



1. Routing Concepts and Static Routing

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FOR EDUCATIONAL PURPOSE ONLY

A. OVERVIEW

1. Learning objective

The **learning objective** of this lab is to get familiar with network devices, how they work together, and the concepts of routing. Moreover, students may practice on physical networking devices or simulation networking applications such as Cisco Packet Tracer. This lab will cover the following topics:

1. Introduction to popular networking devices
2. How to configure networking devices
3. The routing concepts and static routing

2. Practice Environment

a) Netacad account

Students need an account at <https://www.netacad.com/> to download necessary resources and use applications released by Cisco. It's free to create a new account here.

b) Cisco Packet Tracer

Packet Tracer is a simulation, visualization, and collaboration tool for learning networking. It allows students to construct their own model or virtual networks, obtain access to important graphical representations of those networks, animate those networks by adding their data packets, and finally annotate and save their creations.

You need to download the newest version of Packet Tracer Tool at <https://skillsforall.com/resources/lab-downloads>. Furthermore, you may enroll in the “Getting Started with Cisco Packet Tracer course” at <https://skillsforall.com/topics/cisco-packet-tracer> to familiarize yourself with the usage of the Packet Tracer Tool under the instruction of Cisco Academy.

B. LAB TASKS

1. Router and routing concepts

Let's answer the following questions:

- What is the role of routers, switches, hubs in a network system?
- What is the static routing? Briefly describe the advantages and disadvantages of static routing.

2. Basic router configuration and static routing

Giving the network topology and devices' IP address as describe in the Table 1 below:

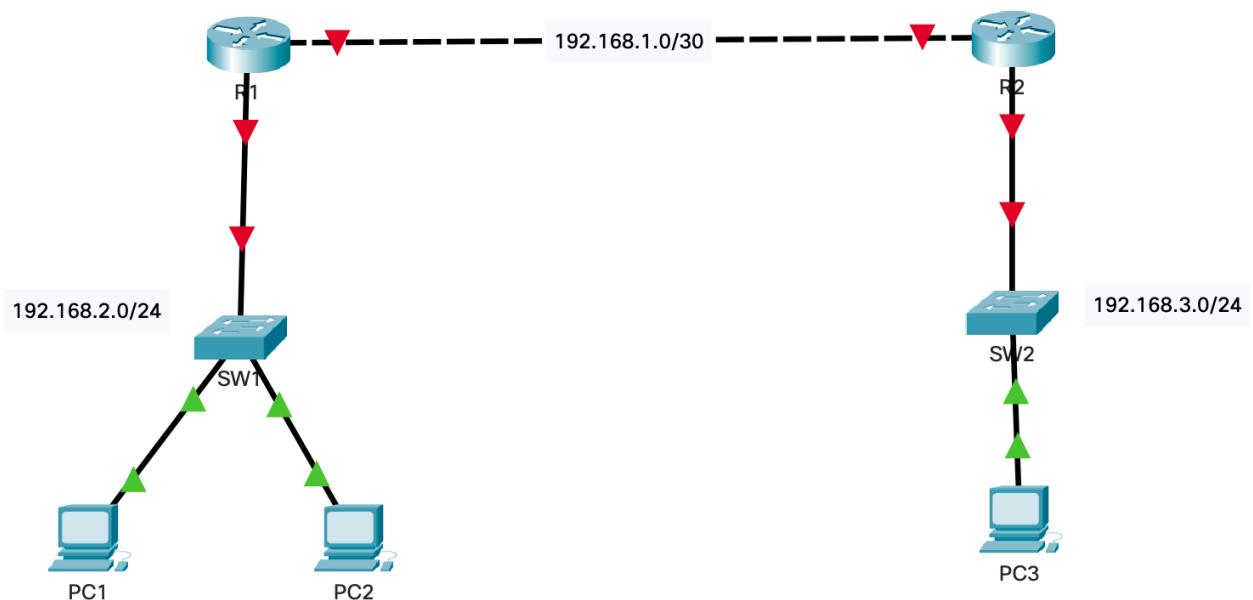


Figure 1: Network topology for Task 2

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
R1	G0/0/0	192.168.1.1	255.255.255.252	
	G0/0/1	192.168.2.1	255.255.255.0	
R2	G0/0/0	192.168.1.2	255.255.255.252	
	G0/0/1	192.168.3.1	255.255.255.0	
PC1	NIC	192.168.2.100	255.255.255.0	192.168.2.1

PC2	NIC	192.168.2.200	255.255.255.0	192.168.2.1
PC3	NIC	192.168.3.50	255.255.255.0	192.168.3.1

Table 1: The IP Address for devices on task 2

Requirements: You are given the network topology as shown in the Figure 1. This task is designed to work on physic network devices.

