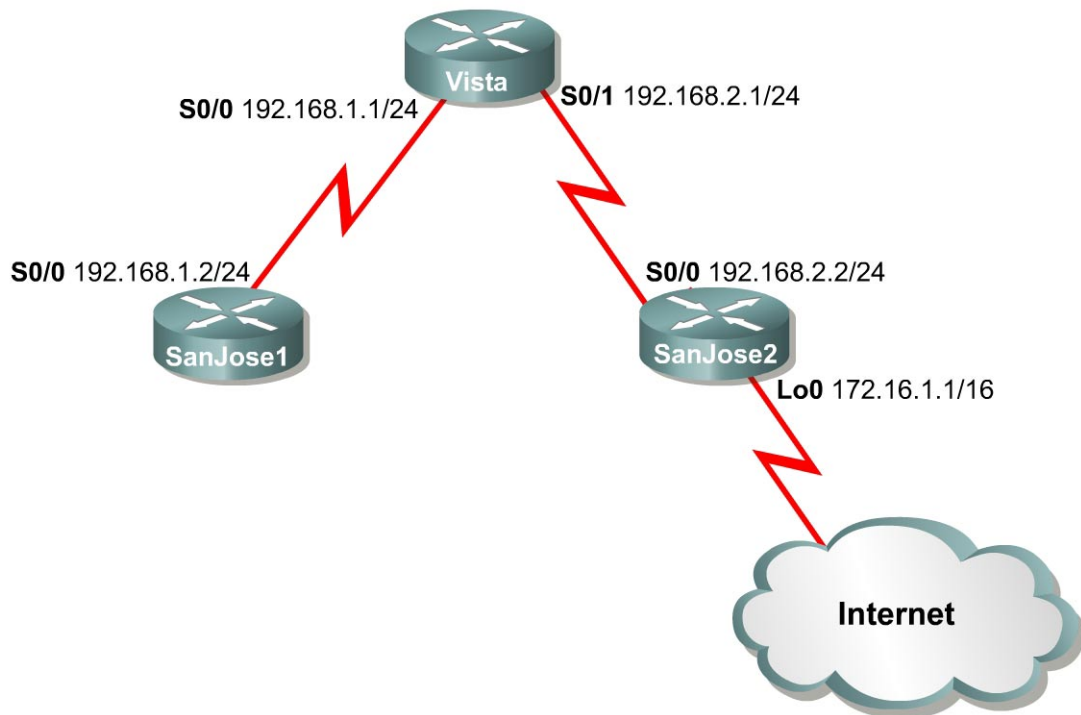## Lab 3.6.3 Configuring Default Routing with RIP and IGRP

Objective

In this lab, configure a default route and use RIP to propagate this default information to other routers. When this configuration has reached convergence, migrate the network from RIP to IGRP and configure default routing to work with that protocol as well.

Scenario

International Travel Agency (ITA) asked for default routing to be configured for its network, which currently uses RIP. The company connects to the Internet through SanJose2. It has been decided to configure a static default route on that router. To aid scalability, SanJose2 will propagate the default route to all other RIP routers.

ITA also asked that the possibility of migrating all routers to IGRP be explored. As a test, configure the three routers in this scenario for IGRP and configure default routing for that protocol as well.

Procedures

Before beginning this lab, it is recommended that each router be reloaded after erasing its startup configuration. This prevents problems caused by residual configurations. After the equipment is prepared, proceed with Step 1.

Step 1

Build and configure the network according to the diagram. If the configuration are used from the previous lab, remove all routing protocols. Do not configure the 172.16.1.1/16 address on SanJose2 yet. This network connects ITA to its ISP and the Internet.

Configure RIP on all three routers. However, be sure not to configure the SanJose2 RIP process to include the 172.16.0.0/16 network.

Use `ping` and `show ip route` to verify full connectivity within the network, excluding 172.16.0.0/16.

Step 2

Configure SanJose2 to simulate the existence of an outside network. For this scenario, the link between ITA and its provider needs to be simulated by configuring a loopback interface with an IP address. Enter the following commands on SanJose2:

```
SanJose2(config)#interface loopback0
SanJose2(config-if)#ip address 172.16.1.1 255.255.0.0
```

Note: If 172.16.1.1 is `pinged` from the SanJose2 console, the loopback interface replies.

From the Vista console, attempt to `ping` 172.16.1.1. This `ping` should fail because the 172.16.0.0/17 network is not in the Vista table.

