



2. Dynamic Routing

NETWORKING TECHNOLOGIES– v1.2025

PHỤC VỤ MỤC ĐÍCH GIÁO DỤC
FOR EDUCATIONAL PURPOSE ONLY

A. OVERVIEW

1. Learning objective

The learning objective of this lab is to understand how to dynamically exchange routing information between routers. Students will configure, observe, and troubleshoot the Routing Information Protocol¹ (RIP) and the Open Shortest Path First² (OSPF).

2. Practice Environment

- Practicing with physical networking devices
- Cisco Packet Tracer

¹ Distance Vector Routing algorithm

² Link State Routing algorithm

B. LAB TASKS

1. Dynamic Routing theory

Before practicing, let's find the answer to the following questions:

- What is the difference between Classful and Classless?
- We usually use the command `no auto-summary` when configuring RIP. Why do we need to use this command? What will happen if we configure RIPv2 without that command?
- What do the C, L, and R (shown in Figure 1) stand for?

```
R1# show ip route | begin Gateway
Gateway of last resort is not set

    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, Serial0/0/0
L       192.168.2.1/32 is directly connected, Serial0/0/0
R       192.168.3.0/24 [120/1] via 192.168.2.2, 00:00:24, Serial0/0/0
R       192.168.4.0/24 [120/1] via 192.168.2.2, 00:00:24, Serial0/0/0
R       192.168.5.0/24 [120/2] via 192.168.2.2, 00:00:24, Serial0/0/0
R1#
```

Figure 1: Example of the routing table

2. Dynamic Routing – RIP

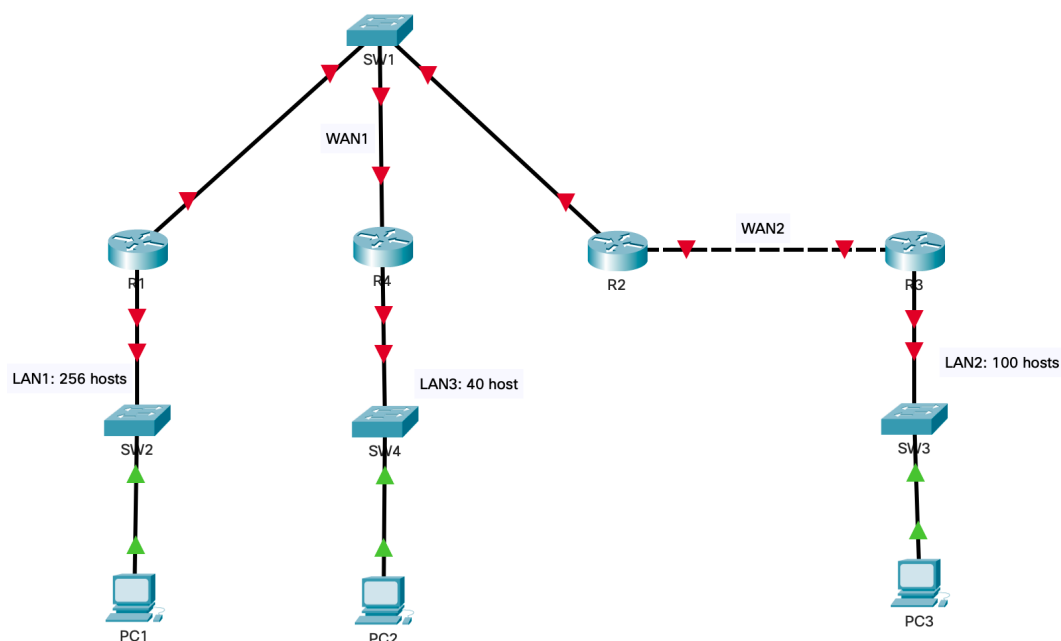


Figure 2: The topology diagram for Task 2

In this task, you will learn how to configure a small network with dynamic routing algorithms.

You are giving a topology diagram as shown in the figure above and network address **172.16.0.0/16**.

Requirements:

1. You need to divide the given network into suitable subnets for LAN networks and WAN networks. Then, fill out the result in **Subnetting table** (refer to Table 1). The VLSM method is recommended.
2. Set the hostname on all devices to match the topology diagram.
3. Set Banner Motd as **“Warning: Authorized Access Only on Router Rx”** (Rx is the name of Routers) on all routes.
4. Configure IP addresses and masks on all devices. You need to fill out this information in the **IP Assignment table** (refer to Table 2).
5. Configure the routers to run RIPv2.
6. Enable Tenet Remote Access on all routers.

You should frequently copy the Running-configuration to the Startup-configuration to avoid configuration losing when the device unexpectedly reboots.

