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Faculty of Science and Technology
Department of Mathematics and Technology
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Lab2 / Network Architecture / M1 CYSIA

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1 Objective

The purpose of this lab is to learn how to configure the RIP dynamic routing protocol on a Cisco router using the Packet Tracer network simulator.

Reminder

To reach networks that are not directly connected, additional entries are needed in the IP routing table. These entries can be configured by the network administrator (static routing - see Lab 1 -) or dynamically learned from other routers. The Routing Information Protocol (RIP) can be configured to allow routers to exchange information and discover remote networks.

Exercise 1

Consider the following network topology :

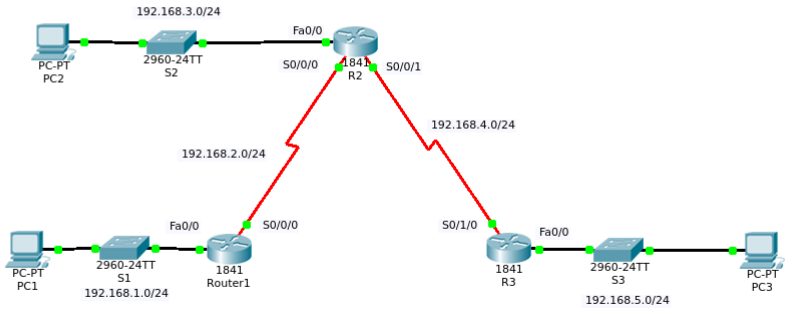


FIGURE 1 – Network Topology.

1. Create the network shown in Figure 1 using Packet Tracer. Make the necessary configurations using the information provided in Table 1.

(a) Configure the IP information on the routers : Activate **global configuration mode** and access router R1 using the CLI. Enter **privileged mode** with the command **enable**. Activate **global configuration mode** with the command **config t**.

(b) Configure the interfaces : Enter **configuration mode for the first FastEthernet interface** with the command **interface fa0/0**. Configure the IP address by typing the command **ip address 192.168.1.1 255.255.255.0** and activate the interface with the command **no shutdown**. Enter **configuration mode for the first serial interface** by typing the command **interface s0/0/0**. Configure the IP address using the command **ip address 192.168.2.1 255.255.255.0**. Configure the clock rate using the command **clock rate 64000**, then activate the interface using the command **no shutdown**.

(c) Exit configuration mode by pressing **Ctrl+Z**. Save the configuration by typing the command **copy run start** or **wr**.

2. Repeat (1) for the other two routers, R1 and R2.
3. Check Layer 1 and Layer 2 information : On each of the three routers, check the status of the interfaces by typing the command **show ip interface brief**.
4. Consult the IP routing table : Check the IP routing table of each of the three routers using the command **show ip route**. Note that the routing table contains only information about directly connected networks. Information about other networks is provided via **static routing** (see Lab 1) or **dynamic routing**, as described below.
5. Configure the RIP protocol on router R1. The choice between RIP v1 or RIP v2 must be justified.

   (a) Using the CLI, enter **privileged mode** with the command **enable**. Activate **global configuration mode** with the command **config t**.

   (b) RIP protocol configuration : Enter **router configuration mode** by typing the command **router rip**. In this mode, specify the networks **directly connected** to the router to start the routing process for these networks. Two networks are **directly connected** to router R1 : **192.168.1.0/24** and **192.168.2.0/24**. Configure the first network using the command **network 192.168.1.0** and the second one with the command **network 192.168.2.0**.

   (c) Save the configuration : Exit configuration mode by pressing **Ctrl+Z**. Save the configuration by typing the command **copy run start** or **wr**.

6. Examine the RIP parameters on router R1 by typing the command **show ip protocols** in **privileged mode** CLI (Enter **privileged mode** by typing the command **enable**).
7. Type the command **debug ip rip** in privileged mode on router R1 and observe what happens.
8. Stop the debug mode on router R1 by typing the command **undebug all**. You can test the **debug ip rip** command on the other routers (R2, R3) when they have been configured.