1. You need to choose the necessary devices and cables. Then set up the network as shown in the topology above.
2. All devices need to power on and assign the corresponding hostname.
3. On each Router, set the password *uitcisco* for the privileged mode, the user EXEC mode, and Telnet remote access. You should use the encrypted password for security.
4. Set Banner Motd as *"Warning: Authorized Access Only on Router Rx"* (Rx is the name of Router) for all Routes.
5. Assign the IP address for all necessary interfaces of devices.
6. Configuring the static routing in all routers so that all devices can communicate with each other.

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

3. Subnetting and static routing

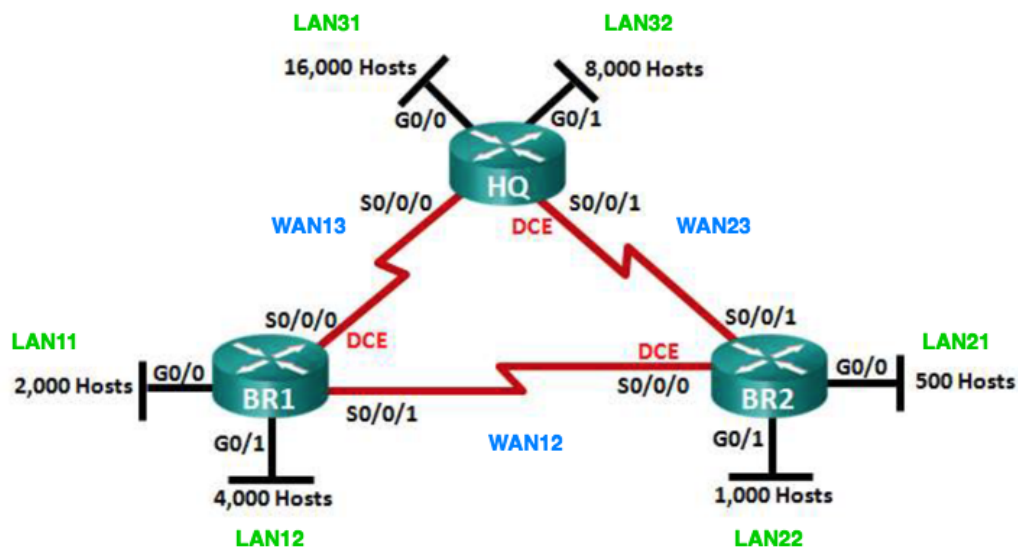


Figure 2: Network topology for task 3

A company needs to set up the network infrastructure as shown in the Figure 2. You need to subnetting the network **172.(16+(X%16)).0.0/16** (X is your group id) into suitable subnets using VLSM¹ method.

For example, group 13 will use the network 172.29.0.0/16 for subnetting.

Requirements: (recommended to perform this task in simulation environment, e.g., Cisco Packet Tracer, EVE-NG,...)

1. Subnetting the given network address and filling out the result to the Table 2. You need to briefly explain how to get these results.
 2. Basic configure on router devices:
 - Set the corresponding hostname for devices.
 - Set the password **uitcisco** on all routers for privileged EXEC, user EXEC, and Telnet remote access.
 - Set the Banner motd for all routers: *"Warning: Authorized Access Only on Router X"*
 3. Assign the IP address to routers' interfaces. In each LAN zone, the first IP address of its subnet is reserved to router's interface. You need to fill out this information to **Table 3**
 4. All routers need to configure static routing. So that all devices can communicate with each other.
 5. Configure any redundancy routes to ensure the Router BR1 and BR2 can communicate with each other even if the direct link (link WAN12) fails.
- Tips: You can use the **floating static route** to achieve this goal.*

¹ Variable Length Subnet Mask method

Note:

- To avoid losing your configuration, you should copy Running-configuration to Startup-configuration before shutdown or close network topology on Packet Tracer Tool.
- Remember to include the topology file (.PKT) in your submission.

Table 2: Subnet information

Subnet	Network Address/CIDR	First IP Address	Broadcast Address
LAN11			
LAN12			
LAN21			
LAN22			
LAN31			
LAN32			
WAN12			
WAN13			
WAN23			

Table 3: IP Address assignment

Device	Interface	IP Address	Subnet Mask	Default Gateway
HQ	S0/0/0			
	S0/0/1			
	G0/0			
	G0/1			

BR1	S0/0/0			
	S0/0/1			
	G0/0			
	G0/1			
BR2	S0/0/0			
	S0/0/1			
	G0/0			
	G0/1			
PC11 (LAN11)				
PC12 (LAN12)				
PC21 (LAN21)				
PC22 (LAN22)				
PC31 (LAN31)				
PC32 (LAN32)				
Server (LAN31)				

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. We prefer you work in a team of four to get the highest efficiency.

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.
- Either Vietnamese or English report is accepted, that's up to you. The report written in the mixing of multiple languages is not allowed (except for the untranslatable keywords).
- 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:

StudentID1_StudentID2_ReportLabX.zip