Ryan Munger

Internetworking

Professor Cannistra

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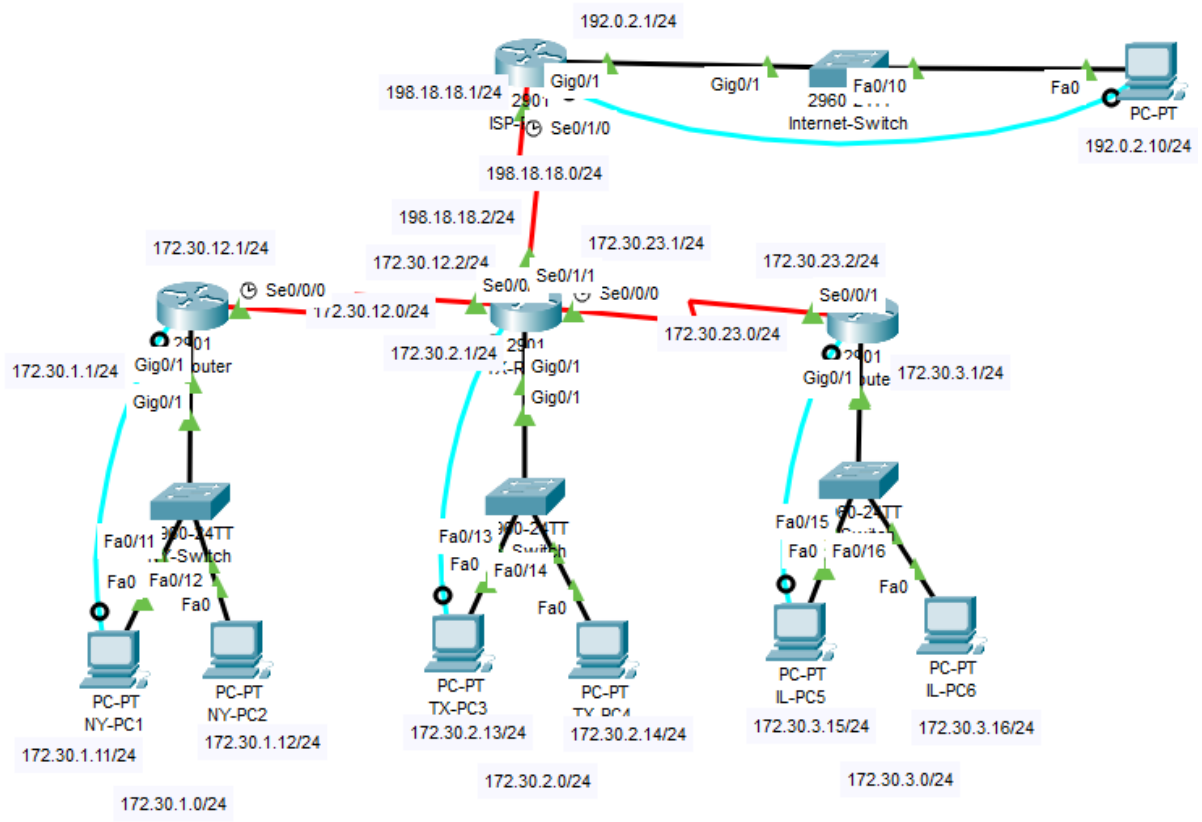
Lab 5

Description: In this lab, I created a topology involving three LANs and the internet. First, I configured it for static routing, then RIP version 2, then OSPF. I learned about dynamic routing protocols and their configurations.

Topology/Diagram:

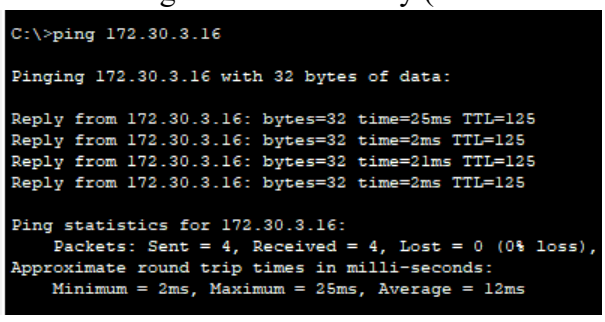


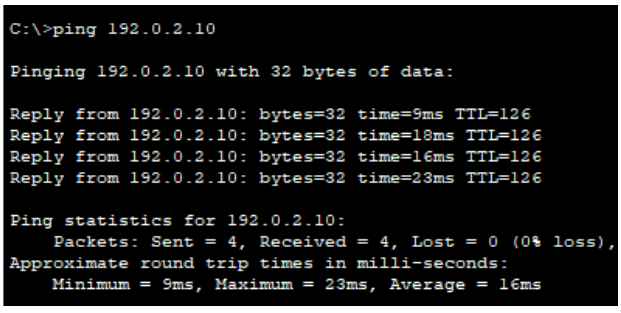
Syntax:

