| **Computer Networks Technologies and Services**	**February 22nd, 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) 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 2) With reference to the MPLS network depicted in the following figure, specify (directly in the boxes in front of packets in the figure) the MPLS label(s) possibly prepended to each of the packets shown in the figure (leave the box blank if no MPLS header is used; in case more than one label is present, write on the outside the one at the top of the label stack). Consider packets to be in transit on the link close to which they are depicted. Consider that the address written on the top in the packets is the source one, while the address underneath is the destination one. (5 points)
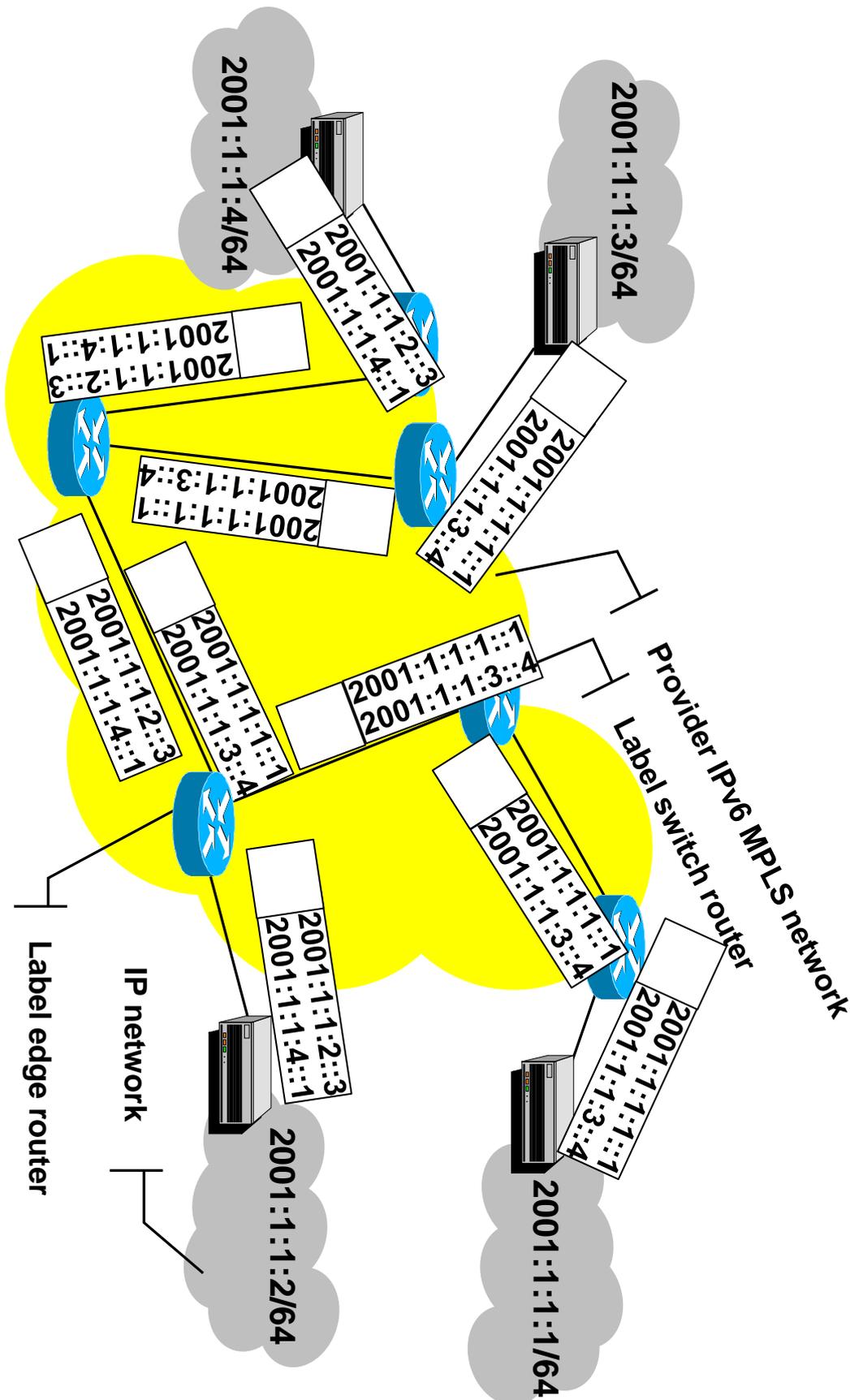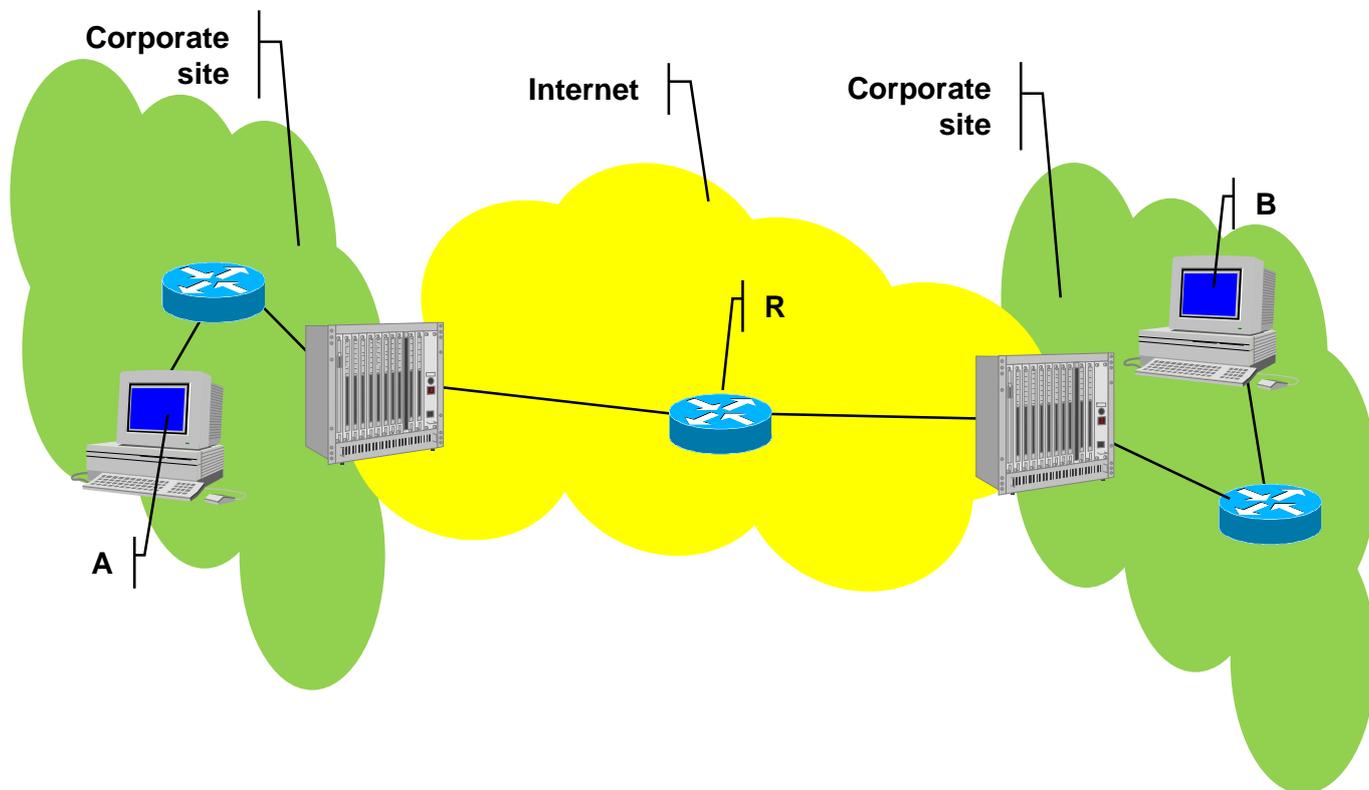
Question 3) Given the typical IPv4 to IPv6 transition scenario depicted in the following figure, assign an address to each of the router and host interfaces and indicate it directly in the figure close to the interface itself. Addresses must be assigned in a way that enables the two stations to communicate using the 6to4 solution for the transition from IPv4 to IPv6. (6 points)

