La Sapienza
Università degli Studi di Roma
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Computer Networks II
Exercise collection 4 – Routing protocols

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Exercise 1 - 1/6

Consider the Autonomous System of Figure 1, which uses OSPF as IGP (Interior Gateway Protocol) and consisting of three areas 0,1,2. Area 2's topology is shown in Figure 2. Area 2's Internal Routers learn reachability information about network *N* having address 200.10.65.0/24 through summary_LSAs sent from ABR1 and ABR2, which in turn receive this information from ABR0.

Assuming that:

- The shortest path cost between network *N* and ABR0 is 6
- The shortest path cost between ABR0 and ABR1 (ABR2) is 4 (respectively, 6)

Answer the following questions:

- Give the costs for network N contained in summary_LSAs sent from ABR0, ABR1 and ABR2
- Provide the graph associated to routers and networks in Area 2
- Determine the Spanning Tree having Router R1 as source and containing the shortest paths between R1 and the routers and networks belonging to Area 2
- Provide Router R1's routing table, also including the information about the reachability of ABR1, ABR2 and network *N*

Exercise 1 - 2/6

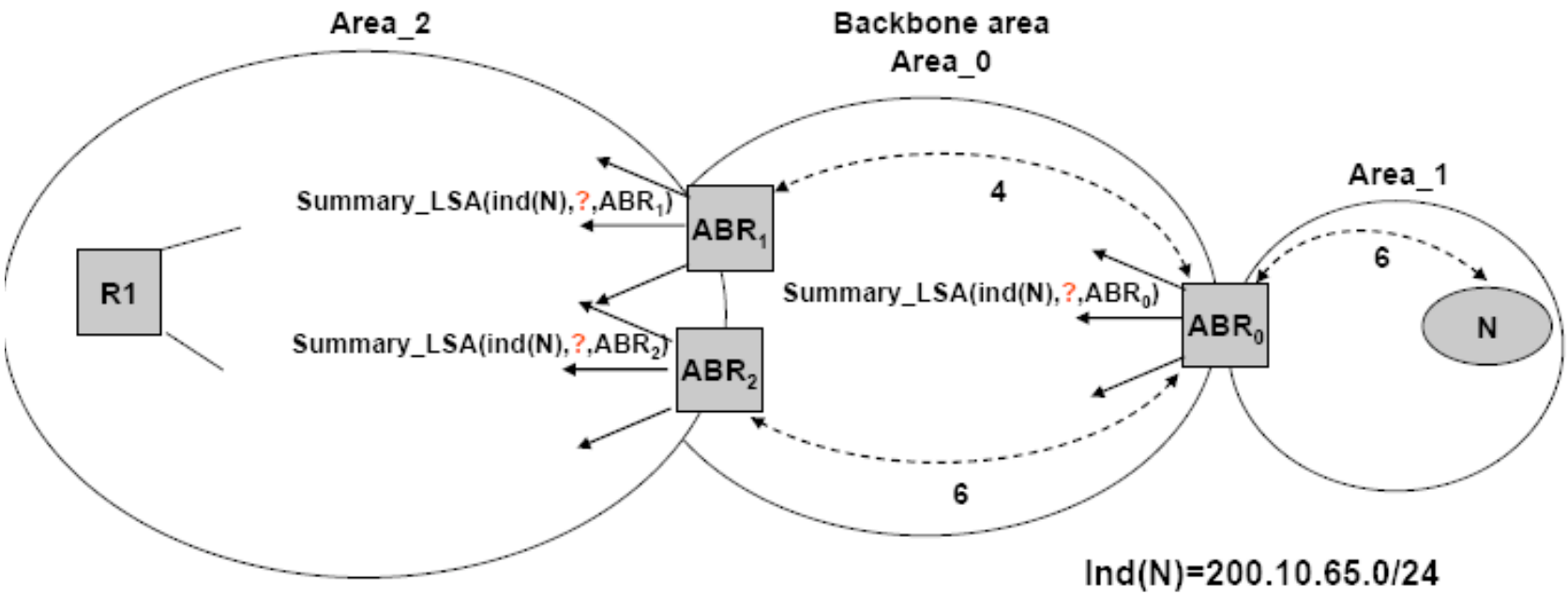


Figura 1

Exercise 1 - 3/6

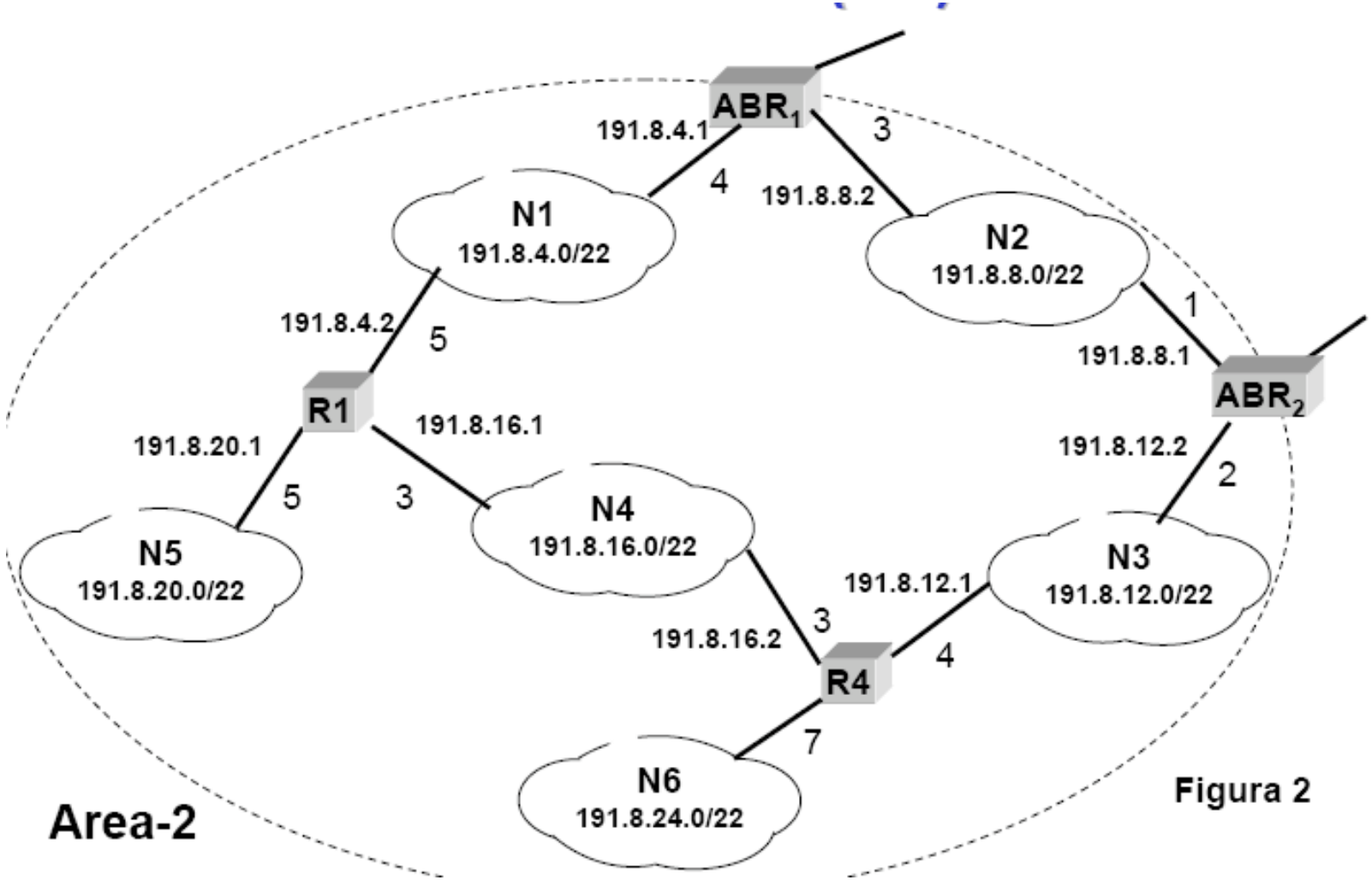
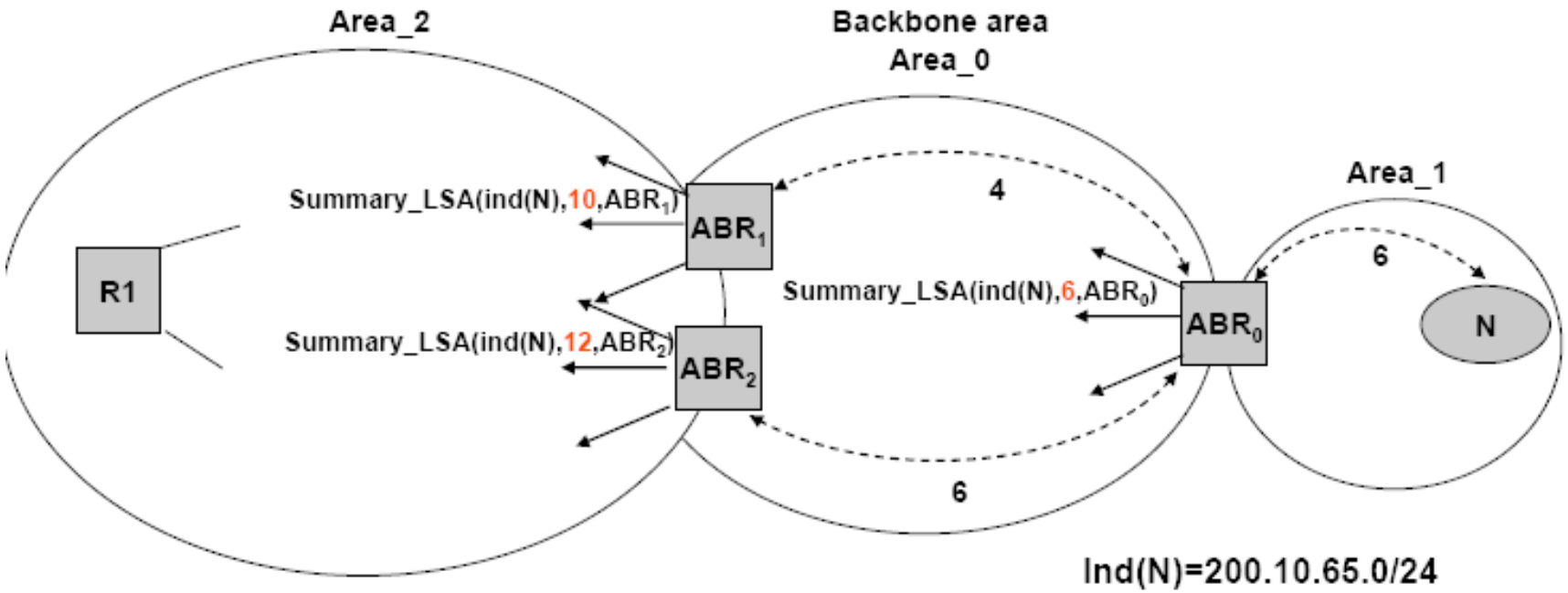
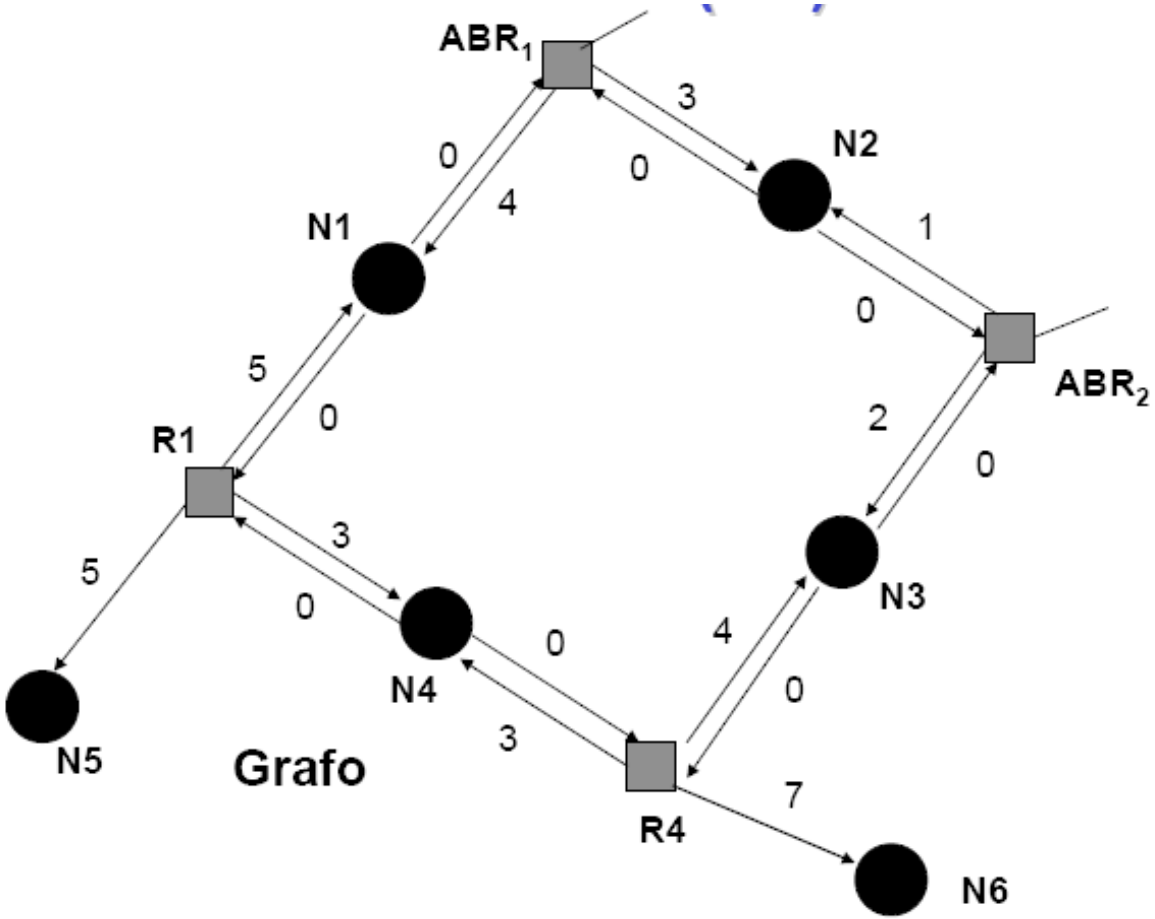


