CSG1105 Workshop Twelve

1 Introduction

This week we are going to extend our Packet Tracer (PT) skills. Last week, we constructed a network with VLANs to implement a network with four subnets with a router for inter-VLAN communication. This week we are going to implement a network with two routers and IPv6. There will be a WAN link between the routers which will use a subnet for the link.

2 Build the Base Network

1. Load Packet Tracer and Create the following network in Packet Tracer using 2960 switches.
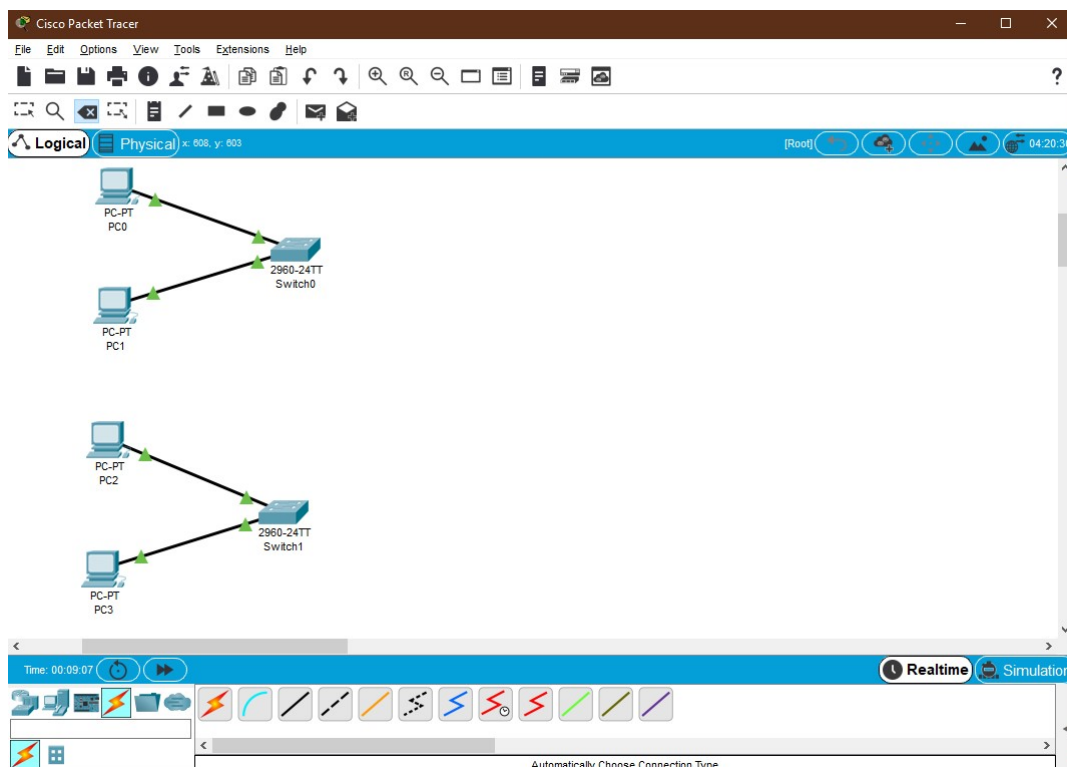

2. Select PC1 and go to Desktop->Command Prompt

3. At the C: prompt, type `ipconfig`
4. You will get a response like:

```
C:\>ipconfig
    FastEthernet0 Connection:(default port)
     Link-local IPv6 Address.: FE80::202:4AFF:FEA8:62C IP
     Address.................: 0.0.0.0 Subnet
     Mask....................: 0.0.0.0 Default
     Gateway.................: 0.0.0.0
```

