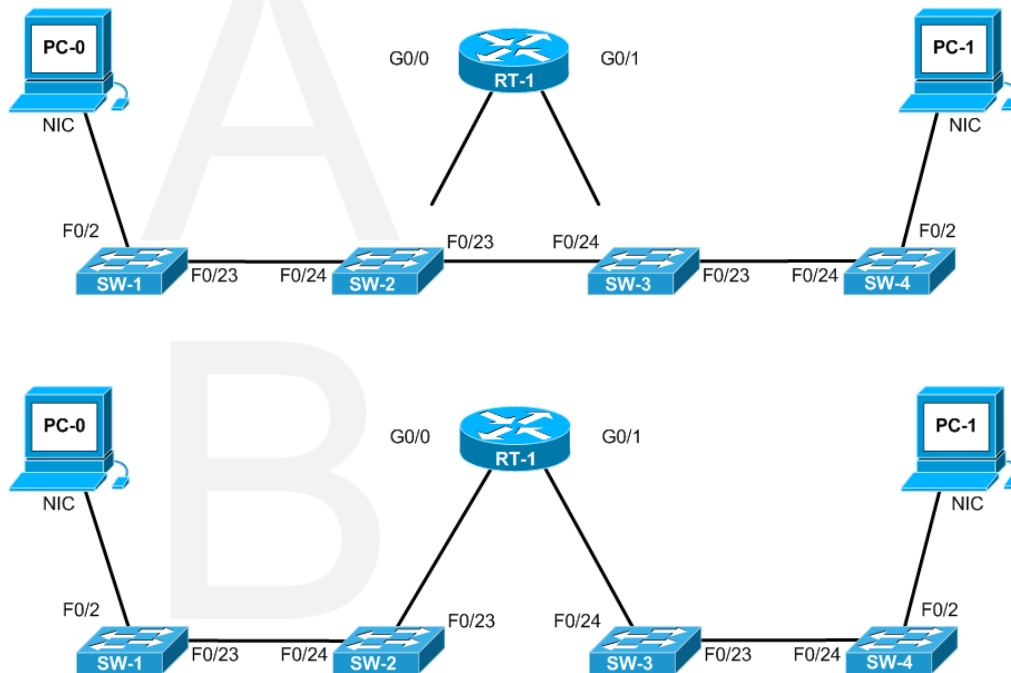


Lab 03 – Basics of Switching

Topology



Note:

- 1) The switches are **2960s** Layer 2
- 2) The routers are **2901s**
- 3) For the In-House students, and for the On-Line students, you will be building the lab in Packet Tracer this week.

IPv4 Addressing Table

Device	Port	IPaddress	Subnet /CIDR	Default Gateway
RT-1	G0/0	192.168.1.254	/24	
RT-1	G0/1	192.168.11.254	/24	
PC-0	NIC	192.168.1.1	/24	
PC-1	NIC	192.168.1.2	/24	

The switches have no configuration this week.

Remember a L2 switch new out of the box and turned on is ready for computers to be plugged in and the systems will be able to communicate with each other.



Objectives

- This lab normally is written for both the in-house student (in a lab classroom at Fanshawe College) and for the student taking this course on-line. BUT this week everyone will be using Packet Tracer.
- This week I want you to see the MAC address and ARP tables. Yes, this is doable with the real equipment in the lab, BUT is much easier in the Packet Tracer tool.
- Please follow the lab step by step **CLOSELY!**
- There will be a lot going on, you may have to do things two or three times to see the small changes as they happen.

Initial Setup

I would like to see each router and switch 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

For any system that you configure in this lab, the **Basic system setup** will be done for each system.

NOTE: As in the past labs, when explaining the commands we are using:

Black is description, Blue is the prompt, Red is the command

Now on with the LAB Part - 1

- a) You should have two PC's, four 2906 layer 2 switches, and one 2901 routers on to the PT work space. Some of the configuration has been done for you in the supplied:

Lab-03 - Students.pkt

file, check the lab section of FOL for today for this file.