Figura 2

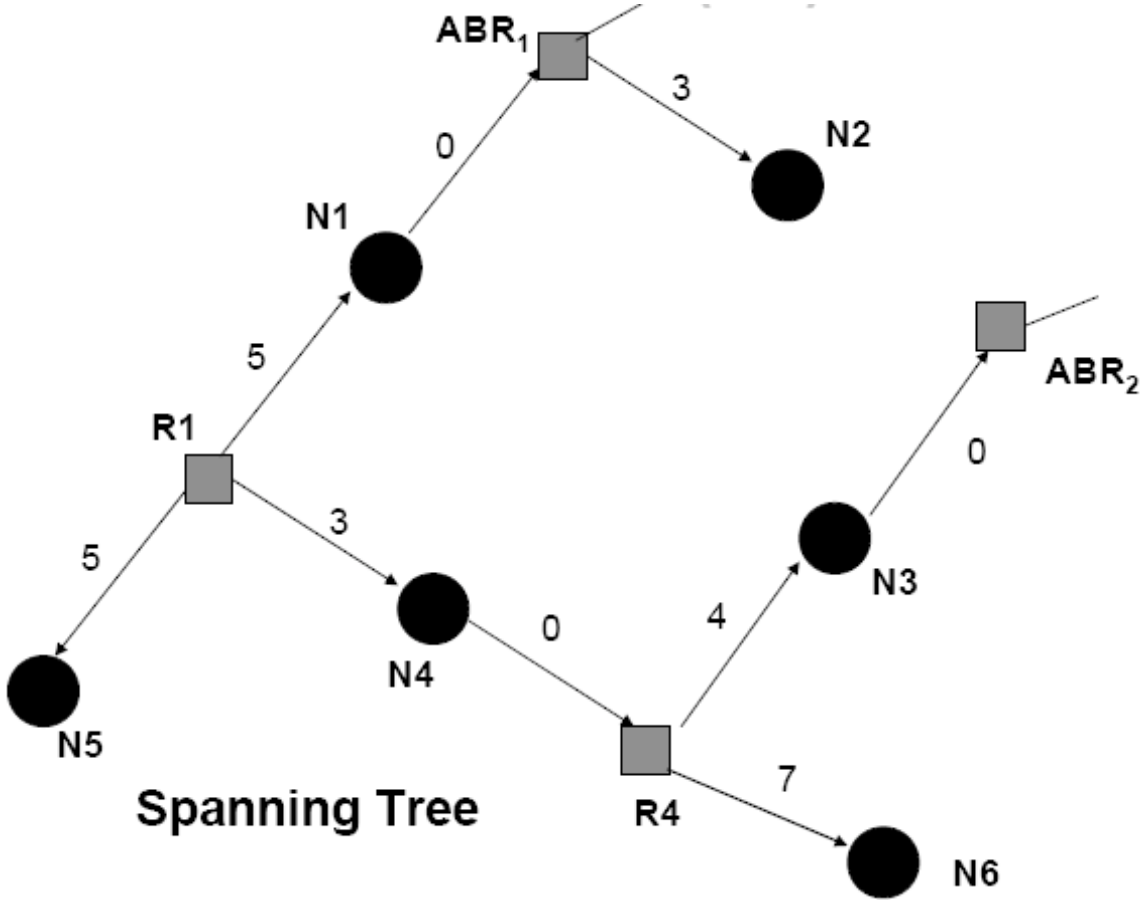
Exercise 1 - 4/6



Exercise 1 - 4/6



Esercizio 1 - 5/6



Esercizio 1 - 6/6

Net or ABR	Next-hop Router	Cost
191.8.4.0/22	Diretto	5
191.8.8.0/22	191.8.4.1	8
191.8.12.0/22	191.8.16.2	7
191.8.16.0/22	Diretto	3
191.8.20.0/22	Diretto	5
191.8.24.0/22	191.8.16.2	10
ABR_1	191.8.4.1	5
ABR_2	191.8.16.2	7
200.10.65.0/24	191.8.4.1	15

Summary_LSA(ind(N),10,ABR_1)

Summary_LSA(ind(N),12,ABR_2)

Exercise 2

The two *Autonomous Systems* (AS) in the figure use BGPv4 protocol as an EGP. What is the NLRI (Network Layer Reachability Information) contained in the *update* message sent by R4 to router R6 to notify reachability of the networks within its autonomous system?