Table 1: Example of Subnetting Table

Subnet	Network Address/CIDR	First IP Address	Broadcast Address
LAN1			
LAN2			
LAN3			
WAN1			
WAN2			

Table 2: Example of addressing table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			
	Fa0/1			
R2	Fa0/0			
	Fa0/1			

R3	Fa0/0			
	Fa0/1			
PC1	NIC			
PC2	NIC			
PC3	NIC			

3. Dynamic routing – OSPF

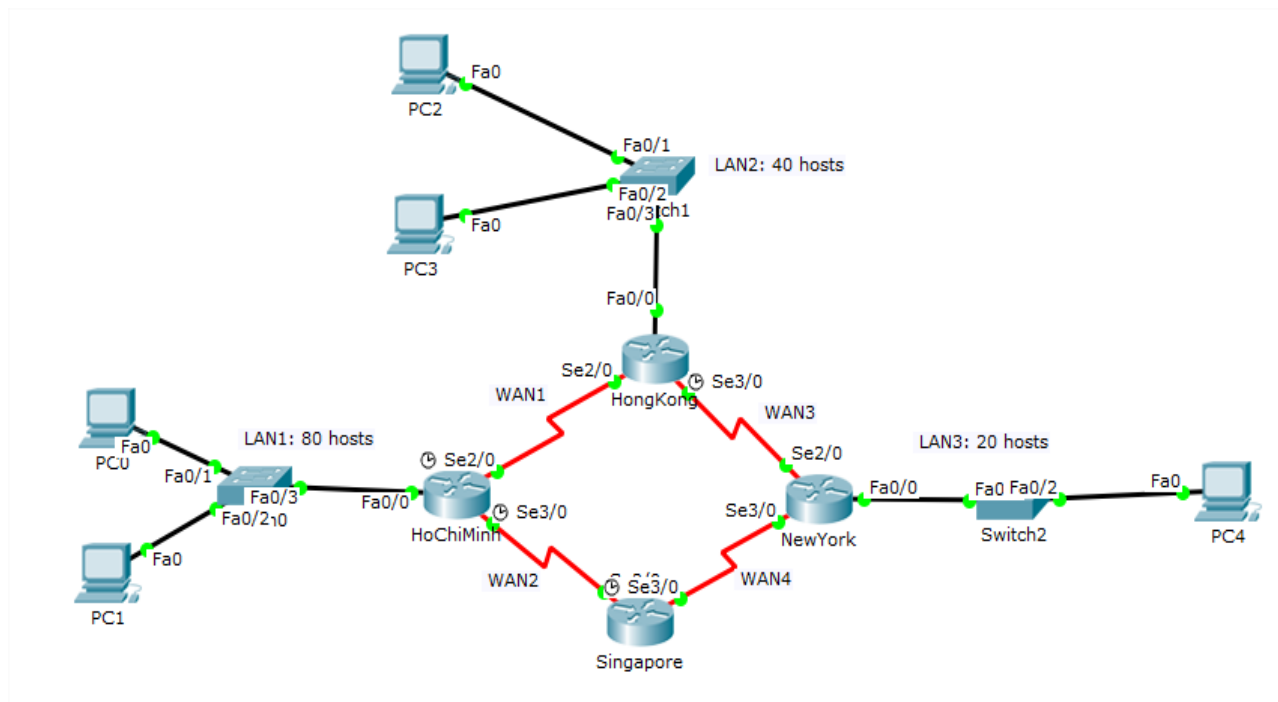


Figure 3: The topology diagram for Task 3

Requirements: You are given the network topology as shown in the figure above and network address **172.16.0.0/16** (with X standing for your group's ID).

1. You need to divide the allocated network into suitable subnets for LAN and WAN networks. Then, fill out the result in **Subnetting table** (refer to Table 1). The VLSM method is recommended.
2. Set the hostname on all devices.
3. Set Banner Motd as **"Warning: Authorized Access Only on Router Rx"** (Rx is the name of Routers) on all Routes.
4. Assign the IP address for all necessary interfaces of devices. You need to fill out this information in the **IP Assignment table** (refer to Table 2).
5. Configure OSPF routing to all routers so that all hosts among networks can communicate with each other.

Please note that you should frequently save the Running-configuration to the Startup-configuration in case of unexpected device rebooting.

C. REQUIREMENTS

You are expected to complete all tasks in section B (Lab tasks). Advanced tasks are optional, and you could get bonus points for completing those tasks.

Your submission must meet the following requirements:

- You need to submit a **detailed lab report in .docx** (*Word Document*) format, **using the report template** provided on the UIT Courses website.
- A report written in English is required.
- When it comes to **programming tasks** (*require you to write an application or script*), please attach all source-code and executable files (if any) in your submission. Please also list the important code snippets followed by explanations and screenshots when running your application in your report. Simply attaching code without any explanation will not receive points.
- Submit work you are proud of – don't be sloppy and lazy!

Your submissions must be your own. You are free to discuss with other classmates to find the solution. However, copying reports is prohibited, even if only a part of your report. Both reports of the owner and the copier will be rejected. Please remember to cite any source of the material (website, book,...) that influences your solution.

Notice: Combine your lab report and all related files into a single **ZIP file (.zip)**, name it as follow:

StudentID_ReportLabX.zip