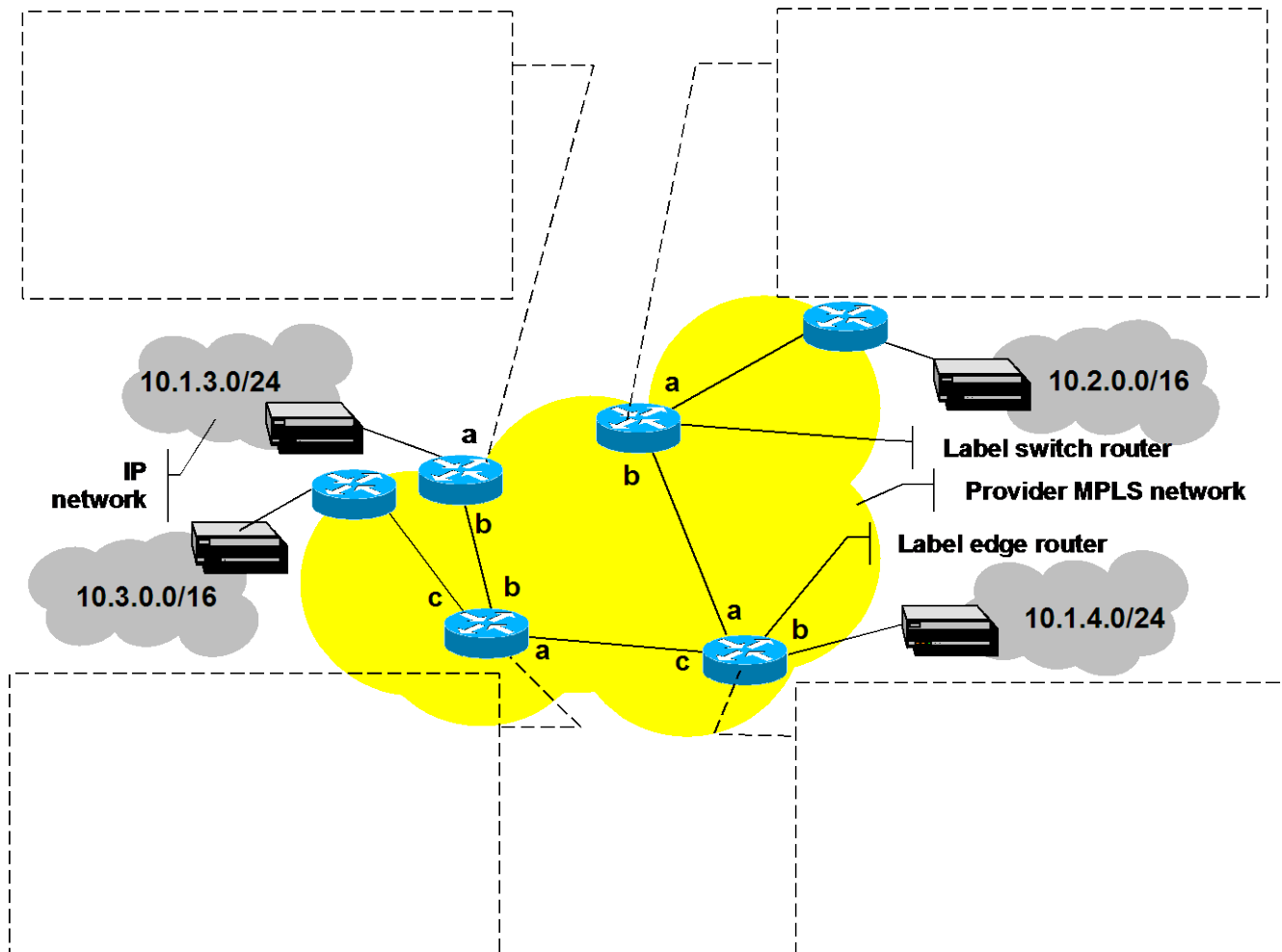


Computer Networks Technologies and Services	September 4th, 2014
First and last name	Student ID