CLI	Command	Description	Mode
Cisco IOS	show controller <interface>	shows the interface controller info	User Mode
Cisco IOS	router rip	sets the routing protocol to RIP	Global Config
Cisco IOS	version 2	sets the RIP protocol to version 2	Router Config
Cisco IOS	network <ip>	(RIP) specify directly connected subnets to be advertised to routers	Router Config
Cisco IOS	no auto-summary	(RIP) forces the advertisement of different subnets from different interfaces on the same network	Router Config
Cisco IOS	clear ip route *	flushes routing table	Privilege Exec
Cisco IOS	show ip protocols	shows the ip protocols in use	User Exec
Cisco IOS	router ospf <id>	enables ospf with the id	Global Config
Cisco IOS	network <ip> <wildcard>	(OSPF) advertise the network, enables hello packets on the interface, wildcard specifies how many bits need to match	Router Config
Cisco IOS	show ip ospf neighbor	shows the neighboring routers that hello packets have been exchanged with	User Mode
Cisco IOS	(OSPF) default-information originate	distributes gateway of last resort/default route	Router Config

Verification:

Static Routing LAN connectivity (NY-PC1 to IL-PC6) & Internet (TX-PC3 to Intenet-PC)





TX-Router's Static Routing Table:

```
Gateway of last resort is 198.18.18.1 to network 0.0.0.0

     172.30.0.0/16 is variably subnetted, 8 subnets, 2 masks
S       172.30.1.0/24 [1/0] via 172.30.12.1
C       172.30.2.0/24 is directly connected, GigabitEthernet0/1
S       172.30.3.0/24 [1/0] via 172.30.23.2
C       172.30.12.0/24 is directly connected, Serial0/0/1
C       172.30.23.0/24 is directly connected, Serial0/0/0
     198.18.18.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.18.18.0/24 is directly connected, Serial0/1/1
S*   0.0.0.0/0 [1/0] via 198.18.18.1

TX-Router>
```

Verify Full RIPv2 Connectivity (NY-PC1 to IL-PC6) & Show TX-Router's routing table:

```
C:\>ping 172.30.3.16

Pinging 172.30.3.16 with 32 bytes of data:

Reply from 172.30.3.16: bytes=32 time=32ms TTL=125
Reply from 172.30.3.16: bytes=32 time=30ms TTL=125
Reply from 172.30.3.16: bytes=32 time=2ms TTL=125
Reply from 172.30.3.16: bytes=32 time=2ms TTL=125

Ping statistics for 172.30.3.16:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 32ms, Average = 16ms
```

```
Gateway of last resort is 198.18.18.1 to network 0.0.0.0

     172.30.0.0/16 is variably subnetted, 8 subnets, 2 masks
R       172.30.1.0/24 [120/1] via 172.30.12.1, 00:00:17, Serial0/0/1
C       172.30.2.0/24 is directly connected, GigabitEthernet0/1
R       172.30.3.0/24 [120/1] via 172.30.23.2, 00:00:12, Serial0/0/0
C       172.30.12.0/24 is directly connected, Serial0/0/1
C       172.30.23.0/24 is directly connected, Serial0/0/0
     198.18.18.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.18.18.0/24 is directly connected, Serial0/1/1
S*   0.0.0.0/0 [1/0] via 198.18.18.1
```

Display the routing protocols configured on each of the routers with HINT: "show ip...". Has anything changed since you configured OSPF? Why do you think this is occurring?

show ip protocols: OSPF is now listed under the IP protocols; it is listed because we entered the command 'router OSPF <id>' in config mode to enable it. RIP is described as routing for 172.30.0.0 while OSPF is described more specifically as routing for the different subnets, their wildcard mask, and their area.
sh ip route | ex L: If you check the routing table, the RIP routes have been replaced by the routes learned from OSPF due to their lower administrative distance (110) than RIPv2 (120). The default static route remains listed.

Verify Full OSPF Connectivity & Show TX-Router's Routing Table

```
C:\>ping 172.30.3.16

Pinging 172.30.3.16 with 32 bytes of data:

Reply from 172.30.3.16: bytes=32 time=36ms TTL=125
Reply from 172.30.3.16: bytes=32 time=17ms TTL=125
Reply from 172.30.3.16: bytes=32 time=2ms TTL=125
Reply from 172.30.3.16: bytes=32 time=29ms TTL=125

Ping statistics for 172.30.3.16:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 36ms, Average = 21ms
```

```
Gateway of last resort is 198.18.18.1 to network 0.0.0.0

     172.30.0.0/16 is variably subnetted, 8 subnets, 2 masks
O       172.30.1.0/24 [110/65] via 172.30.12.1, 00:03:29, Serial0/0/1
C       172.30.2.0/24 is directly connected, GigabitEthernet0/1
O       172.30.3.0/24 [110/65] via 172.30.23.2, 00:03:19, Serial0/0/0
C       172.30.12.0/24 is directly connected, Serial0/0/1
C       172.30.23.0/24 is directly connected, Serial0/0/0
     198.18.18.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.18.18.0/24 is directly connected, Serial0/1/1
S*   0.0.0.0/0 [1/0] via 198.18.18.1
```

Display the routing tables on each of the routers. Has anything changed since you configured default route injection? Explain what is occurring?

Since default route injection was configured on Tx-Router, the routing tables of NY-Router and IL-Router have the default static route to the internet advertised to them. TX-Router is sharing the default route now in its LSAs.
Example of a default route learned via OSPF:
O*E2 0.0.0.0/0 [110/1] via 172.30.12.2, 00:00:56, Serial0/0/0

Conclusion: Everything went smoothly in this lab except for my initial RIPv2 configuration for network 172.30.3.0. This network was not being advertised, but after reconfiguring RIPv2, the network was functional. I now understand the migration from static routing to RIPv2 and OSPF as well as the differences between the protocols.