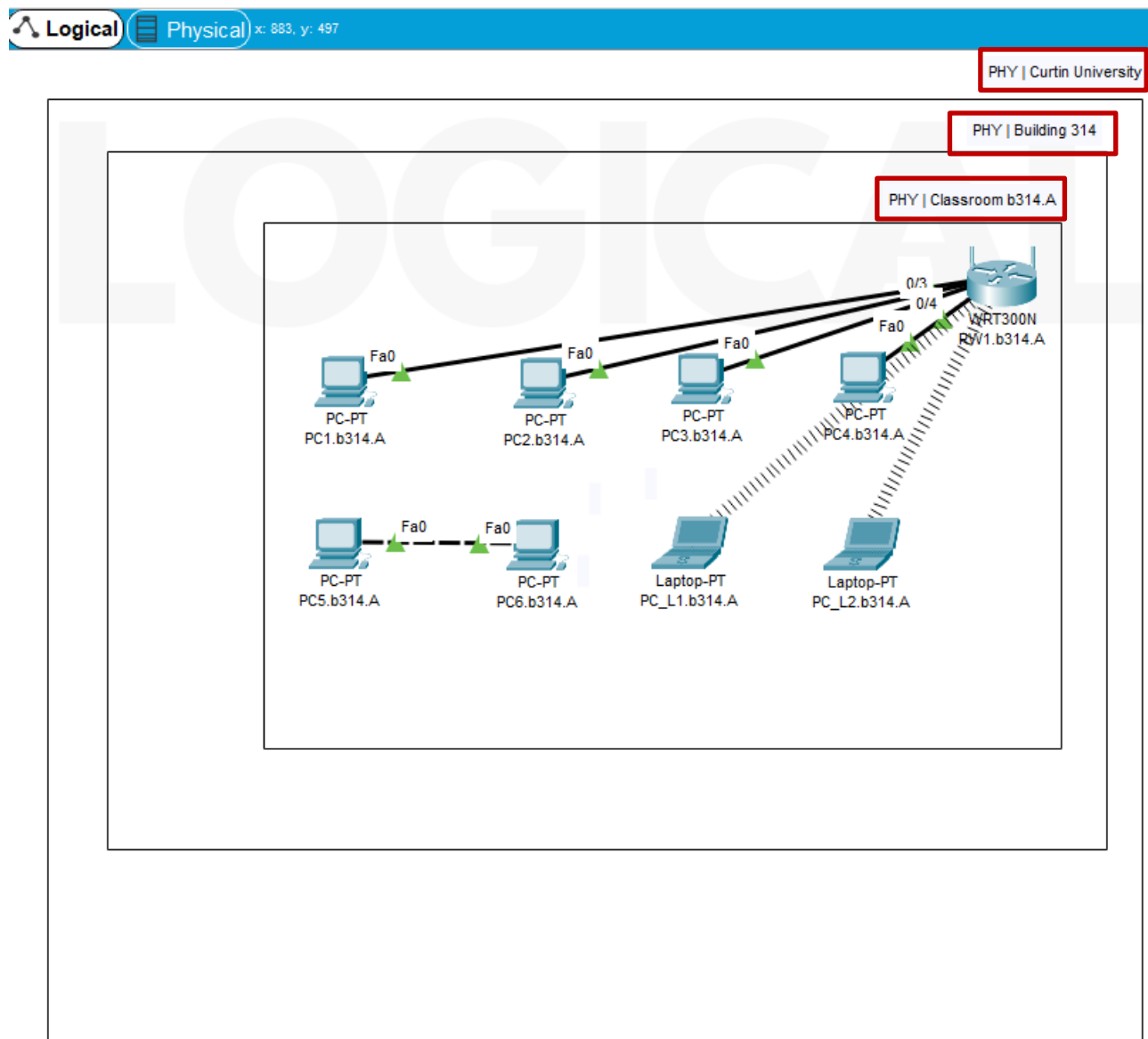


## P02: Working with Physical and Logical Workspace

*P02 is a continuation of P01 Practical Sheet.*

### Q1: Design a basic wired & wireless network

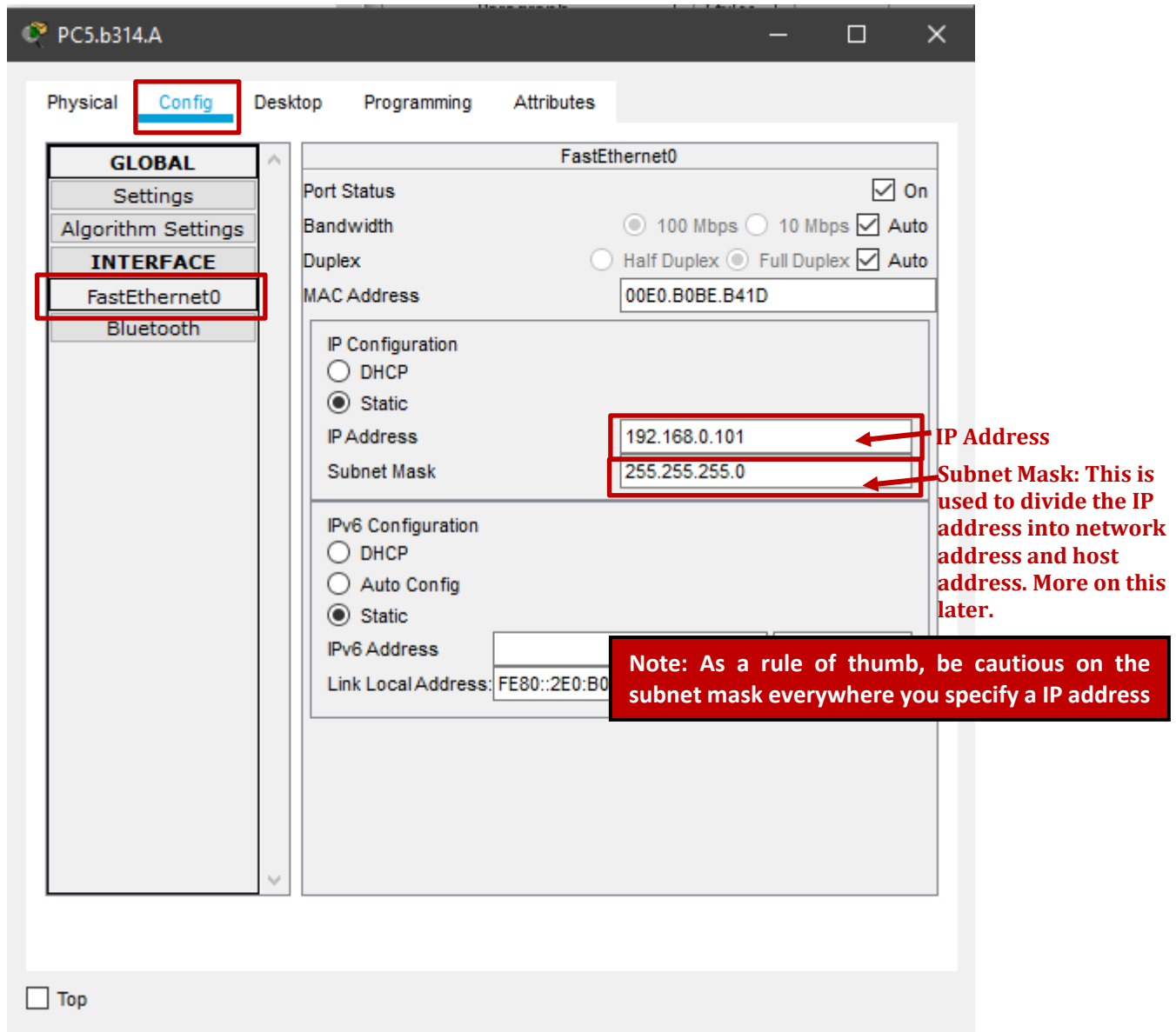
1. Switch to **logical view** of the network
2. Draw the physical borders and arrange the elements as shown below: You may make use of drawing tool bar



3. Though we have connected the devices physically with the wires the devices need to be given an IP address so that each device will be accessible by each other in the network.
4. There are two approaches to assign an IP address to a device in a network (static vs dynamic).
5. First, we will assign IP addresses manually to **PC5.b314.A** and **PC6.b314.A** (a.k.a **static IP address**)

allocation)

