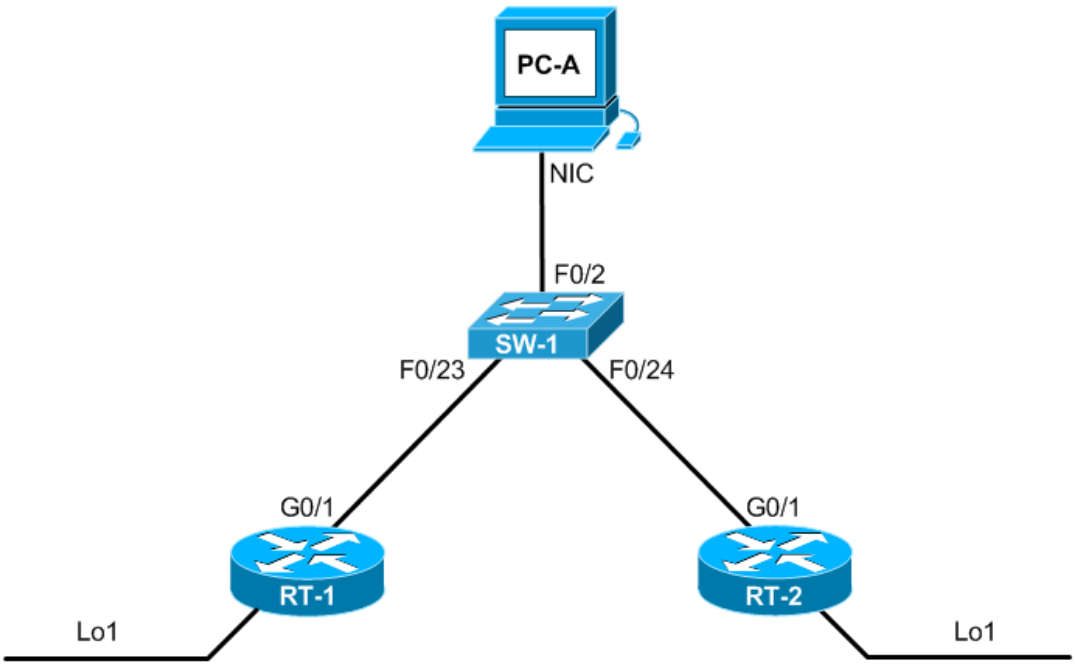
INFO-6047: Lab 07 – Static Routing

Topology



Note:

1) The router in the topology above are **2901**s and the switch is a **3560** Layer 3 (we are using this as a router this week)
2) For the In-House students, you will be working on your own this week. (You can talk, help and work with each other, BUT you must build your own topology.)
3) For the In-House students with the need for 2 routers per student you can have a **maximum of 3 student per row!**
4) For the On-Line students, you will have to build the lab in Packet Tracer.
5) You will find in the Lab section of FOL for this week a PowerPoint file. Please download this file, I have placed markers in the lab where you should do each capture. Make the screen captures and save them in the PowerPoint file according to the questions asked.

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IPV4 Addressing Table

Device	interface	IP Address	Subnet Mask	Default Gateway	Ports	Vlan name
RT-1	G0/1	172.16.0.254	/24			
		2001:acad:db8:16::254	/64			
	Lo1	10.10.10.10	/24			
		2001:acad:db8:10:10:10:10:10	/64			
RT-2	G0/1	172.18.0.254	/24			
		2001:acad:db8:18::254	/64			
	Lo1	10.20.20.20	/24			
		2001:acad:db8:20:20:20:20:20	/64			
SW-1	Vlan 10	192.168.1.254	/24		1 - 12	Users
		2001:acad:db8:1::254	/64			
	F0/23	172.16.0.1	/24			
		2001:acad:db8:16::1	/64			
	F0/24	172.18.0.1	/24			
		2001:acad:db8:18::1	/64			
PC-A	NIC	2001:acad:db8:1::10	/64	2001:acad:db8:1::254		
		192.168.1.10	/24	192.168.1.254		

Initial Setup

I would like to see each device with the following:

Basic system config:

a) The time set on your devices (both the clock and the time zone).
b) Set the hostname
c) Set the enable password to “class”.
d) Encrypt all passwords.
e) Disable domain name lookup.
f) Setup a banner.
g) Set the console and vty password to “cisco”.
h) Setup synchronous logging on the console port.
i) Enable telnet and ssh on the vty ports