5. Note that there is no IPv4 address assigned to this PC.
6. The **link-local** IPv6 address is automatically assigned and can be used on the local network only. It is configured using a modified version of the MAC address of the NIC. Select and copy the IPv6 address.
7. Select PC2 and go to Desktop->Command Prompt
8. Enter the command `ping` and paste the IPv6 address from PC1. You will see PC1 respond to the ping requests. Unlike IPv4 where we would have to statically assign an IP address and netmask, or enable DHCP to assign an IP address, IPv6 automatically generates a link-local address from the MAC address of the PC.
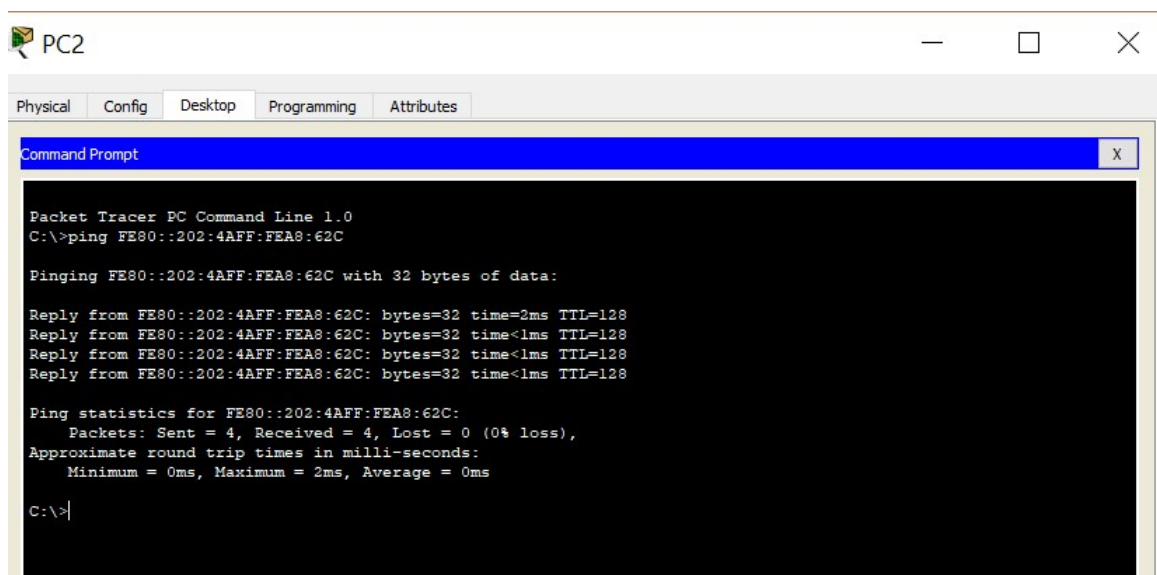
3 CONFIGURE A ROUTER WITH LINK-LOCAL ADDRESSES

1. Link the two switches with a 1941 router. We now need to assign link-local addresses to the router interfaces.
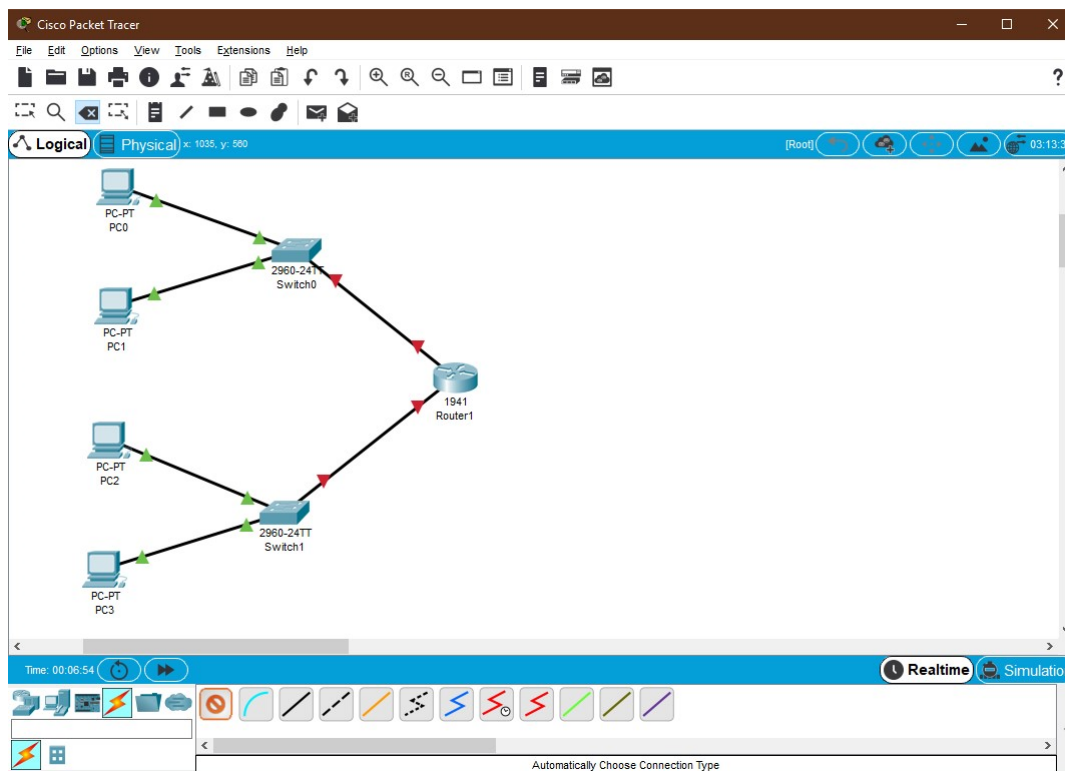
2. Enter the CLI console of the router and enter the following commands.

```
enable
conf t
ipv6 unicast-routing
interface g0/0
ipv6 address FE80::1 link-local
no shutdown
interface g0/1
ipv6 address FE80::1 link-local
no shutdown
```

3. When this is completed, the links to the router will turn green and the PCs will be able to ping the router.
4. Note that we used the same link-local address for both g0/0 and g0/1. This is because a link-local address is only significant on that local network only. You will not be able to ping PC3 from PC2 as they are on different networks.