- b) Configuring the router, start with the **Basic system setup**

- c) Setting up the two interfaces on the router

```
RT-1(config)# interface gig0/0  
RT-1(config)# ip address 192.168.1.254 255.255.255.0  
RT-1(config)# no shutdown  
RT-1(config)# exit
```

Note by the prompt what mode we are in.

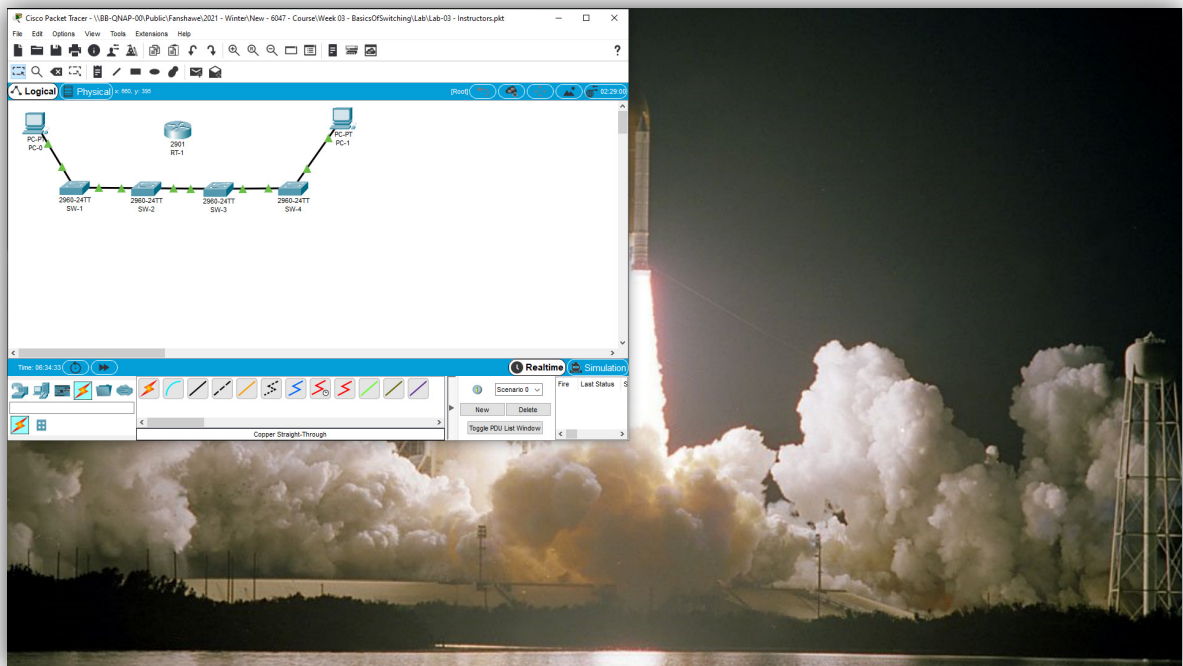
Remember there are two interfaces on the router.

I have just showed the configuration for one of them please refer to the [Topology](#) and [IPv4 Addressing Table](#) to change the information above for the second interface.

- d) Now set aside the router for a few minutes.

we will continue with cabling up things according to the [Topology](#), “A”

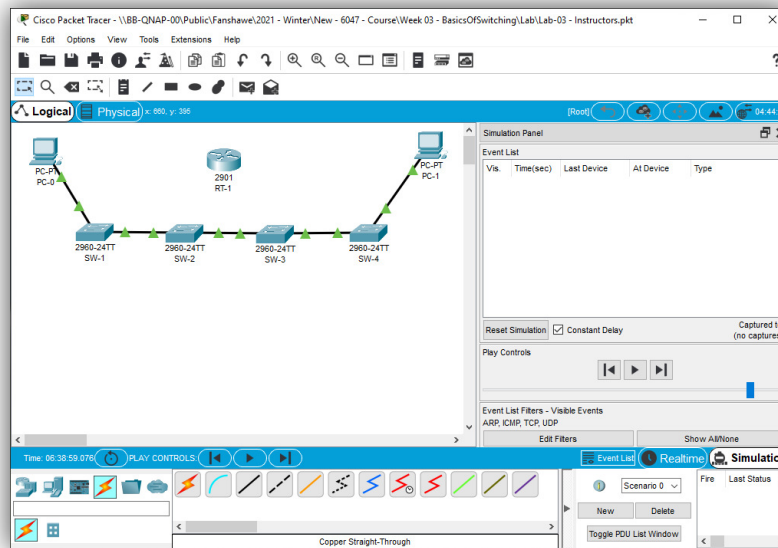
- e) Resize and place the PT tool in the top left of your screen:






This is a 1920 x 1080 display



- f) Click on the Simulation button in the lower right of the PT tool



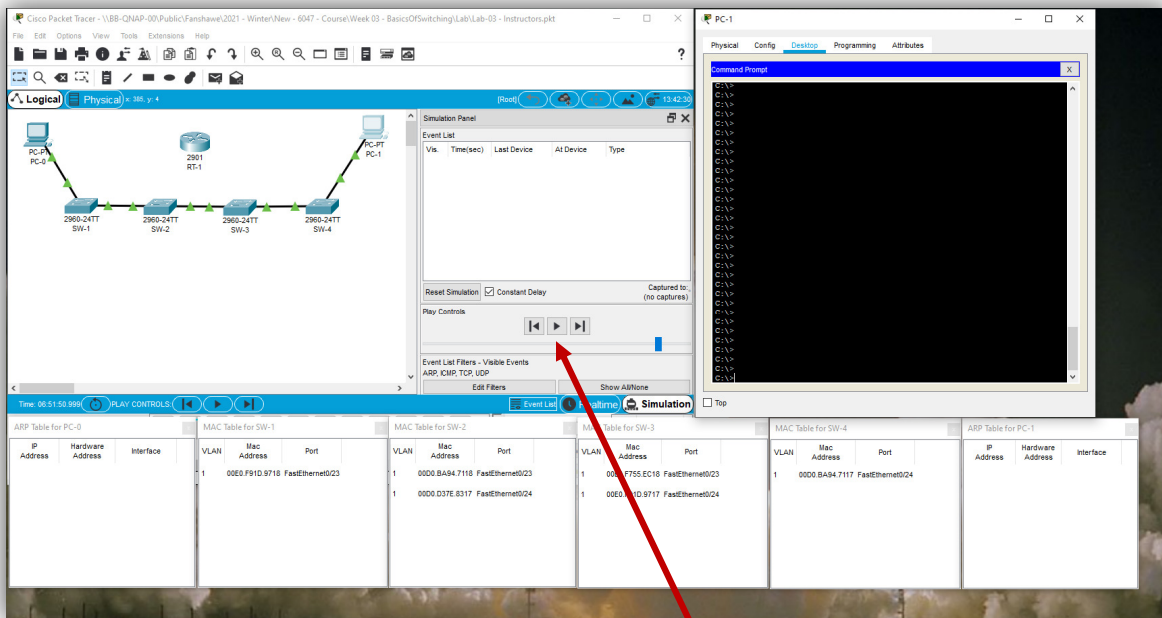
- g) Now resize the PT tool so you can see all the information as above
- h) Here is where things get to be fun
- In the tool bar (Top Left) look for the  and click on it
 - Now on each of the PC's click on it and select ARP table.
 - Now on each of the switches click and select MAC Table
 - Finally find the  to the left of the  and click on it
- i) The 6 windows that you just opened, resize them (smaller) and arrange them in the same order as the devices on the PT desktop

ARP Table for PC-0			MAC Table for SW-1			MAC Table for SW-2			MAC Table for SW-3			MAC Table for SW-4			ARP Table for PC-1		
IP Address	Hardware Address	Interface	VLAN	Mac Address	Port	VLAN	Mac Address	Port	VLAN	Mac Address	Port	VLAN	Mac Address	Port	IP Address	Hardware Address	Interface
			1	00E0.F91D.9718	FastEthernet0/23	1	00D0.BA94.7118	FastEthernet0/23	1	00E0.F755.EC18	FastEthernet0/23	1	00D0.BA94.7117	FastEthernet0/24			
						1	00D0.D37E.B317	FastEthernet0/24	1	00E0.F91D.9717	FastEthernet0/24						

