

The University of Jordan, Comp. Eng. Dept.

Spring 2023: Networks lab: Experiment 5

RIPv2 and RIPvng (Problem Sheet)

Problem 1: Configuring RIP v2 (IPv4) routing protocol

In this activity (i.e., Exp_5_Problem_1_RIPv2.pka), you will configure the PCs and routers interfaces using CIDR for IPv4, which is discussed comprehensively in Experiment 2. Then, you are requested to configure the RIPv2 routing protocol with static and default routing for Internet access and ensure full connectivity between all devices in the network. Figure 1 shows the topology that you want to configure.

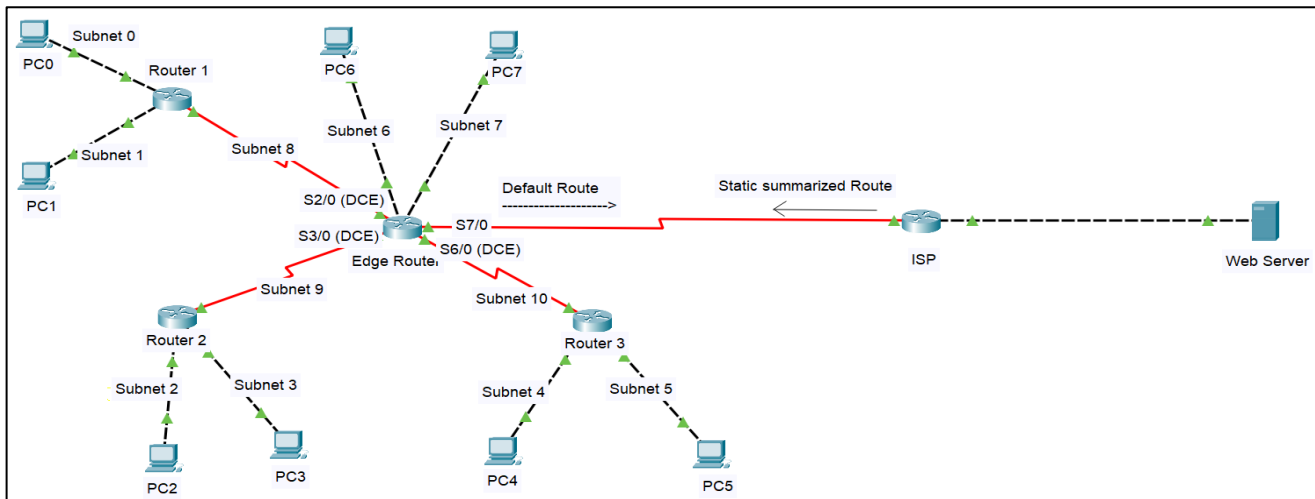


Figure 1. Network topology for problem 1.

Part 1: Configuring a network with the IPv4 and RIPv2 using the following instructions:

1. You have been given the network address **200.50.0.0/20** to use in your network design. Perform CIDR to minimize the number of routing entries that each router will advertise. Consider that the default gateway IP addresses of the hosts (i.e., the routers' LAN interfaces) are included in the hosts' number.
2. Fill in the table below (i.e., Table 1) with addresses based on the CIDR rules addressed in the handout for experiment 2. Considering these instructions, to make the proper configurations.

➤ **For each LAN interface:**

- ✓ The LAN interface is the connection between the PC and the router, where each LAN is represented by a single PC to simplify the network topology.
 - ✓ Assign the first valid host address in each subnet to the LAN interface of each router.
 - ✓ Assign the last valid host address in each subnet to the PC in the corresponding subnet.
- Subnet 0 supports 500 hosts.
 - Subnet 1 supports 220 hosts.
 - Subnet 2 supports 120 hosts.
 - Subnet 3 supports 60 hosts.
 - Subnet 4 supports 25 hosts.
 - Subnet 5 supports 10 hosts.
 - Subnet 6 supports 5 hosts.
 - Subnet 7 supports 5 hosts.