3.1 Configure routable IPv6 addresses

1. To enable communication between the LANs, we need to assign Routable IPv6 global unicast addressing
2. The `2001:DB8` in the network registry portion of the network address is like the 10.0.0.0, 172.16.0.0 and 192.168.0.0 private addresses of IPv4 in that it will not be routed on the wider Internet. The `C0FE` portion of the address (which can be in the range from 0000-FFFF) is the ISP's allocation to your organisation.

3. Following this is 16 bits for subnetwork addresses (in this case networks 1 and 2). The remaining 64 bits are for your host addresses. The "::" indicates all zeros between the other numbers. The full first address would be 2001:0DB8:C0FE:0001:0000:0000:0000:0001.

4. Use the following commands at the config prompt:

```
interface g0/0
ipv6 address 2001:DB8:C0FE:1::1/64
no shutdown
interface g0/1
ipv6 address 2001:DB8:C0FE:2::1/64
no shutdown
```

5. The "/64" indicates that there is 64 bits of network address and therefor 64 bits for the host address allowing 18,446,744,073,709,551,616 hosts and as you have 16 bits under your control for the subnetwork number, 65,536 networks!

6. Use the write memory command to save your configuration.

3.2 Configuring the hosts

1. Select each of the PCs on network 1 and go to Desktop->IP configuration. You will see the link-local address. Select the Auto Config option and an IPv6 address will be assigned automatically to the PC as will the IPv6 gateway address using the link-local address of the router.


2. Write down the IPv6 address of this PC and enter the command prompt of a PC on network 2. Use the ping command to confirm that routing is occurring between network 1 and network 2.

3.3 Default Routes

1. Create a mirror network to the one created earlier using FE80::2 as the link-local address and create networks `2001:DB8:C0FE:4::1/64` and `2001:DB8:C0FE:5::1/64` on interfaces g0/0 and g0/1. Set up the PCs to auto configure IPv6.

