byte] = 8 [bit], 1 [kbyte] = 1000 [byte] = 8000 [bit], 1[kb]=1000[bit])



Questions (8 points)

Q1

A router has the following interface configuration and routing table. Indicate how packets with the following destinations are handled

Eth0 145.170.123.76/25
Eth1 145.174.124.169/25

Network	mask	Next hop
145.170.122.128	255.255.255.128	145.174.124.254
145.170.122.0	255.255.254.0	145.170.123.1
145.174.124.0	255.255.255.128	145.170.123.2
145.174.122.0	255.255.254.0	145.170.123.3
0.0.0.0	0.0.0.0	145.174.124.253

145.170.123.134	145.174.123.12	140.170.124.6
145.170.122.134	145.174.124.136	

Q2

Router R1 receives a packet and forwards it to router R2:

Packet has the following addresses

Source IP: 192.168.0.1

Destination IP: 131.175.35.22

Source MAC: 1234:1234:fafa:3333

Destination MAC: baba:acac:5656:3434

The interface of router R2 reachable by R1 has the following addresses:

IP: 131.175.21.2

MAC: 4444:5555:6666:7777

The forwarding interface of R1 has the following addresses:

IP: 131.175.21.254

MAC: 1111:2222:3333:4444

Indicate:

- Destination IP address of the packet forwarded by R1
- Source IP address of the packet forwarded by R1
- Destination MAC address of the packet forwarded by R1
- Source MAC address of the packet forwarded by R1
- MAC address of the R1 interface that received the packet

Q3

Devices access to a shared medium according to the ALOHA protocol. The traffic generated (transmissions + retransmissions) can be considered as a Poisson process with intensity $\lambda = 0.8$ [accesses / second]. Find the maximum duration of the transmissions that guarantees a collision probability less than 10% in the case of SLOTTED ALOHA. Calculate the corresponding throughput.