- **For each WAN interface (Subnet 8, Subnet 9, and Subnet 10):**
 - ✓ The WAN interface is the connection between two routers.
 - ✓ Assign the first valid host address in each subnet to the DCE WAN interface on the router.
 - ✓ Assign the last valid host address in each subnet to the DTE WAN interface on the router.
- 3. Configure the routers PCs using your addressing table. Before continuing, make sure that each device can ping its directly connected neighbor (its default gateway).
- 4. Configure all routers with RIPv2 routing except the ISP. In your configuration, make sure you do the following:
 - Disable automatic summarization.
 - Stop routing updates on interfaces that are not connected to RIP neighbors.
 - Set a default route from the Edge Router to the ISP using the outbound interface.
 - Redistribute the default route from Edge Router.
- 5. Configure a summarized static route on the ISP using the next hop IP option.

Part 2: Verify Configurations

1. View the routing tables for Edge Router, Router 1, Router 2, and Router 3.

- Use the appropriate command to show the routing table of Edge Router. RIP (R) now appears with connected (C) and local (L) routes in the routing table. All networks have an entry. You also see a default route listed.
- View the routing tables for Router 1, Router 2, and Router 3. Notice that each router has a full listing of all the networks.

2. Verify full connectivity to all destinations.

- Every device should now be able to ping every other device inside the network. In addition, all devices should be able to ping the ISP and the Web Server.

Table 1: Addressing table for IPv4 configuration for problem 1

Device	Interface	IPv4 Address	Subnet mask	Default Gateway	Connected with
Edge Router	FastEthernet0/0			--	PC6
	FastEthernet1/0			--	PC7
	Serial2/0 (DCE)			--	S2/0 of Router 1
	Serial3/0(DCE)			--	S2/0 of Router 2
	Serial6/0(DCE)			--	S2/0 of Router 3
	Serial7/0	100.100.100.2	255.255.255.252	--	S2/0 of ISP
Router 1	FastEthernet0/0			--	PC0
	FastEthernet1/0			--	PC1
	Serial2/0			--	S2/0 of Edge Router
Router 2	FastEthernet0/0			--	PC2
	FastEthernet1/0			--	PC3
	Serial2/0			--	S3/0 of Edge Router
Router 3	FastEthernet0/0			--	PC4
	FastEthernet1/0			--	PC5
	Serial2/0			--	S6/0 of Edge Router
ISP	Serial2/0(DCE)	100.100.100.1	255.255.255.252	--	S7/0 of Edge Router
	FastEthernet0/0	108.75.40.1	255.255.255.252	--	Web Server
Web Server	Fa0	108.75.40.2	255.255.255.252	--	ISP

PC0	Fa0				Fa0/0 of Router 1
PC1	Fa0				Fa1/0 of Router 1
PC2	Fa0				Fa0/0 of Router 2
PC3	Fa0				Fa1/0 of Router 2
PC4	Fa0				Fa0/0 of Router 3
PC5	Fa0				Fa1/0 of Router 3
PC6	Fa0				Fa0/0 of Edge Router
PC7	Fa0				Fa1/0 of Edge Router

Problem 2: Configuring RIPng (IPv6) routing protocol

In this activity, you will configure an IPv6 network with the RIPng routing protocol using the instructions and information given in Figure 2 and Table 2. In a few words, in this activity (Exp 5_Problem_2_RIPng.pka), you will configure the PCs and routers' interfaces with the IPv6 addresses provided in Table 2. Then, you are requested to configure the RIPng routing protocol with static and default routing for Internet access and ensure full connectivity between all devices in the network. Figure 2 shows the topology that you want to configure.