(PowerPoint – Capture 1)



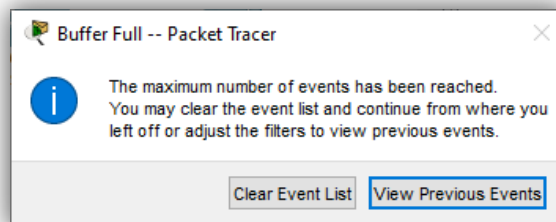
- j) Click on the PC-1, opening up the PC-1 tool and select the “Command Prompt” window



(PowerPoint – Capture 2)

- k) You should now have something like this (above)
- l) In the PC's CMD window, **ping 192.168.1.1** and click the play key
Let things play through the first time and don't worry about the results yet

NOTE: If at any time you see a window like:



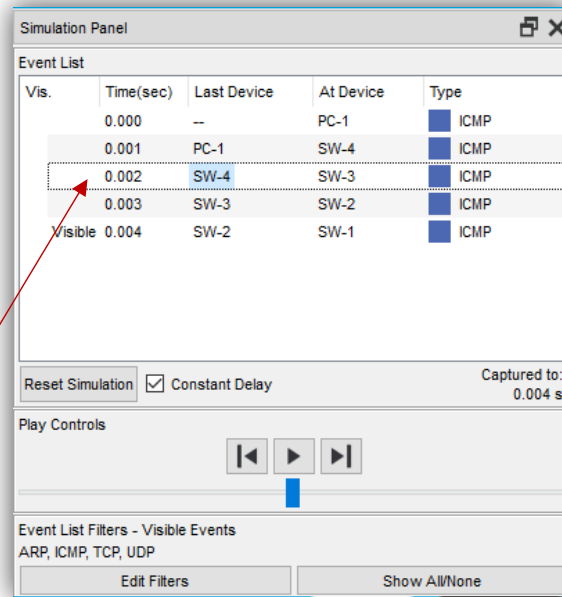
Click the “**Clear Event List**” button

- m) Click the Realtime button next to the Simulation button and wait for a few minutes, you should see about ½ of the MAC addresses disappear (in a bit of time).
- n) Look at the MAC address for PC-0. Note the last 4 digits, this is the destination mac address for the ping we are about to do

NOTE: The ARP and MAC table windows that you opened earlier (steps “i” & “j” above), you can adjust the width of the columns





- o) Click on the “Simulation” button again
- p) In the command prompt for PC-1 do the same ping again (arrow up, will repeat last commands), and click the play button
- q) Watch as the packets/frames (the little envelope) as it moves along.
- r) After it moves two or three times, click the play button again (this should stop things until the play button is clicked again).

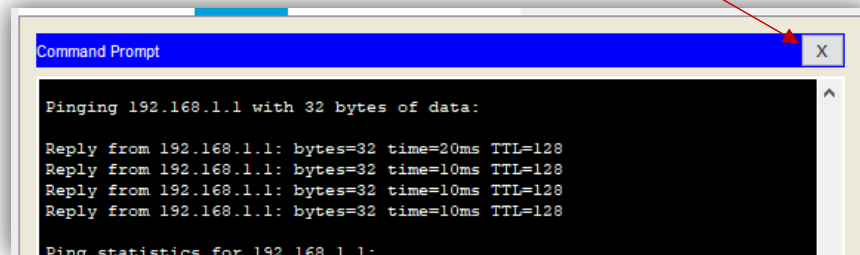


- s) Click on
- t) The window that opens click on the L2 line, read what it says.
- u) Go back and click the play button and let things paly out. Think about what is showing up in the 6 windows as the packet moves along and what said at L2....