1. If no default route exists, what does a router do with a packet destined for a network that is not in its table?

    _____

Step 3

Next, configure SanJose2 with a 0.0.0.0/0 default route pointed at the simulated ISP. Issue the following command on SanJose2:

```
SanJose2(config)#ip route 0.0.0.0 0.0.0.0 loopback0
```

This command statically configures the default route. The default route directs traffic destined for networks that are not in the routing table to the simulated WAN link loopback 0.

Depending on the IOS version, RIP might need to be specifically configured to propagate this 0.0.0.0/0 route. Enter the following commands on SanJose2:

```
SanJose2(config)#router rip
SanJose2(config-router)#default-information originate
```

Step 4

Now check the routing tables of SanJose1 and Vista using the `show ip route` command. Verify that they both have received and installed a route to 0.0.0.0/0 in their tables.

2. On Vista, what is the metric of this route?

    _____

3. On SanJose1, what is the metric of this route?

    _____

SanJose1 and Vista still do not have routes to 172.16.0.0/16 in their tables. From Vista, `ping` 172.16.1.1. This `ping` should be successful.

4. Why does the `ping` to 172.16.1.1 work, even though there is no route to 172.16.0.0/16 in the Vista table?

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Check to be sure that SanJose1 can also `ping` 172.16.1.1. Troubleshoot, if necessary.

> **Note:** If default route propagation does not occur as expected, two options are available as a last resort:

(1) Save the configuration files and reboot the routers.

(2) Remove the RIP process on each router with the `no router rip` command and reconfigure the RIP.

Step 5

With default routing now working, migrate the network from RIP to IGRP for testing purposes. Issue the following command on all three routers:

```
SanJose1(config)#no router rip
```

With the RIP removed from each router configuration, configure IGRP on all three routers using AS 24, as follows:

```
SanJose1(config)#router igrp 24
SanJose1(config-router)#network 192.168.1.0

Vista(config)#router igrp 24
Vista(config-router)#network 192.168.1.0
Vista(config-router)#network 192.168.2.0

SanJose2(config)#router igrp 24
SanJose2(config-router)#network 192.168.2.0
```

Use `ping` and `show ip route` to verify that IGRP is working properly. Do not worry about the 172.16.1.1 loopback address on SanJose2 yet.

Step 6

Check SanJose2 routing table. The static default route to 0.0.0.0/0 should still be there. The `default-information originate` command may have been required to propagate this route with RIP, based on the IOS version. The `default-information originate` command is not available in an IGRP configuration. Therefore, use the `ip default-network` method to propagate default information in IGRP.

On SanJose2, issue the following commands:

```
SanJose2(config)#router igrp 24
SanJose2(config-router)#network 172.16.0.0
SanJose2(config-router)#exit
SanJose2(config)#ip default-network 172.16.0.0
```

These commands configure IGRP to update neighbor routers about the network 172.16.0.0/16, which includes the simulated ISP link, loopback 0. Not only will IGRP advertise this network, but the `ip default-network` command also will flag this network as a candidate default route. A candidate default route is flagged with an asterisk in the routing table. When a network is flagged as a default, that flag will stay with the route as it passes from neighbor to neighbor by IGRP.

Check the routing tables of SanJose1 and Vista. If they do not yet have the 172.16.0.0/16 route with an asterisk, wait for another IGRP update. This could take 90 seconds. The `clear ip route *` command could also be issued on all three routers to force them to immediately send new updates.

When the 172.16.0.0/16 route appears as a candidate default in all three routing tables, proceed to the next step.

> **Note:** If default route propagation does not occur as expected, two options are available as a last resort:

(1) Save the configuration files and reboot the routers.

(2) Remove the RIP process on each router with the `no router igrp 24` command and reconfigure the RIP.

Step 7

The 172.16.0.0/16 network is known explicitly by SanJose1 and Vista. To test our default route, a second loopback interface needs to be created on SanJose2. Issue the following commands on SanJose2:

```
SanJose2(config)#interface loopback1
SanJose2(config-if)#ip address 10.0.0.1 255.0.0.0
```

This loopback interface simulates another external network, but one that is not explicitly identified in the routing table for SanJose1 or Vista.

Return to SanJose1 and check its routing table using the `show ip route` command.

5. Is there a route to the 10.0.0.0/8 network?

_____

From SanJose1, `ping` 10.0.0.1. This `ping` should be successful.

6. If there is no route to 10.0.0.0/8 and no route to 0.0.0.0/0, why does this `ping` succeed?

_____

Save the configuration files for the next lab.