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Setup the Network

a) Once you have decided which switch's and router's you will be using,
   PLEASE check that they are clean before you start

b) When you are building the configuration for the switch (the **3560** switch is a Layer 3 switch) please remember in it's default (clean) stat, it is a layer 2 device, we have to tell it to enable the layer 3 features we what to use!

   i. Refer back to "Lab 3" where we learned about SDM (System Database Management) and lets setup this switch to run IPv6 and IPv4 at the same time.
      SW-1(config)# sdm prefer dual-ipv4-and-ipv6 default
      There is more to this (a process that needs to be run, please check what we did in lab 3 section "SDM")

   ii. Once you have the SDM set correctly
      i. Let's enable IPv4 routing
         1. **SW-1(config)# ip routing**
      ii. Let's enable IPv6 routing
         1. **SW-1(config)# ipv6 unicast-routing**

   iii. Last thing, remember this is a layer 2 device until we tell it other wise, so all the port switch MAC addresses. We need to tell any port we want to have as a routable port with IP addresses assigned to it, that this port is no longer a switchport. (in our config for to day port f0/23 is **one** of these ports, here is an example for port f0/23)
      i. **SW-1(config)# inter f0/23**
      ii. **SW-1(config-if)# no switchport**
      iii. **SW-1(config-if)# ip add 172.16.0.1 255.255.255.0**
      iv. **SW-1(config-if)# ipv6 add 2001:acad:db8:16::1/64**

      No longer just switching MAC addresses
      Add an IPv4 address
      Add an IPv6 addres

      Let's look at what we just did, **i**) we went in to the interface (f0/23), then **ii**) we turned off switchport mode (don't look to MAC addresses for forwarding any more), then **iii**) and **iv**) we assigned IPv4 and IPv6 addresses to the port. With these instructions this port in now a routable port (we can route according to the IPaddresses attached)

c) Configure the other port on the switch (Port 24)

d) Assign the name to the Vlan 10

e) Create the Vlan 10 and assign the appropriate IP addresses (don't forget the **no shutdown** command)

f) Assign the Vlan 10 to the appropriate ports

g) Build the router configs
   i. Don't forget to enable IPv6

h) Copy the 3 config files you have created into the three devices

i) Connect the cables between the devices as per the topology diagram

i) For all 3 devices copy the "**show ip route**" command to see what is connected. (Only copy the information needed. Hence the lines that are at the bottom of the output from the **show ip route** command. The lines that show the "C", "L", and "S", from and including the line that starts "Gateway of last resort")

i. SW-1

```
Gateway of last resort is not set

     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.0.0 is directly connected, FastEthernet0/23
     172.18.0.0/24 is subnetted, 1 subnets
C       172.18.0.0 is directly connected, FastEthernet0/24
C    192.168.1.0/24 is directly connected, Vlan10
```

ii. RT-1

```
Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.10.10.0/24 is directly connected, Loopback1
L       10.10.10.10/32 is directly connected, Loopback1
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.0.0/24 is directly connected, GigabitEthernet0/1
L       172.16.0.254/32 is directly connected, GigabitEthernet0/1
```

iii. RT-3

```
Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.20.20.0/24 is directly connected, Loopback1
L       10.20.20.20/32 is directly connected, Loopback1
     172.18.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.18.0.0/24 is directly connected, GigabitEthernet0/1
L       172.18.0.254/32 is directly connected, GigabitEthernet0/1
```

j) For all 3 devices copy the "**show ipv6 route**" command to see what is connected. (Only copy the information needed. Hence the lines that are at the bottom of the output from the **show ipv6 route** command. The lines that show the "C", "L", and "S")

a. SW-1

```
C   2001:ACAD:DB8:1::/64 [0/0]
    via ::, Vlan10
L   2001:ACAD:DB8:1::254/128 [0/0]
    via ::, Vlan10
C   2001:ACAD:DB8:16::/64 [0/0]
    via ::, FastEthernet0/23
L   2001:ACAD:DB8:16::1/128 [0/0]
    via ::, FastEthernet0/23
C   2001:ACAD:DB8:18::/64 [0/0]
    via ::, FastEthernet0/24
L   2001:ACAD:DB8:18::1/128 [0/0]
    via ::, FastEthernet0/24
L   FF00::/8 [0/0]
```

b. RT-1

```
C   2001:ACAD:DB8:10::/64 [0/0]
    via Loopback1, directly connected
L   2001:ACAD:DB8:10:10:10:10:10/128 [0/0]
    via Loopback1, receive
C   2001:ACAD:DB8:16::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L   2001:ACAD:DB8:16::254/128 [0/0]
    via GigabitEthernet0/1, receive
L   FF00::/8 [0/0]
    via Null0, receive
```

c. RT-3

```
C   2001:ACAD:DB8:18::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L   2001:ACAD:DB8:18::254/128 [0/0]
    via GigabitEthernet0/1, receive
C   2001:ACAD:DB8:20::/64 [0/0]
    via Loopback1, directly connected
L   2001:ACAD:DB8:20:20:20:20:20/128 [0/0]
    via Loopback1, receive
L   FF00::/8 [0/0]
    via Null0, receive
```

