

Computer Networks II – Master degree in Computer Engineering

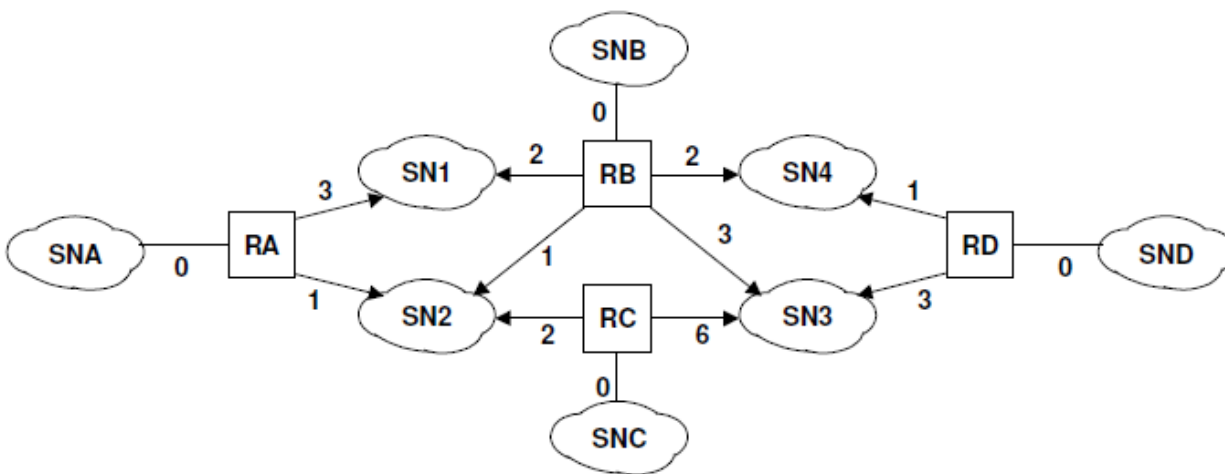
Exam session: 14/7/2010 – Instructors: Becchetti/Trevisani

Last name		Student Identification number	
First name			

- You are only allowed to use a pen and a pocket calculator
- Please write in a clear language and use a **READABLE** writing; it is important to **MOTIVATE THE ANSWERS YOU GIVE**.
- Please only use the blank spaces at the bottom of every question
- At the end of your exam, please return **THESE** sheets and those possibly received by the teacher to write a draft copy of your answers. The latter **WILL NOT** be considered during the process of correction.
- Students copying or consulting course material will be expelled from the exam.

Assignment 1. [7 points]

Consider the autonomous system in the picture, consisting of routers and sub-networks; in the picture, link costs are those **seen by the various routers**. Assume that RIP is the IGP protocol used and that router RX is identified, within a subnet, by the notation $\text{HOST_ID} = X$ [for example, router RC's interface belonging to subnet SN2 is "200.0.0.C".]



Assume the following set of subnet addresses:

Sotto-rete	NET_ID	Sotto-rete	NET_ID
SNA	215.0.0	SN1	195.0.0
SNB	218.0.0	SN2	200.0.0
SNC	220.0.0	SN3	205.0.0
SND	222.0.0	SN4	210.0.0

(assignment 1 continued)

a. Write router RA's routing table once equilibrium is reached.

Sub-net	Next hop	Sub-net	Next hop
SNA		SN1	
SNB		SN2	
SNC		SN3	
SND		SN4	

- b. Assume equilibrium has been reached. Assume then that the metric of router RB's link to network SN2 becomes **16**. Write down the following RIP update message [which includes the update] sent by router RB. When and to which nodes is this message sent?

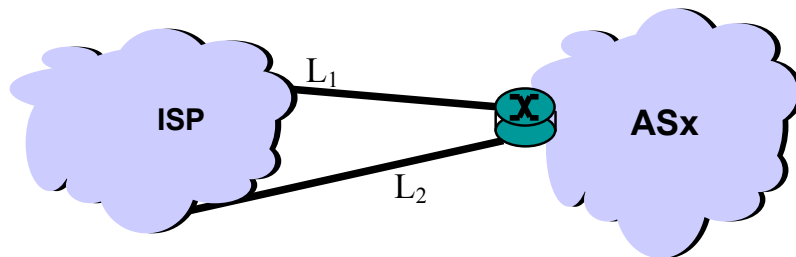
Sotto-rete	Metrica	Sotto-rete	Metrica
SNA		SN1	
SNB		SN2	
SNC		SN3	
SND		SN4	

- c. Can the anomaly known as “counting to infinity” arise as a consequence of the event described as point b? Motivate your answer.

(assignment 2 continued)

Assignment 3. [7 points]

Consider the autonomous system AS x in the picture, corresponding to address block 131.14.0/20.



Assume IP traffic directed to AS x is in the average uniformly distributed among destination addresses in the block 131.14.0/20. Answer the following questions:

(continua quesito 3)

1. Propose a BGP announcement policy for the links L_1 and L_2 such that, in the average, each of the two links receives the same amount of inbound traffic; explicitly write the address blocks announced on each of the two links. Motivate your answer.
2. Discuss how to use the MED (Multi Exit Discriminator) attribute so as to achieve the following goal: if any of the two links fails, its traffic is redirected to the other. Under which hypotheses is this MED-based policy applicable?

Assignment 4. [2 points]

Briefly describe the registration procedure of a mobile host in Mobile-IP. **Use Mobile-IP terminology.**

(assignment 4 continued)

Assignment 5. [2 points]

Considering the OSPF protocol, describe the 4 LSA [Link State Advertisements] types. In particular, **using OSPF terminology**, for each LSA describe:

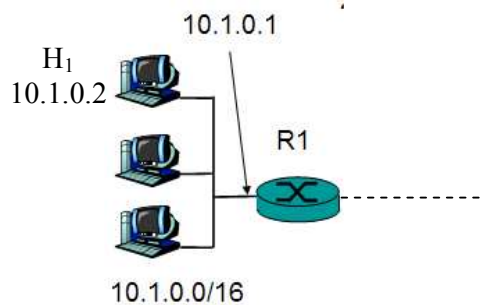
- The routers exchanging the LSA
- The type of information carried by the LSA [topological update or pre-processed routing information]
- The diffusion technique used [flooding or point-to-point]

Assignment 6. [2 points]

Explain the meaning of the BGP NEXT_HOP attribute. Use an example to illustrate the concept.

Assignment 7. [3 points]

Consider the following network scenario.



- **Host H₁** uses a VPN client that implements [again in H₁] a virtual network interface with address 10.2.0.100 and subnet mask 255.255.0.0
- According to host H₁'s routing table, traffic towards the network 10.2.0.0/16 is routed using the above-mentioned virtual network interface
- Host H₁ has active and operating IP routing capabilities
- Router R1 is the default gateway for subnet 10.1.0.0/16

Given these hypotheses, which static route has to be added to R1's routing table, so that every host in subnet 10.1.0.0/16 can use the VPN connection established by H₁ in order to reach network 10.2.0.0/16 ?

I hereby authorize, in compliance with law number 675 of 31/12/96, the teacher to publish the results of my exam on the Web.

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