6. Click on **PC5.b314.A** assign the IP address as shown below:



Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

**FastEthernet0**

Bluetooth

**FastEthernet0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.B0BE.B41D

IP Configuration

☐ DHCP

☒ Static

IP Address 192.168.0.101

Subnet Mask 255.255.255.0

IPv6 Configuration

☐ DHCP

☐ Auto Config

☒ Static

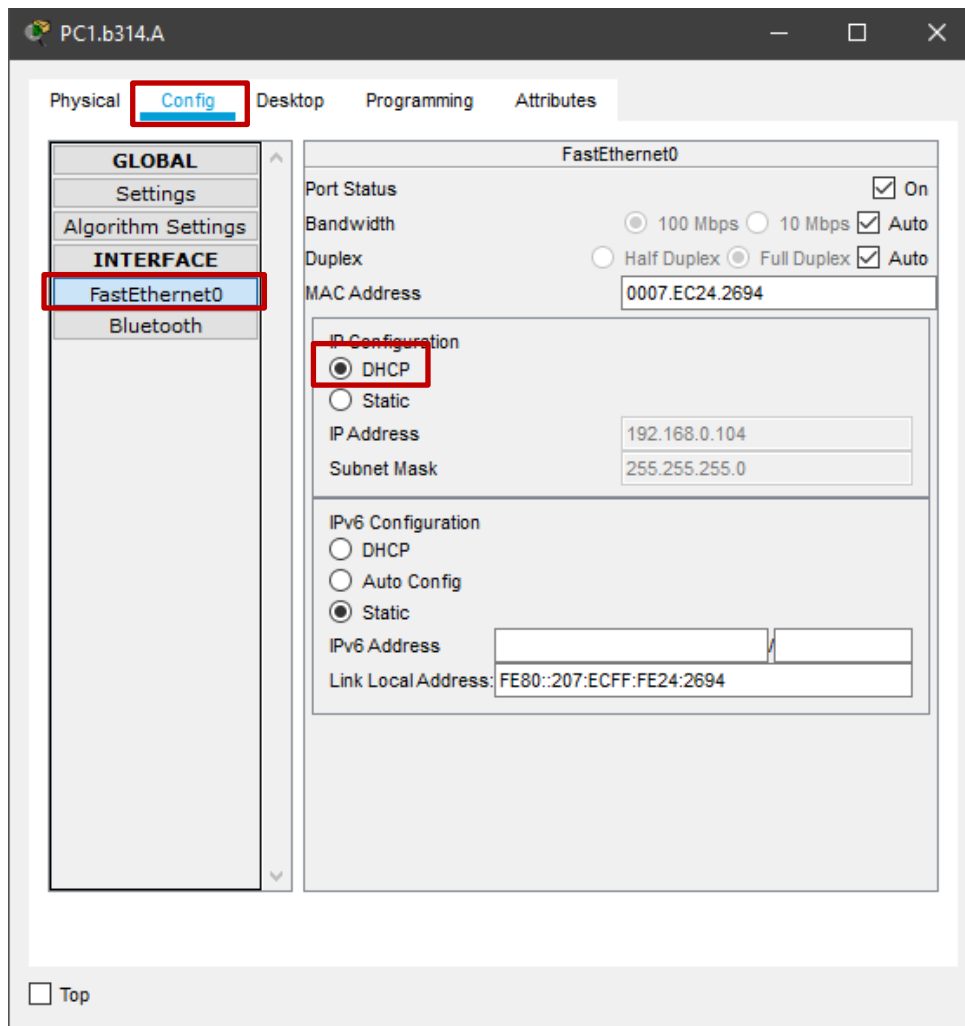
IPv6 Address

Link Local Address: FE80::2E0:B0

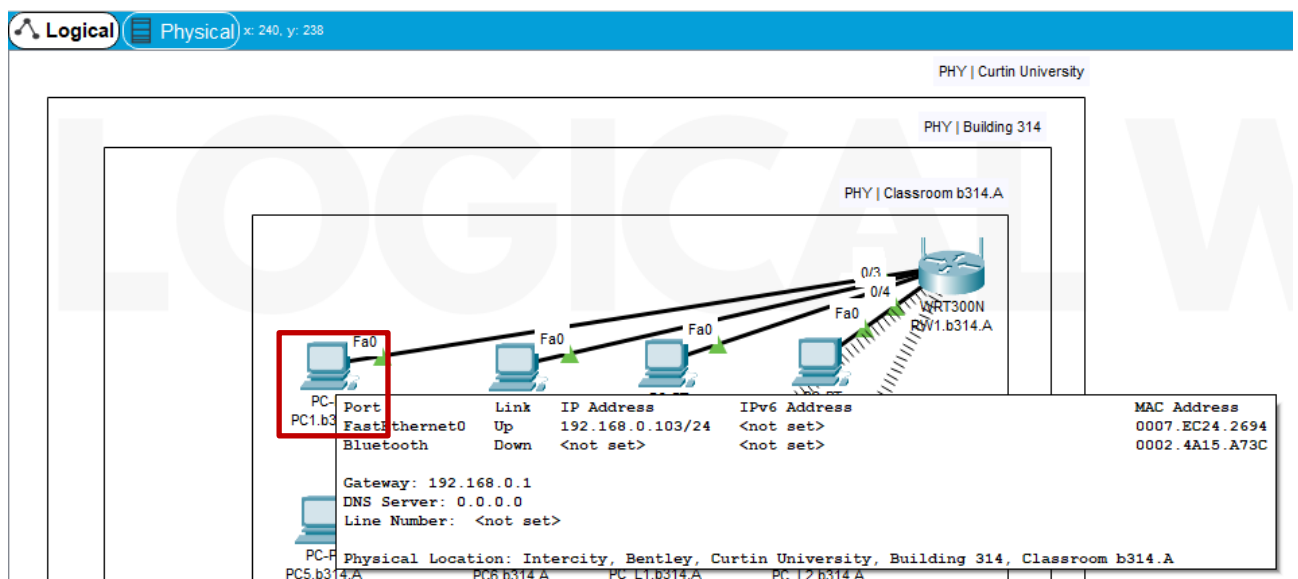
**Note: As a rule of thumb, be cautious on the subnet mask everywhere you specify a IP address**

☐ Top

7. Click on **PC6.b314.A** assign the IP address with the subnet mask (**192.168.0.102/255.255.255.0**)
8. Next, we will perform **dynamic IP address allocation** via DHCP protocol (Dynamic Host Control Protocol).