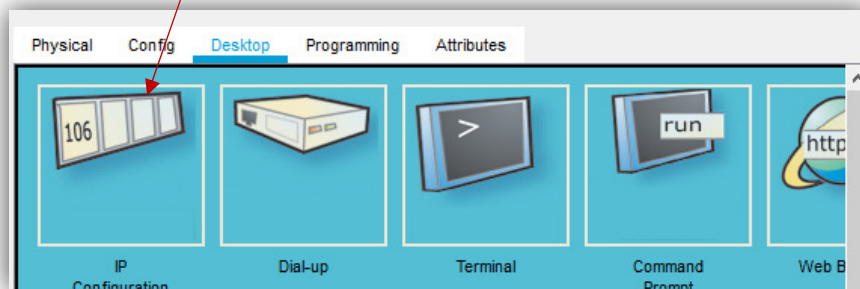
(PowerPoint – Capture 3)

Now on with the LAB Part - 2

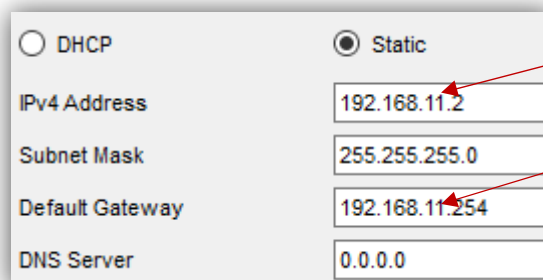
- a) Using the  delete the ethernet connection between SW-2 and SW-3
- b) Back to  and connect in the router as in Topology “B”
- c) Click on the “X” in the top corner of the command prompt





- d) Now select the IP Configuration



- e) In the window change the ones to elevens



- f) Now go back to the command prompt, so we can use ping again **in a few minutes**
- g) Using the  and click on the router selecting “ARP Table”
- h) Back to  and select Simulation button if you’re not already there
- i) Shrink and adjust the ARP Table just opened and adjust its placement so that it is close to and maybe below the middle of SW-2 and SW-3

(PowerPoint – Capture 4)



- j) It's time to do the ping again (ping 192.168.1.1) the broadcast will not find the 192.168.1.1 address because the broadcast is not propagated to the other network through the router.
- k) Watch the table for the switches and the router and you will see the ARPs going back and forth trying to figure out where the destination IP address is.
- l) Once the ARPs are finished doing their thing, you should see at least one time out and then successful pings afterwards in the PC's Command window.

(PowerPoint – Capture 5)

- m) If you go back to the list of packets, the ARPs in packet 2 or 3 down in the list of ARPs, if you examine, you should be able to find the broadcast (also known as a flooding ARP)

```
Layer 2: Ethernet II Header
0001.6316.EEE1 >> FFFF.FFFF.FFFF ARP
Packet Src. IP: 192.168.11.2, Dest. IP:
192.168.11.254
```

(PowerPoint – Capture 6)

We talked about this a BIT in the lecture.... And will talk more about this next week.

SDM

Try the SDM command although we are not doing anything with IPv6 this week, we will be in the next few weeks. In the part of the lab above, we have used a 2960 (layer 2) switch. To get the following SDM commands to work correctly you need to be using a layer 3 switch. After cleaning your switch and router out that you used in the first part of this lab, please try the SDM command as listed below on a L3 switch:

In “enable” mode use the show command to see the state of the “SDM”
SW-1# show sdm prefer

Copy the information from the command and add it to the supplied field below:

(PowerPoint – Capture 7)

Now we need to actually tell the switch that we will be using IPv4 and IPv6 addressing

SW-1# conf t
SW-1(config)# sdm prefer ?

This will give you a list of possible SDM configurations, the one you want is:
dual-ipv4-and-ipv6 default



once you see the list of possible options the prompt at the bottom of the screen should be

```
SW-1(config)# sdm prefer
```

with the cursor at the end of the line, so all you need to do is type in

```
"dual-ipv4-and-ipv6 default"
```

Press enter and follow the prompts which should have you doing:

```
SW-1(config)# exit
```

```
SW-1# reload
```

Follow any prompts and let the system reload.

Although your configuration may not load the memory should be reallocated to be shared for both IPv4 and IPv6. To prove this, try the **show sdm prefer** command again and see the difference from the copy and paste you did above.

That's it for today.

- If you were in class please Clean out the configurations on the switches and routers you used this week.
- If you are working in PT please save your file to an appropriate place for later use.
- Don't forget to collect your cables.
- Then cleanup your workstations
- Finally do the quiz for this week it is worth 3% of your final grade.in most cases it is due Saturday at 23:59 EST

