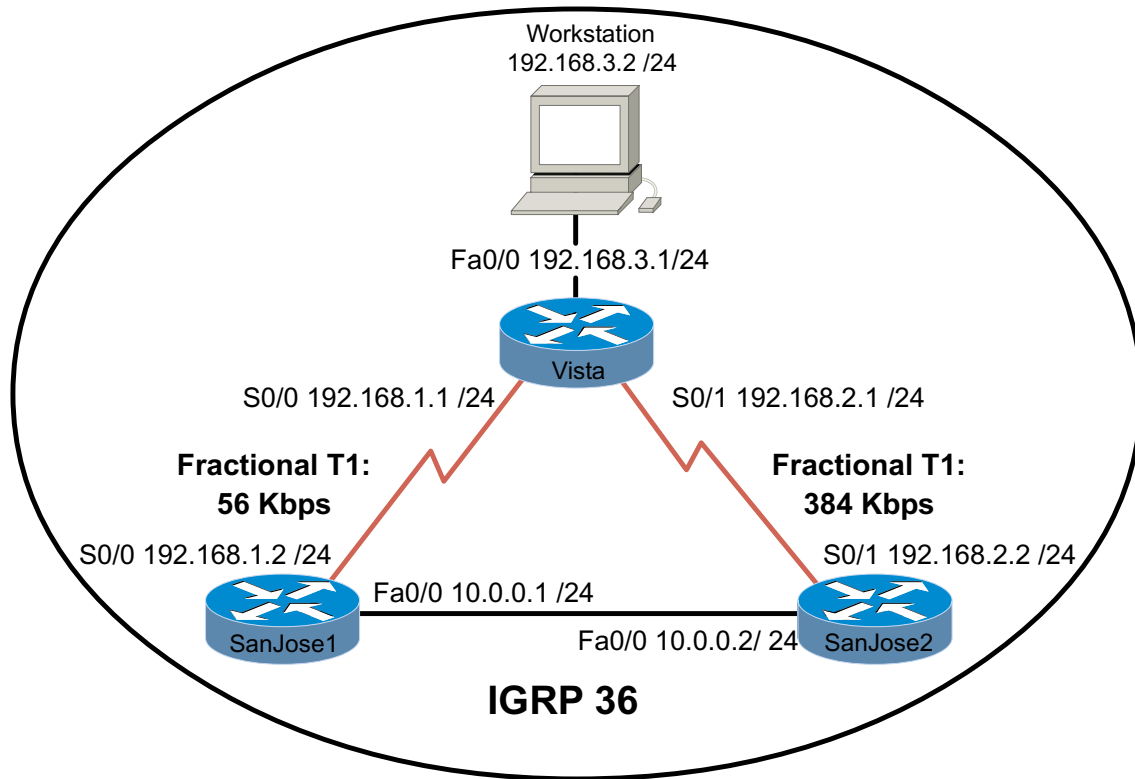


1.5.2 Unequal-Cost Load Balancing with IGRP



Objective

In this lab, you observe unequal-cost load balancing on an IGRP network by using advanced debug commands.

Scenario

Vista has two paths to network 10.0.0.0, but they have unequal IGRP metrics. You will configure unequal-cost load balancing and use advanced debug features to verify your work.

Step 1

Build and configure the network according to the diagram just shown. Use IGRP with an autonomous system number of 36, and enable updates on all active interfaces with these **network** commands:

```
SanJose2(config)#router igrp 36
SanJose2(config-router)#network 192.168.1.0
SanJose2(config-router)#network 10.0.0.0
```

Use ping to verify your work and test connectivity between all interfaces.

Also, because IGRP's metric includes bandwidth in its calculation, you must manually configure the bandwidth of serial interfaces in order to ensure accuracy. (For the purposes of this lab, Vista's alternative paths to network 10.0.0.0 aren't of unequal cost until the appropriate bandwidths are set.) Use the following commands to further configure Vista for the correct bandwidth and process switching:

```
Vista(config)#interface s0/0
Vista(config-if)#bandwidth 56
Vista(config-if)#no ip route-cache
Vista(config-if)#interface s0/1
Vista(config-if)#bandwidth 384
Vista(config-if)#no ip route-cache
```

Use the **show interface** command output to verify the correct bandwidth settings and the **show ip interface** command to ensure that fast switching is disabled.

1. Can the bandwidth of Ethernet or Token Ring interfaces be set manually?

2. Can an Ethernet interface be placed in fast switching mode?

Step 2

Check the routing table on Vista by using the **show ip route** command. Vista should have only one route to network 10.0.0.0 in its table. Troubleshoot if necessary.

Step 3

The variance value determines whether IGRP will accept unequal-cost routes. An IGRP router will only accept routes equal to the local best metric for the destination multiplied by the variance value. So, if an IGRP router's local best metric for Network A is 10476, and the variance is 3, the router will accept unequal-cost routes with any metric up to 31428 (10,476 x 3), as long as the advertising router is closer to the destination. An IGRP router accepts only up to four paths to the same network.

Note: An alternate route is added to the route table only if the next-hop router in that path is closer to the destination (has a lower metric value) than the current route.

By default, IGRP's variance is set to 1, which means that only routes that are exactly 1 times the local best metric are installed. Thus, a variance of 1 disables unequal-cost load balancing.

Configure Vista to enable unequal-cost load balancing using the following commands:

```
Vista(config)#router igrp 36
Vista(config-router)#variance 10
```

1. According to the help feature, what is the maximum variance value?

Step 4

Check Vista's routing table again. Vista should have two routes to network 10.0.0.0 with unequal metrics.

1. What is the IGRP metric for the route to 10.0.0.0 via SanJose1?

2. What is the IGRP metric for the route to 10.0.0.0 via SanJose2?

Step 5

Now you can test unequal-cost load balancing by sending a ping packet to network 10.0.0.0 from Vista while debugging. First, configure an access list to restrict debug output to the ping requests from Vista to network 10.0.0.0:

```
Vista(config)#access-list 101 permit icmp any 10.0.0.0  
0.255.255.255
```

Then, enable debug using the access list to filter output:

```
Vista(config)#debug ip packet 101
```

Finally, ping 10.0.0.1.

1. Are the packets load-balanced per destination or per packet?

2. How is unequal-cost load balancing different from equal-cost load balancing?