Static Routing

a) Routers IPv4
   a. Both routers have only one path to the rest of the network, this can be considered a default route, so instead of putting in multiple static routes for each of the networks in our topology, we can do a single default route to direct our packets to all unknown networks not listed in our routing table.

      Any Network | any mask | next hop

      i. **RT-1(config)# ip route 0.0.0.0 0.0.0.0 172.16.0.1**
   b. Change the appropriate part of this command and repeat it on RT-2

b) Show the lines that changed when you do a "**show ip route**" command on each of the routers (compared to section "i" in Setup the Network), only show the differences
   a. RT-1

      S* 0.0.0.0/0 [1/0] via 172.16.0.1

   b. RT-2

      S* 0.0.0.0/0 [1/0] via 172.18.0.1

c) Routers IPv6
   a. Again both routers have only one path to the rest of the network, this can be considered a default route, so instead of putting in multiple static routes for each of the networks in our topology, we can do a single default route to direct our packets to all unknown networks not listed in our routing table.

      Any Network / any mask | next hop

      i. **RT-1(config)# ipv6 route ::/0 2001:ACAD:DB8:16::1**
      ii. Change the appropriate part of this command and repeat it on RT-2
      iii. What should the other routers command be?
         1. **RT-2(config)# ipv6 route**

d) Show the lines that changed when you do a "**show ipv6 route**" command on each of the routers (compared to section "J" in Setup the Network), only show the differences
   a. RT-1

      S ::/0 [1/0]
      via 2001:ACAD:DB8:16::1

   b. RT-2

      S ::/0 [1/0]
      via 2001:ACAD:DB8:18::1

e) Switch IPv4
   a. Out of the 5 networks in our topology, how many are connected to this switch **3**
   b. This means the are **2** unknown networks to this switch (the switch does not know where these networks are at this point in time).
   c. We need to tell the switch how to find these networks

      this network | this mask | next hop

      i. **SW-1(config)# ip route 10.10.10.0 255.255.255.0 172.16.0.254**
      ii. What should the other route we need be?
         1. **SW-1(config)# ip route 10.20.20.0 255.255.255.0 172.18.0.254**

f) Show the lines that changed when you do a "**show ip route**" command on the switch (compared to section "i" in Setup the Network), only show the differences
   a. SW-1

```
      10.0.0.0/24 is subnetted, 2 subnets
S     10.10.10.0 [1/0] via 172.16.0.254
S     10.20.20.0 [1/0] via 172.18.0.254
```

g) Switch IPv6
   a. Again out of the 5 networks in our topology, how many are connected to this switch **3**
   b. This means the are **2** unknown networks to this switch (the switch does not know where these networks are at this point in time).
   c. We need to tell the switch how to find these networks

      this network / this mask | next hop

      i. **SW-1(config)# ipv6 route 2001:ACAD:DB8:10::/64 2001:ACAD:DB8:16::254**
      ii. What should the other route we need be?
         1. **SW-1(config)# ipv6 route 2001:ACAD:DB8:20::/6 2001:ACAD:DB8:18::254**

h) Show the lines that changed when you do a "**show ip route**" command on the switch (compared to section "i" in Setup the Network), only show the differences
   a. SW-1

```
S   2001:ACAD:DB8:10::/64 [1/0]
    via 2001:ACAD:DB8:16::254

S   2001:ACAD:DB8:20::/64 [1/0]
    via 2001:ACAD:DB8:18::254
```

i) Get the PowerPoint file from lab section in this week's section of FOL, complete the 10 PPTx slides/captures.

(PowerPoint – Capture 1)

(PowerPoint – Capture 2)

(PowerPoint – Capture 3)

(PowerPoint – Capture 4)

(PowerPoint – Capture 5)

(PowerPoint – Capture 6)

(PowerPoint – Capture 7)

(PowerPoint – Capture 8)

(PowerPoint – Capture 9)

(PowerPoint – Capture 10)

That's it for today.

Clean out the configurations on the switches and routers you used this week.
Don't forget to collect your cables.
Then cleanup your workstations
Save your PT, for later use/viewing/study