| Computer Networks Technologies and Services	September 4th, 2015
First and last name	Student ID ....…....

NOTES

i. Nothing else than what is needed to write (pen, eraser), a piece of ID, and possibly water and food can be taken to the seat where you take your exam. Please leave any other item you might have (coat, bag, phone, calculator, and any other object) at the front or back of the classroom.

ii. The answers to each question must be written exclusively on the same page of the question, which is the only material that will be graded.

iii. Do not forget to write your name and student ID in each one of the marked spaces on the exam paper.

iv. In case you will use part of pages containing the questions as a scratch pad, please indicate it clearly and possibly cross out such parts before handing in the exam.

v. The score assigned to answers varies from zero to the maximum score reported at the end of the question. Please notice that the maximum scores of all questions do not necessarily sum up to 30.

vi. When answering questions, please feel free to use drawings whenever they can help expressing and clarifying the answer.

vii. Answers that are not understandable (for example because written badly or with bad handwriting) might be considered wrong.

viii. During the test, any communication with other classmates is prohibited and will cause the student to be sent away from the classroom

ix. The instructors and the assistants that are present during the test are there for the sole purpose of verifying proper progress of the exam. Their role is not giving any support to the interpretation of the text, neither helping the students to correctly formulate the answers. Please avoid any such request.

