

Portfolio RIP and EIGRP (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Objectives

Configure EIGRP for IPv4 in a small routed network (review).

The purpose of this activity is to review EIGRP routing protocol concepts and to compare/contrast RIP and EIGRP as distance-vector routing protocols.

Scenario

You are preparing a portfolio file for comparison of RIP and EIGRP routing protocols.

Think of a network with three interconnected routers with each router providing a LAN for PCs, printers, and other end devices. The graphic on this page depicts one example of a topology like this.

In this modeling activity scenario, you will be creating, addressing and configuring a topology, using verification commands, and comparing/contrasting RIP and EIGRP routing protocol outputs.

Complete the PDF reflection questions. Save your work and be prepared to share your answers with the class. Also save a copy of this activity for later use within this course or for portfolio reference.

Resources

Packet Tracer and word processing software programs

Directions

Step 1: WAN and LAN topology design

- Use Packet Tracer to design a network with three routers (1941 model, suggested). If necessary, add NIC cards to the routers to provide connectivity to the routers to provide for at least one LAN to each router. Add at least one PC to each LAN.
- Address the networks. You may use a flat addressing scheme or VLSM. Use only IPv4 networks for this entire activity.

Step 2: Copy the topology

- Highlight the entire topology by using your cursor.
- Use Ctrl+C to make a copy of the highlighted topology.
- Use Ctrl+V to insert a full copy of the topology to the desktop of Packet Tracer. You will now have displayed two exact, IPv4-addressed topologies with which to work for routing protocols configurations.
- While highlighted, move the copied topology to a different location on the Packet Tracer desktop to create room between the two for configuration purposes.

Step 3: Configure RIP and EIGRP on the separate topologies.

- Configure the RIP routing protocol on the first topology and EIGRP on the second routing topology.
- Once you have successfully configured RIP on one topology and EIGRP on the other, check to make sure your PCs can ping each other.
- Save your work so no configuration information is lost.

Step 4: Use verification commands to check output for the routing protocols.

- To compare/contrast routing protocol information from the two topologies, issue the **show ip route** command on R1 for topology 1 and 2.
- Copy the output into a table in your word processing program file. Label each column with RIP or EIGRP and place the output you received from the **show ip route** command.
- Issue the **show ip protocols** command on R1 for topology table 1 and 2. Create another table in your word processing software file and place the output information below RIP or EIGRP.
- Issue the **show cdp neighbors** command on R1's topology 1. Copy the output to a third table with RIP as the heading and issue the **show ip eigrp neighbors** command on R1's topology 2. Copy the output from this command in column 2 of table 3 under the heading EIGRP.

Reflection

- Compare and contrast the output for the **show ip route** verification command.

Answers will vary, but some answers may include: In both tables, the directly connected and link-local addresses show the same information, including subnet mask information if a flat addressing scheme was used. In the RIP table, routes to LANS are depicted by an R and an administrative distance/cost of 120/1 in all routing entries. This is the default for the RIP routing protocol. For EIGRP, routing table entries are depicted with a D and administrative distance is 90 for all LAN entries, but cost varies between the three LANs.

- Compare and contrast the output for the **show ip protocol** verification command.

Answers will vary but some answers may include: RIP and EIGRP are listed as the respective routing protocols. RIP shows an update schedule (every 30 seconds), while EIGRP does not show an update schedule. The metric weight and hop count limit is listed for EIGRP for bandwidth and delay calculations purposes. There is a process ID listed for EIGRP and no process ID listed for RIP. Interfaces are listed for RIP and no interfaces are listed for EIGRP. Administrative distance for RIP is shown as a value of 120 and for EIGRP, 90.

- Compare and contrast the **show cdp neighbors** command for the RIP topology and the **show ip eigrp neighbors** command for the EIGRP topology.

Both output shows directly connected neighbors information. The RIP output shows what type of routers are reporting the neighbor information and the EIGRP output does not. Interface connections are shown for both by name (Ser 0/0/0 and Ser 0/0/1). The IPv4 address is shown for interface connections on EIGRP output only.

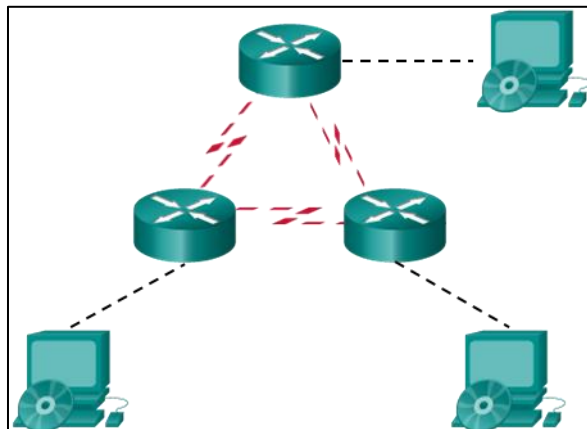
- After comparing and contrasting the RIP and EIGRP output, which do you find most informative? Support your answer.