2. Confirm your configuration by pinging a PC on network 4 from network 5.
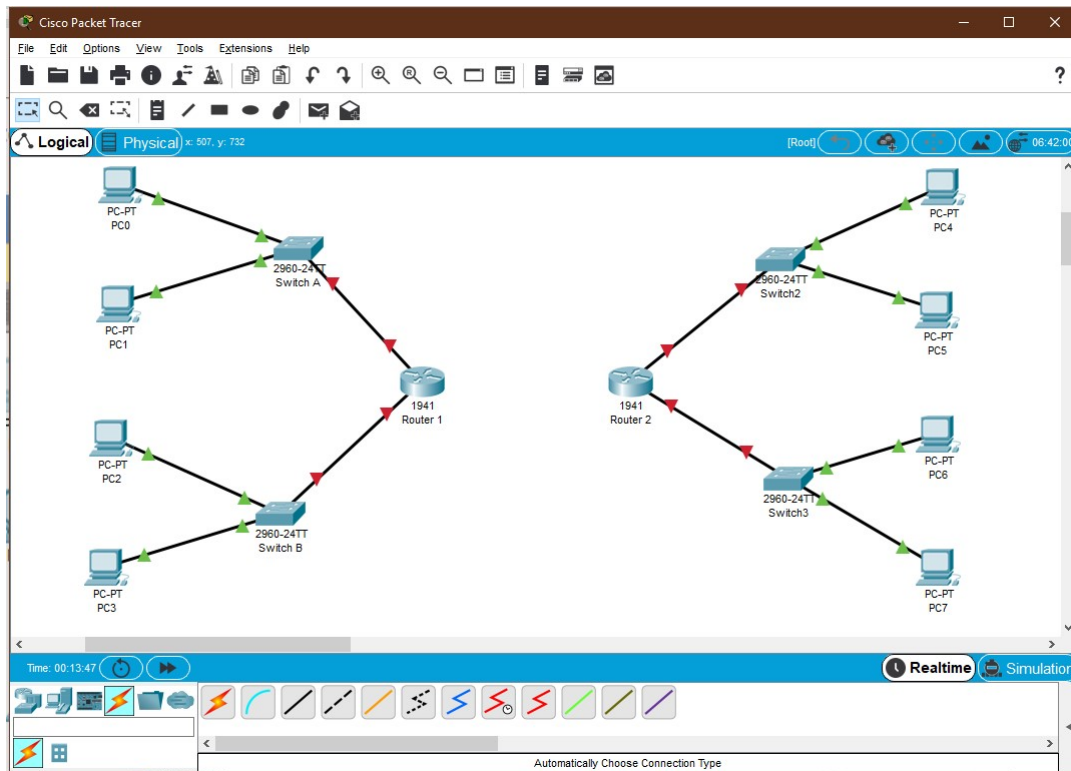
3. We now need to add an interface card to each of the routers. Select each of the routers and select the physical interface tab. Click on the button to switch the power off to the router. Select from the list on the left a HWIC-2T card and drag it one of the black empty slots on the router. This is a card with high-speed serial interfaces. Click on the power button to switch the power back on.
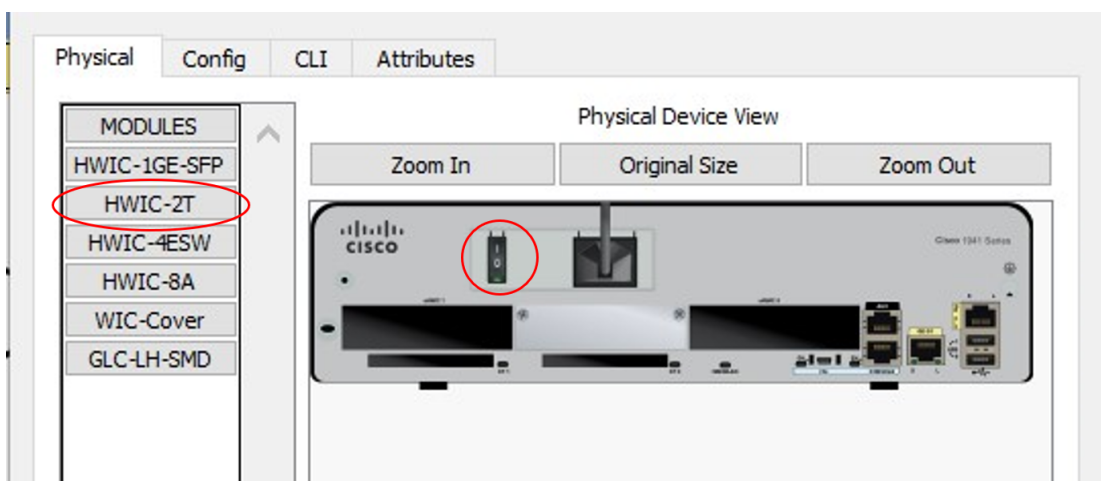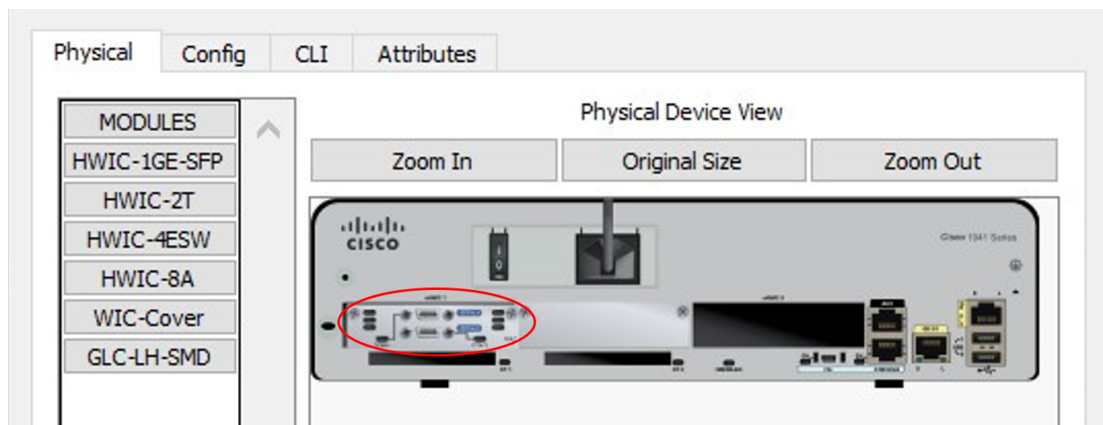
4. Add a serial link between the two routers
5. On the first router

```
conf t
interface s0/1/0
ipv6 address FE80::1 link-local
ipv6 address 2001:db8:c0fe:3::1/64
no shut
```

6. On the second router

```
conf t
interface s0/1/0
ipv6 address FE80::2 link-local
ipv6 address 2001:db8:c0fe:3::2/64
no shut
```

7. We are now going to add static default routes from each router to the other networks on the other router. IPv6 uses ::/0 as the default route. On the first router at the config prompt

```
ipv6 route ::/0 2001:db8:c0fe:3::2
```

8. And on the second router

```
ipv6 route ::/0 2001:db8:c0fe:3::1
```

9. You should now be able to ping any PC from any other PC on the network.

4 SUMMARY

In this workshop, we have had a brief introduction to configuring IPv6 and static routes in Packet Tracer.