Question 1) With reference to the MPLS network depicted in the following figure, specify (directly in the dashed boxes) all of the information needed in MPLS forwarding tables of the corresponding router to make it possible for hosts in network 10.1.4.0/24 to send packets to hosts in the networks 10.1.3.0/24 and 10.2.0.0/16. The IP addresses near the MPLS router interfaces should be interpreted as the IP addresses of the interface. (6 points)
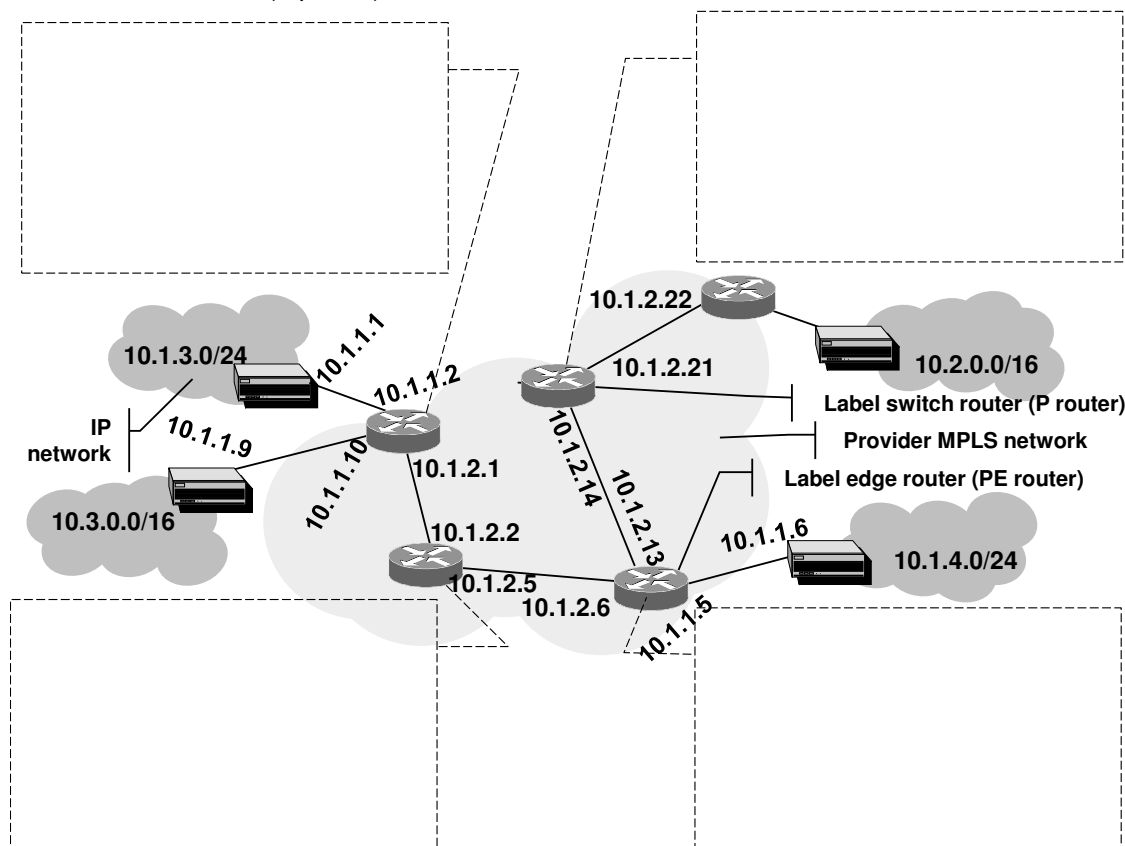
Question 2) Given the IPv4 to IPv6 transition scenario based on the A+P solution depicted in the following figure, indicate (directly in the table below) the IP addresses assigned to the interfaces and IP addresses and transport ports included in the packets marked with a number. Interface addresses can be chosen freely as long as they are compatible with the operating principles of IP and the A+P solution. As far as packets are concerned, please explicitly provide both source and destination IP addresses and ports; in case multiple IP headers are deployed (tunneling), explicitly list the IP address pair (source and destination) within each of the headers, clearly specifying the header (i.e., internal or external) they belong to. As far as interfaces are concerned, please list all IP addresses assigned to them if the specific deployment scenario requires them to have more than one address. (6 points)
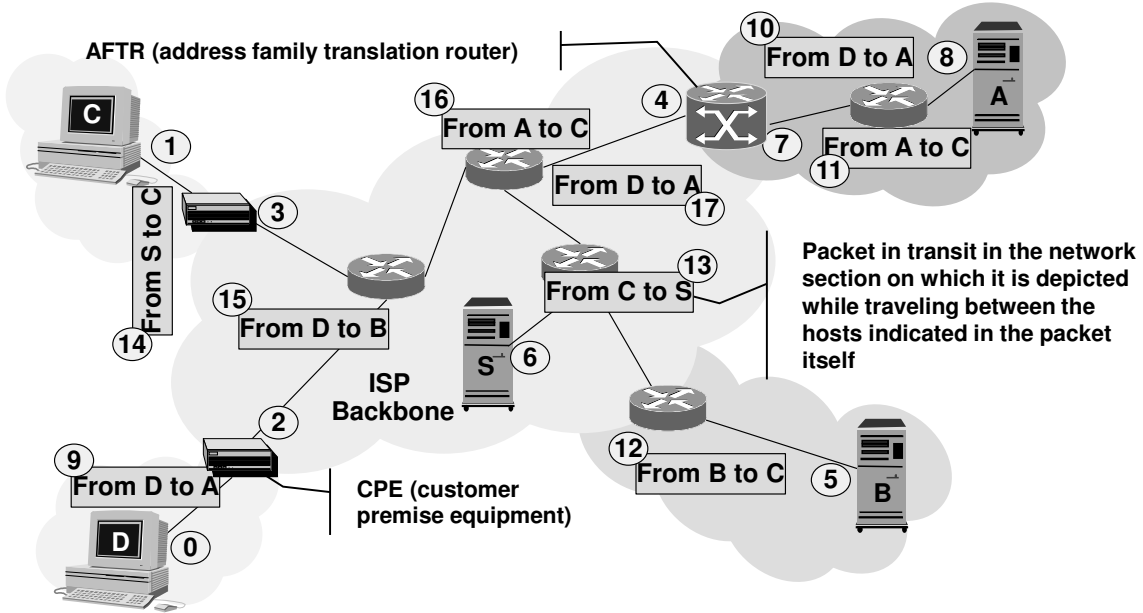
0)	1)
2)	3)
4)	5)
6)	7)
8)	9)
10)	11)
12)	13)
14)	15)
16)	17)

Question 3) A SIP user alice@provider1.com is connected to her own service provider network and starts her own software phone to connect to her own SIP domain. Assuming that the SIP user knows neither the name nor the IP address of her own SIP server, list all the messages sent and received by the SIP client from the software phone activation time to the instant at which the user is actually registered in the domain. Consider messages of all possible involved protocols. (5 points)

Question 4) The employees of a company can connect to their corporate network through a VPN software, which terminates all its traffic on a VPN gateway with address 15.2.1.3. Through that connection, employees have access to all the services available on the corporate network. The student should describe (briefly) a packet that transports an HTTP request (GET) coming from an employee (that uses the VPN service) and going to a Google server (IP address 173.194.35.148), captured on the link that connects the Google server to the Internet. Assume a centralized Internet access. The IP address of the client is 130.192.10.81, while the IP address assigned to the client within the VPN is 15.2.1.5. (6 points)