In almost all cases, students will mention EIGRP as the most informative; although, without any advance configurations, the information is basically the same. One item students may mention, though, is that the lower the administrative distance, the better the route; therefore, in this case, the EIGRP output would be looked at as a more informative protocol.

Instructor Resource Example

The information listed in this section is only one depiction of what students could see as a result of this activity. Other topology designs, addressing schemes, interface connections and router output comparisons may vary per student groups.

Blank Topology Example



Sample Router Output for RIP and EIGRP configurations:

R1# show ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
 D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
 N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
 i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
 * - candidate default, U - per-user static route, o - ODR
 P - periodic downloaded static route

Gateway of last resort is not set

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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, 00:00:25, Serial0/0/0
        [120/1] via 192.168.4.1, 00:00:10, Serial0/0/1
192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.4.0/24 is directly connected, Serial0/0/1
L    192.168.4.2/32 is directly connected, Serial0/0/1
R    192.168.5.0/24 [120/1] via 192.168.2.2, 00:00:25, Serial0/0/0
R    192.168.6.0/24 [120/1] via 192.168.4.1, 00:00:10, Serial0/0/1
    
```

R1# show ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
 D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
 N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
 E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
 i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
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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
D    192.168.3.0/24 [90/2681856] via 192.168.2.2, 01:23:40, Serial0/0/0
        [90/2681856] via 192.168.4.1, 01:01:12, Serial0/0/1
192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.4.0/24 is directly connected, Serial0/0/1
L    192.168.4.2/32 is directly connected, Serial0/0/1
D    192.168.5.0/24 [90/2170112] via 192.168.2.2, 01:23:29, Serial0/0/0
D    192.168.6.0/24 [90/2170112] via 192.168.4.1, 01:01:12, Serial0/0/1
    
```

<pre> R1# show ip protocol Routing Protocol is "rip" Sending updates every 30 seconds, next due in 8 seconds Invalid after 180 seconds, hold down 180, flushed after 240 Outgoing update filter list for all interfaces is not set Incoming update filter list for all interfaces is not set Redistributing: rip Default version control: send version 1, receive any version Interface Send Recv Triggered RIP Key-chain GigabitEthernet0/0 1 2 1 Serial0/0/0 1 2 1 Serial0/0/1 1 2 1 Automatic network summarization is in effect Maximum path: 4 Routing for Networks: 192.168.1.0 192.168.2.0 192.168.4.0 Passive Interface(s): Routing Information Sources: Gateway Distance Last Update 192.168.2.2 120 00:00:19 192.168.4.1 120 00:00:08 Distance: (default is 120) </pre>	<pre> R1# show ip protocol Routing Protocol is "eigrp 1" Outgoing update filter list for all interfaces is not set Incoming update filter list for all interfaces is not set Default networks flagged in outgoing updates Default networks accepted from incoming updates EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0 EIGRP maximum hopcount 100 EIGRP maximum metric variance 1 Redistributing: eigrp 1 Automatic network summarization is in effect Automatic address summarization: Maximum path: 4 Routing for Networks: 192.168.1.0 192.168.2.0 192.168.3.0 192.168.4.0 Routing Information Sources: Gateway Distance Last Update 192.168.2.2 90 91539 192.168.4.1 90 1445980 Distance: internal 90 external 170 </pre>
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<pre> R1# show cdp neighbors Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone Device ID Local Intrfce Holdtme Capability Platform Port ID R2 Ser 0/0/0 172 R C1900 Ser 0/0/0 R3 Ser 0/0/1 127 R C1900 Ser 0/0/0 R1# </pre>	<pre> R1# show ip eigrp neighbors IP-EIGRP neighbors for process 1 H Address Interface Hold Uptime SRTT RTO Q Seq (sec) (ms) Cnt Num 0 192.168.2.2 Se0/0/0 10 01:26:12 40 1000 0 11 1 192.168.4.1 Se0/0/1 14 01:03:38 40 1000 0 14 R1# </pre>
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Identify elements of the model that map to IT-related content:

- RIP routing protocol
- EIGRP routing protocol
- Distance vector routing protocol
- Process ID for EIGRP
- Administrative distance and cost
- Metrics
- Directly connected networks
- Link local addressing
- Routing tables
- Neighbors