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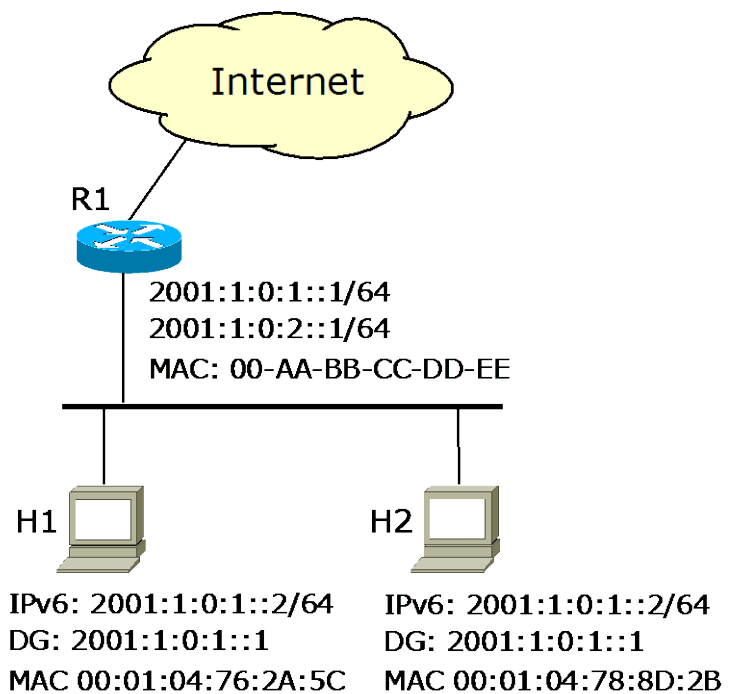
- Nothing else than what is needed to write (pen, eraser), a piece of ID, and possibly water and food can be taken at the seat where you take your exam. Please leave any other non allowed item you might have (coat, bag, phone, calculator, and any other object) at the front or back of the classroom.
- The answers to all questions must be written exclusively on the provided sheets of paper. Do not forget to write your name and student ID on each sheet of paper deployed.
- In case you will use whole pages or part of pages as a draft copy, please indicate it clearly and possibly cross out such parts before handing in the exam.
- The score assigned to answers varies from zero to the maximum score reported at the end of the question.
- When answering questions, please feel free to use drawings whenever they can help expressing and clarifying the answer.
- Answers that are not understandable (for example because written badly or with bad handwriting) might be considered wrong.
- During the test, any communication with other classmates is prohibited and will cause the student to be sent away from the classroom
- 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 any pair of hosts in the networks 10.x.x.x to exchange packets. The letters near the MPLS router interfaces should be interpreted as the identifier of the interface. (6 points)



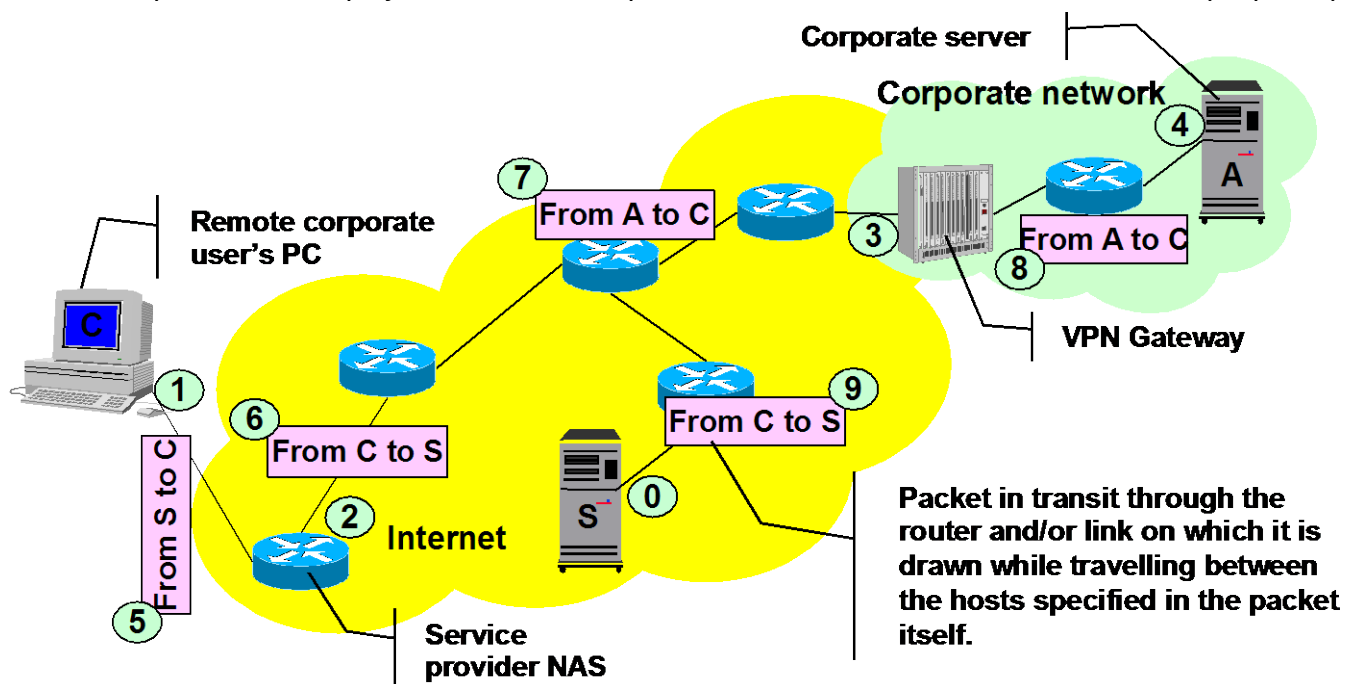
Question 2) Briefly describe the role of DNS in the context of SIP explaining the various types of interaction that can take place with DNS servers during the operation of the several SIP components (phones, proxies, etc.). (5 points)

Question 3) Write, directly in the table below, relevant information in packets exchanged on the network when H1 sends a DNS query to H2. Use the “Upper layers” cell to specify information related to upper layer protocols encapsulated inside IP packets that are relevant in this scenario. Please note that it is not necessary to use all the rows in the table below. (6 points)



Pkt. 1	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 2	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 3	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 4	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 5	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 6	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 7	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	

Question 4) Given the customer 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. (11 points)



0)	1)
2)	3)
4)	
5)	
6)	
7)	
8)	
9)	