IPv6

IPv4

IPv6
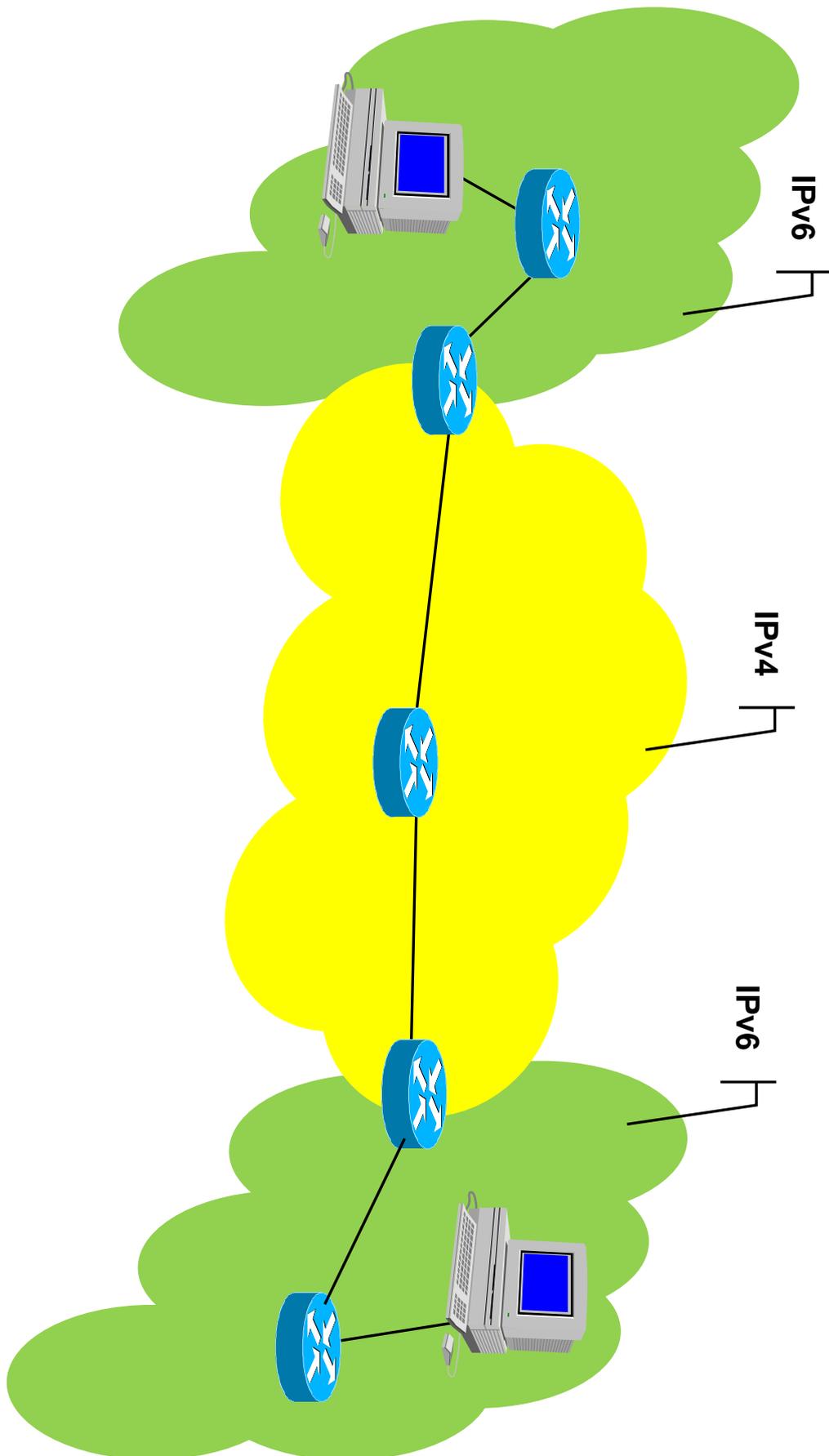
Question 4) Given the scenario depicted in the figure below in which two corporate sites must be connected through a VPN over the Internet, assign an address to each of the router and host interfaces and indicate it directly in the figure close to the interface itself. Concisely describe (best with a drawing) a packet sent from host A to host B captured

- A) On the link of host A
- B) On one of the links of router R

Please explicitly show all of the protocol headers deployed and for each of them the content of the fields that play a key role in ensuring proper functioning (e.g., source and destination IP addresses, etc.) (8 points)

A)

B)