

Intermediary Project

1 Introduction

This project consists in the design, implementation, and test of a network with Layer 3 and Layer 2 routing protocols. The main task is to build and configure the network of Figure 1.

2 Project description

The network topology for the intermediary project is shown in Figure 1. For addressing, you may use the block of 193.X.144.0/21 and 2001:X:cafe::/48. The value of X should be the number of your group in fenix.

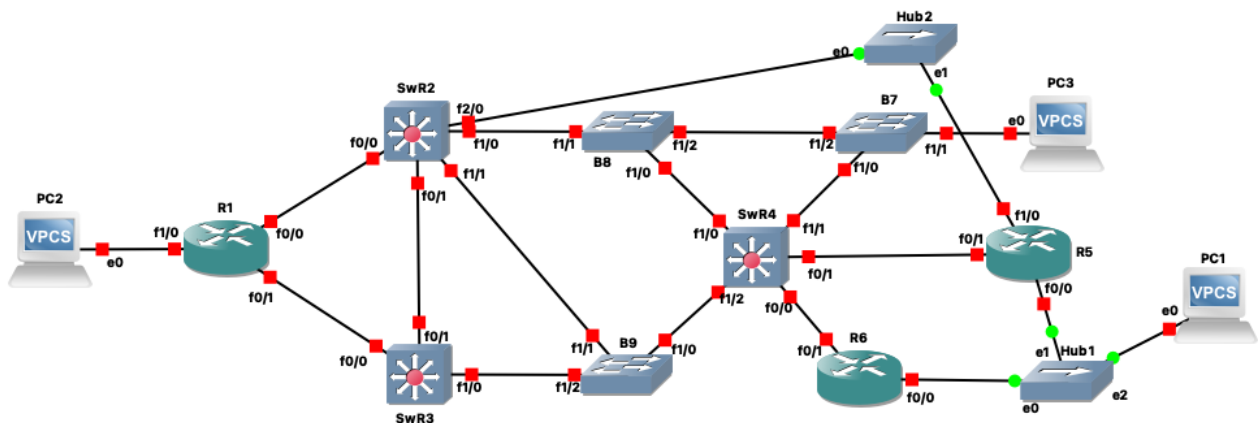


Figure 1: Network topology for the intermediary project.

B7, B8 and B9 are managed switches (use routers and change image) and thus, the NM-16ESW module needs to be added. SwR2, SwR3 and SwR4 are switch-routers (NM-16ESW should also be added in slot 1). Finally, R1, R5 should have an extra routing port (NM-1FE-TX) at slot 1 as well as SwR2 at slot 2.

Perform the following configuration steps:

1. Establish IPv4 connectivity among all network elements, including the PCs. You may use VPCS or routers acting as PCs for PC2, PC1 (use R6 as default-gateway) and PC3 (use SwR4 as default-gateway). Layer-3 IPv4 routing should be performed with OSPFv2. At this step, all interface costs should be 10, which is the default for slot 0 but not for slot 1.
2. Establish IPv6 connectivity among all network elements, including the PCs. Use IPv6 auto-configuration for the PCs. Layer-3 IPv6 routing should be performed with **static routes**. SwR3 and SwR4 should not be used in the routing paths.
3. Configure the following IPv4 routing paths:

- a. PC2 to PC1 packets always go through R1→R3→SwR2→SwR4→R6.
 - b. **PC1 to PC2** packets always go through R6→SwR4→R5→SwR2→R1.
 - c. This routing paths must be performed by manipulating OSPF interface costs. Note that the routing paths are strict (should not go through any other device).
4. Layer-2 routing should be performed based on the Spanning Tree Protocol. Before starting any configuration make sure that MAC address increases with the SwR/B number and the default priority is used in all SwR/B. Then, perform the following steps:
 - a. B8 should be the root bridge.
 - b. PC2 to PC1 packets always go through SwR2→B9→SwR4
 - c. **PC3 to PC2** packets always go through B7→B8→SwR2. **It may be needed to follow the path defined in b).**
5. Connect an additional router (R10) to R5, configure two loopback interfaces (10.0.X.0/24 and 10.1.X.0/24) at this router and use RIP to interchange routing information between R10 and R5. The newly installed router should be aware of all OSPF networks and the OSPF routers of the RIP networks. Note that R10 cannot have OSPF installed.

3 Report

The report should include the following information:

1. Network figure with the addresses assigned for each network and a table with all IP addresses assigned for the interfaces. Both for IPv4 and IPv6.
2. Network L2 diagram illustrating which switching ports were blocked, the STP costs and which device is the root bridge. Include a table with the MAC of every switch.
3. Short description of the configuration actions performed for each network element. Avoid long text and repetitions.
4. Define which costs/priority were changed in each network element and how the routing paths were successfully done.
5. Proof of connectivity between all PCs using ping. Both for IPv4 and IPv6.
6. OSPFv2 database description (detailed) showing that all links are described.
7. Proof of correct IPv4 routing according to the routing paths defined above, using traceroute.
8. Proof of correct L2 routing according to the routing paths define above, using MAC address tables.
9. IPv4/IPv6 routing table of R6 and R2, at least.

Points 6-10 should be shown during one of the session of the labs, where additional questions may be asked.

4 Submission

You must upload one zip file with the GNS3 configuration files (project folder) and the report which should have all configurations in annex. The deadline for the submission is 15th December 2023, at 23:59. The report should include the group number and all members which have participated in the project.

Note that all students will be evaluated individually at the end of the semester regarding lab/project work.

5 Code of Conduct

Each student is expected to subscribe to the highest standards of academic honesty. This means that each idea that does not belong to the student must be explicitly accredited to the respective author. Failure to comply with this simple rule constitutes plagiarism. Plagiarism includes the use of ideas, code or solutions from other students or individuals, or any other sources in addition to the course supporting texts. The students can and should identify the source as comment (use ! in the beginning of a line) in the configuration code.

But students cannot copy configurations (or code) from other students or give their own configuration to others under any circumstances. Any plagiarism will have the immediate consequence of failing all students involved (including those that made it possible).