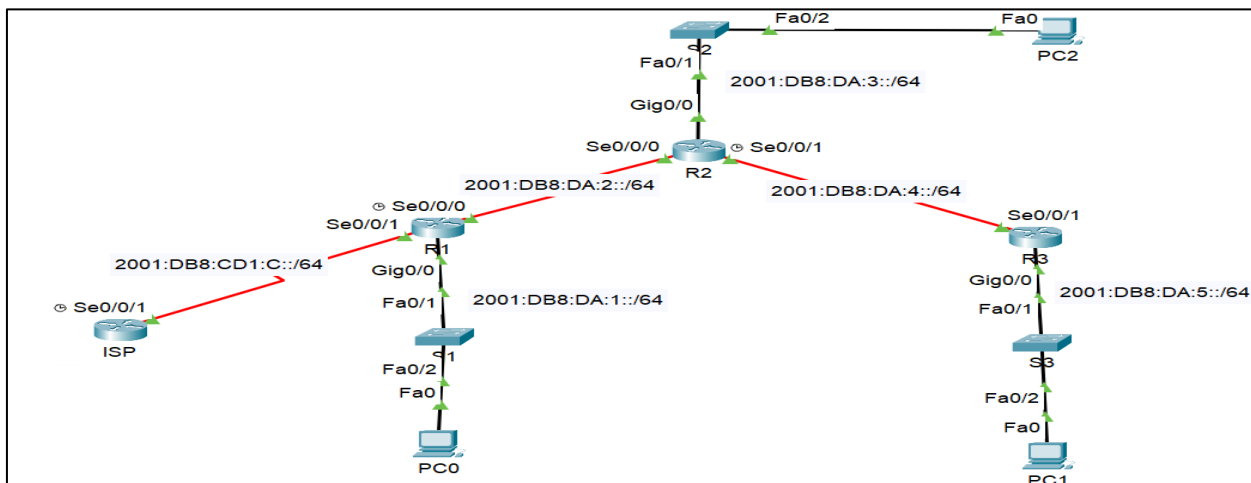


Figure 2. Network topology for problem 2.

Table 2: Addressing table for IPv6 configuration for problem 2

Device	Interface	IPv6 Address	Link-local	Default Gateway	Connected with
R1	S0/0/0(DCE)	2001:DB8:DA:2::1/64	FE80::1	--	R2
	S0/0/1	2001:DB8:CD1:C::2/64	FE80::1	--	ISP
	G0/0	2001:DB8:DA:1::1/64	FE80::1	--	PC0
R2	S0/0/0	2001:DB8:DA:2::2/64	FE80::2	--	R1
	S0/0/1(DCE)	2001:DB8:DA:4::1/64	FE80::2	--	R3
	G0/0	2001:DB8:DA:3::1/64	FE80::2	--	PC2
R3	S0/0/1	2001:DB8:DA:4::2/64	FE80::3	--	R2
	G0/0	2001:DB8:DA:5::1/64	FE80::3	--	PC1
ISP	S0/0/1(DCE)	2001:DB8:CD1:C::1/64	FE80::C	--	R1
PC0	Fa0	2001:DB8:DA:1::A/64	--	FE80::1	R1
PC1	Fa0	2001:DB8:DA:5::A/64	--	FE80::3	R3
PC2	Fa0	2001:DB8:DA:3::A/64	--	FE80::2	R2

Part1: Configuring a network with IPv6 and RIPng:

1. Configure each PC with:

- the 10th address of the IPv6 subnet provided in the network topology (i.e., A).
- a /64 network prefix length.
- the default gateway using the router's link-local addresses.
- **Note:** The link-local of each PC is already automatically configured, therefore, there is no need to configure it.

2. On all routers, configure the following:

- Enable IPv6 routing.
- Configure all interfaces with the assigned IPv6 link-local address, and global unicast IPv6 address.
- Enable the interfaces.
- Set the clock rate of serial DCE interfaces to 128000.

3. On all routers except the ISP:

- Enable RIPng on each interface except serial 0/0/1 of Router 1.
- Use the name: **RIPv6** in all caps as the RIPng routing process name (this name is case-sensitive).

4. On Router 1:

- Configure an IPv6 default route out of the s0/0/0/1 interface and propagate that route to the rest of the network using RIPng. Also, on the interface Serial0/0/1 of Router 2 only propagate that route using the following command, on the interface mode:

```
ipv6 rip RIPv6 default-information originate
```

5. On the ISP router:

- Configure an Ipv6 summary route, out of the s0/0/1 interface, to reach all Router 0, Router 1, and Router 2 subnets.

Part 2: Verify Configurations

1. View routing tables of Router 1, Router 2, and Router 3.

- Use the appropriate command to show the routing table of Router 1. RIP (R) now appears with connected (C) and local (L) routes in the routing table. All networks have an entry. You also see a default route listed.
- View the routing tables for Router 2 and Router 3. Notice that each router has a full listing of all the networks.

2. Verify full connectivity to all destinations.

- Every device should now be able to ping every other device inside the network. In addition, all devices should be able to ping the ISP.