Network Architectures (AR)

BSc in Communication Networks Engineering (LETI)

MSc in Electronics Engineering (MEE)

Mini-project

1 Introduction

The objective of the mini-project is to design, configure, and test a networking solution for an ISP, or even a network of ISPs.

The project has two parts. In the first part, you will have to configure and test a networking solution according to predefined requisites. In the second part, you will have to enhance the previous solution with functionality selected by yourself.

The mini-project is performed in groups, by the groups of the lab classes.

2 Part I

Build and configure the network of Figure 1. Hosts can be implemented with VPCS or Cisco IOS, although Cisco IOS routers are recommended. The DNS server must be implemented through a virtual machine. The switching elements include routers (R), switches (Sw) and switch-routers. (SwR). To start with, configure IPv4 addresses in all network elements: area 3 should use private addresses and the remaining areas public addresses. Private addresses should be in the range 10.0.10.0/24 and public addresses in the range 201.X.Y.0/24, where X is the number of your group and Y is the area number. Now, perform and test the following configurations:

- Hierarchical OSPFv2, to provide communications within areas and between areas.
- Three VLANs in area 3. On every switch assign interfaces f1/2 – f1/4 to VLAN A, f1/5 – f1/9 to VLAN B and f1/10 – f1/14 to VLAN C. The Inter-VLAN routing should be performed in switch-router SwR7.
- A DHCP server in SwR7 to provide automatic IP addressing to all hosts of area 3.
- A NAT box in SwR7 such that the private addresses of area 3 are translated to a network with prefix 201.X.Y and /28 mask. You must use a NAT overload configuration.
- A DNS server in area 1 such that hosts 1, 6 and 7 are accessible by names the h1.ar.org, h6.ar.org and h7.ar.org, respectively. The BIND DNS server in Ubuntu must be used.
- IPv6 addressing and IPv6 routing such that the hosts of area 4 can communicate with the hosts of area 2 using IPv6 addresses. The IPv6 addresses of hosts should be configured through the auto-configuration process. The global addresses must be in the range 2001:db8:X::/64, where X is the number of your group.

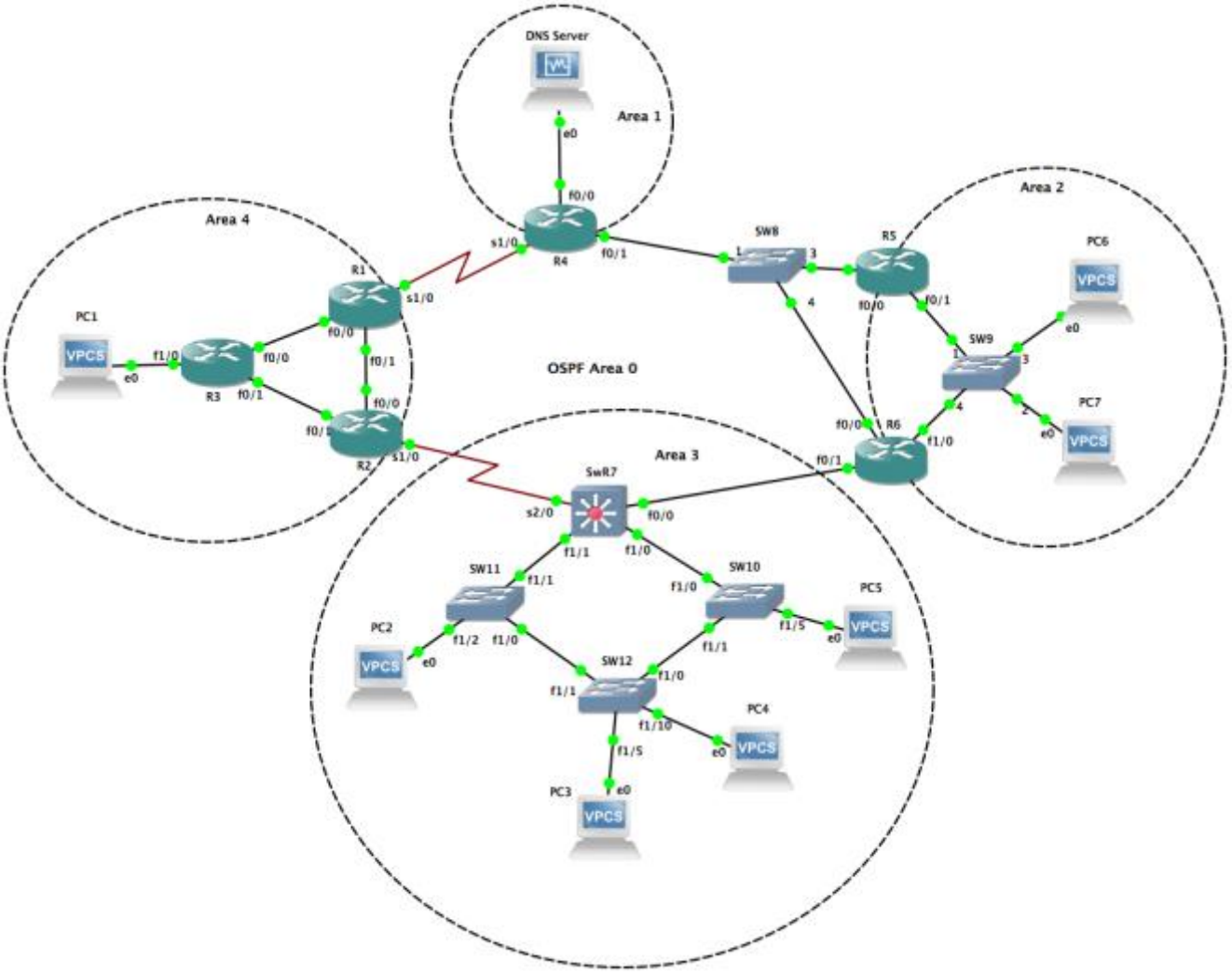

Figure 1 – Network configuration of part I.

3 Part II

You will now enhance the network solution of Part I. You can use technologies addressed in the course, or learn by yourself technologies not addressed in the course and implement them. The second option is preferred: you should demonstrate your ability to learn by yourself. In this process you can add or remove network elements and network configurations. Some suggestions that you can try:

- Imagining that the OSPF areas are Autonomous Systems, connect them through BGP. Test different features of BGP such as AS prepending, route filtering, local preference, etc.
- Assuming that areas 2 and 4 only provide IPv4 addressing and area 0 only support IPv6 addressing configure the mechanisms necessary to provide connectivity among all IPv4 hosts.
- Imagining that OSPF areas are in different geographical sites, connect them through an MPLS VPN.
- …
- Be inventive!

4 Evaluation

You must write a report on part II of the work and upload two zip files, one with the GNS3 configurations of Part I and another of Part II. The evaluation will be based on the report and on a short oral discussion, where

you must demonstrate the operation of both Parts I and II. Make sure that all elements of the group are fully aware of the configuration details; elements that do not, will be penalized.

The deadline for the submission of both project parts is 11/12/2017, at 23:59.