

Computer Networks Technologies and Services	June 23rd, 2016
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) Considering an optical network (5 points)

A) What is the switching unit?

B) List two functions of the control plane.

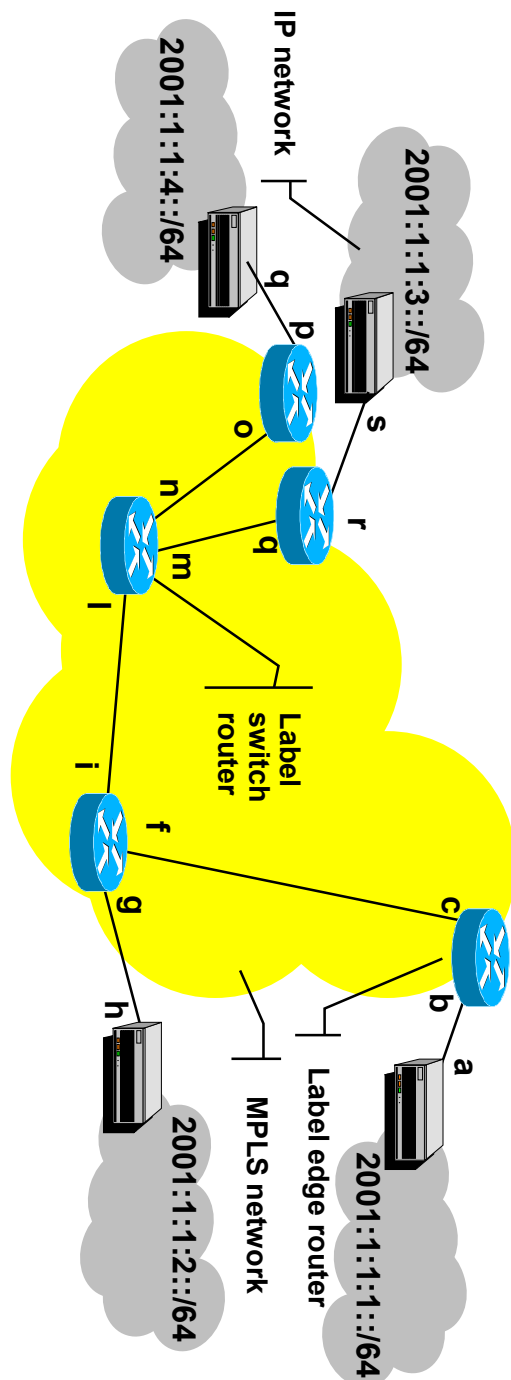
C) Mention one protocol possibly used for routing.

D) Mention a protocol possibly used for connection setup.

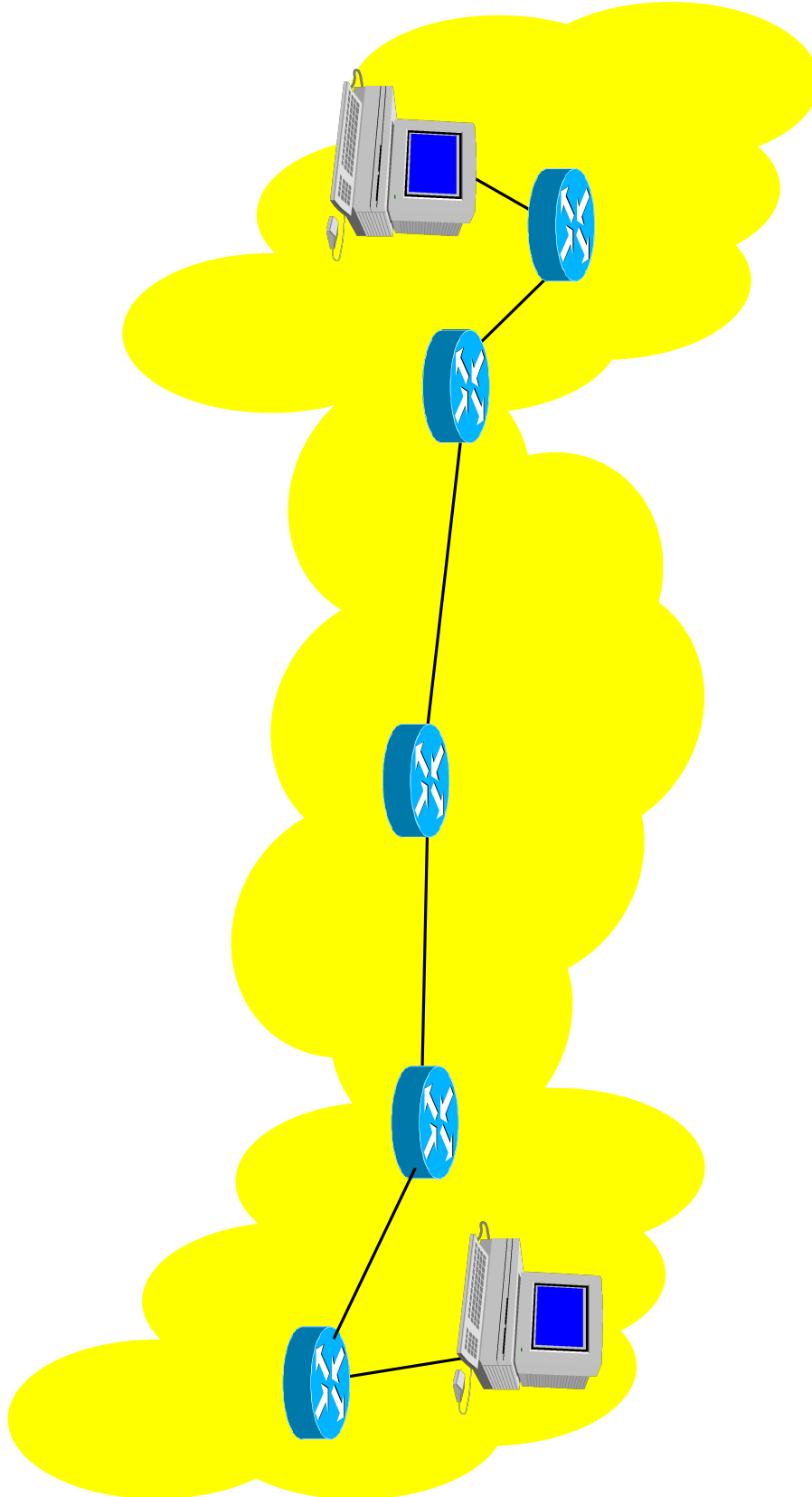
Question 2) Given the network in the following figure, specify the steps required for setting up an LSP to carry traffic from the label edge router at the top on the right hand side to destination 2001:1:1:4::/64. Specifically indicate each action executed either directly on the figure (close to the device taking such action or the link carrying the corresponding message) or in the blank space below (in this case clearly showing the device executing each action or pair of devices exchanging each message), using the following notation:

- binding: B, <FEC>, <label>
- distribution: D, <FEC>, <label>
- mapping: M, <input label or FEC>, <output label>, <next hop>

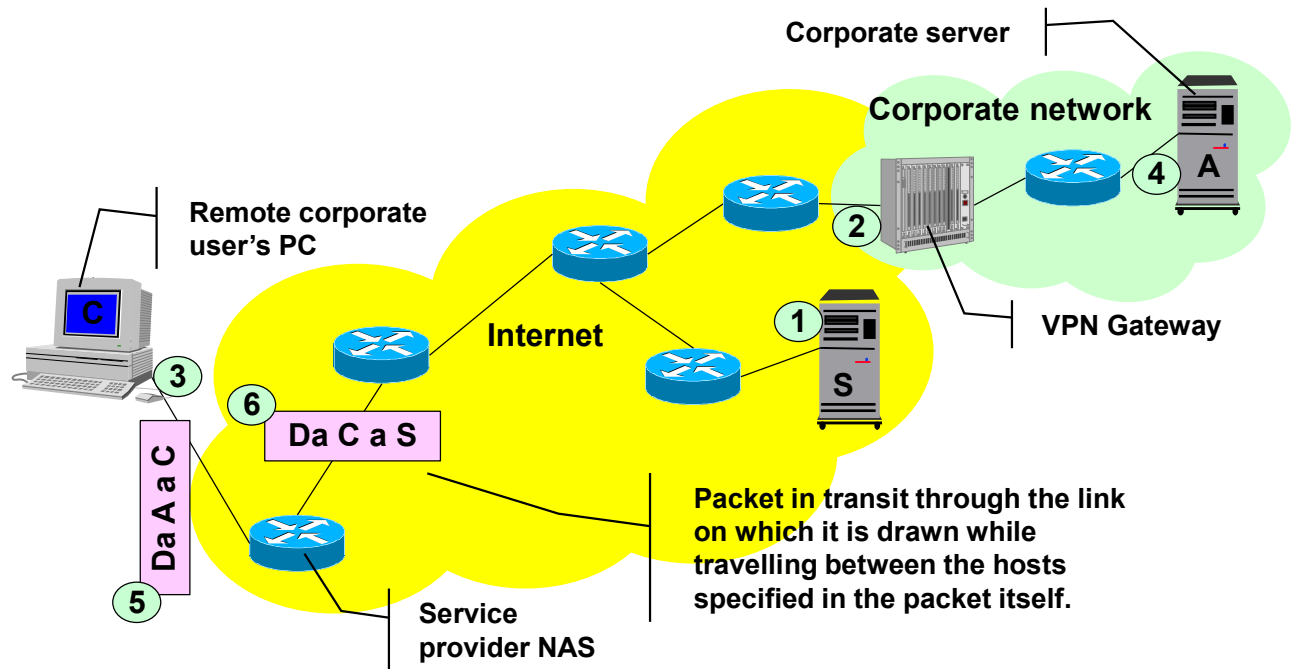
where the first letter identifies an action and what follows are the corresponding parameters. Please consider the letter besides each interface in the figure as the IP address assigned to the interface itself. (7 points)



Question 3) Given the IPv6 network depicted below, assign an IP address to **each** interface of **each** router and host (writing it next to the respective interface directly in the figure). Addresses must be assigned in such a way that (i) **all** interfaces are reachable from any device (router and host) in the network below and (ii) each router has no more than two entries in its own routing table (excluding entries related to directly connected destinations, which are anyway not routes). (6 points)



Question 4) Given the provider provisioned access VPN scenario depicted in the following figure, indicate (directly in the table below) the IP addresses assigned to the interfaces and 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 common deployment practices of this specific access VPN solution. As far as packets are concerned, please explicitly provide both source and destination IP addresses and, in case multiple IP headers be 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 VPN deployment scenario requires them to have more than one address. (7 points)



1)	2)
3)	4)
5)	
6)	