Device	Interface	IPv_4	Subnet Mask	Default gateway
R1	Fa0/0	192.168.1.1	/24	ND
	S0/0/0	192.168.2.1	/24	ND
R2	Fa0/0	192.168.3.1	/24	ND
	S0/0/0	192.168.2.2	/24	ND
	S0/0/1	192.168.4.2	/24	ND
R3	Fa0/0	192.168.5.1	/24	ND
	S0/0/1	192.168.4.1	/24	ND
PC1	Carte réseau	192.168.1.10	/24	192.168.1.1
PC2	Carte réseau	192.168.3.10	/24	192.168.3.1
PC3	Carte réseau	192.168.5.10	/24	192.168.5.1

TABLE 1 – Interface addresses of the network devices in Figure 1.

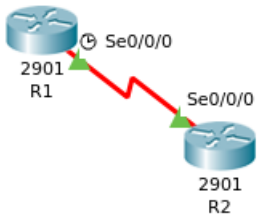
9. Configure interface **FastEthernet Fa0/0** on router R1 as **passive interface**. To do this (**Question for Master 1 only**) :
   (a) Activate **global configuration mode** by typing the command **config t**.
   (b) Enter **router configuration mode** by typing the command **router rip**.
   (c) Then execute the command **passive-interface Fa0/0**.
   (d) Exit configuration mode by typing **Ctrl+Z**.
   (e) Save the configuration by typing **copy run start** or **wr**.
10. Repeat steps (5) through (8) for R1 and R2.
11. Check the RIP parameters for each of the three routers (R1, R2) by typing the command **show ip protocols**.
12. Type the command **show ip route** to check the IP routing table of each router. The routing table should contain an entry for each of the five 5 networks.
13. Verify connectivity by pinging from each computer to the other two. Each ping request should be successful.

Useful Information

1. **Disabling Route Summarization**
   — RIP V1 always uses automatic route summarization. You cannot disable this feature for RIP V1. RIP V2 uses automatic route summarization by default. The RIP routing process summarizes network number boundaries. This can cause routing problems if you have non-contiguous networks.

- For example, if you have a router connected to networks 192.168.1.0, 192.168.2.0, and 192.168.3.0, and these networks all participate in RIP, the RIP routing process creates the summary address 192.168.0.0 for these routes. If an additional router is added to the network with networks 192.168.10.0 and 192.168.11.0 and these networks participate in the RIP protocol, they will also be summarized to 192.168.0.0. To avoid any possibility of routing traffic to the wrong location, disable automatic summarization on routers creating conflicting summary addresses.
- To disable route summarization, enter the command *no auto-summary* in the RIP protocol configuration mode.

2. **Changing the Basic Timers of the RIP protocol** using the following command :
   - Router(config-router)# timers basic 30 40 10 90
   - The default values of the basic timers are :
     - Update : 30 seconds
     - Invalid : 180 seconds
     - Hold Down : 180 seconds
     - Flush : 240 seconds
3. DCE stands for data circuit-terminating, data communications, or data carrier equipment - this is a modem or more generally, a line adapter.
4. DTE stands for data terminal equipment which generally is a terminal or a computer.
5. Basically, these two are the different ends of a serial line.
6. One side of the link (DCE), has to transmit the clock signal, which controls the data rate, and the other side (DTE) receives the clock signal. For example :
   - R1 is a DCE (circuit-terminating, data communications, or data carrier equipment) :
     - interface Serial0/0/0
     - ip address 10.0.0.1 255.255.255.252
     - clock rate 2000000
   - R2 is DTE (Data Terminal Equipment) :
     - interface Serial0/0/0
     - ip address 10.0.0.2 255.255.255.252
7. The difference between the two cables in packet tracer is just which side you click first :
   - With the DCE cable, (red zigzag with clock) the side you click first will be the DCE, the second will be DTE
   - With the DTE cable (red zigzag no clock) the side you click first will be DTE, the second will be DCE
   - Whichever way you do it, you'll see one side of the cable shows the clock symbol : this is the DCE.


Se0/0/0
2901
R1
Se0/0/0
2901
R2