9. **Linksys-WRT300N** is equipped with a DHCP server which is responsible for dynamic IP address allocation. DHCP server is enabled in the router (WRT300N) by default thus we don't need to enable it manually.
10. Now, let's force PCs to use DHCP to request an IP address from the DHCP server as shown below:  
Click on **PC1.b314.A**



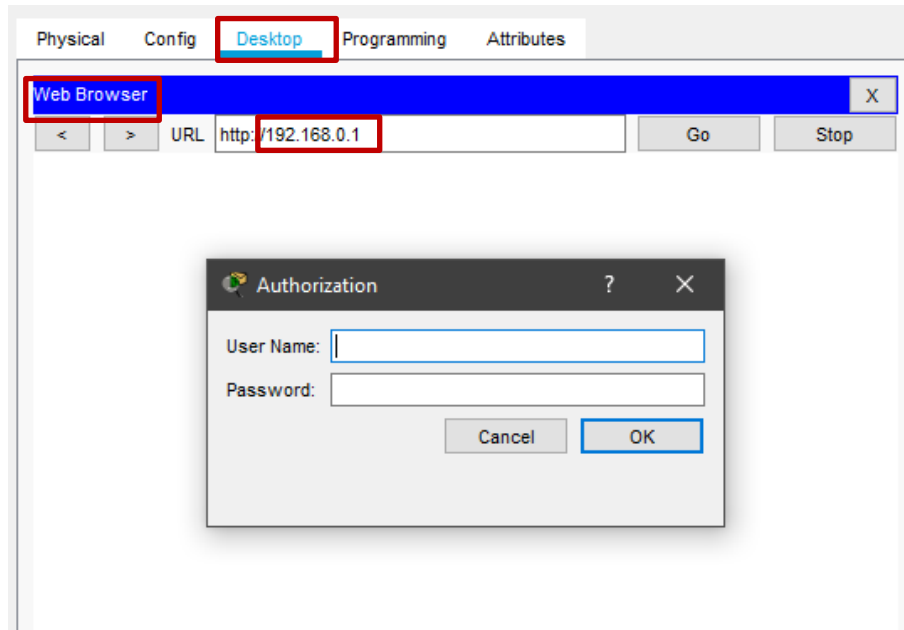
11. Follow the same steps for the PCs: **PC2.b314.A**, **PC3.b314.A**, **PC4.b314.A**, **PC5.b314.A**, **PC6.b314.A**
12. Note that the laptops **PC\_L1.b314.A**, **PC\_L2.b314.A** are already assigned an IP address by the router since the moment they were connected wirelessly to the router.
13. Once done, hover the mouse over any PC to check its IP address



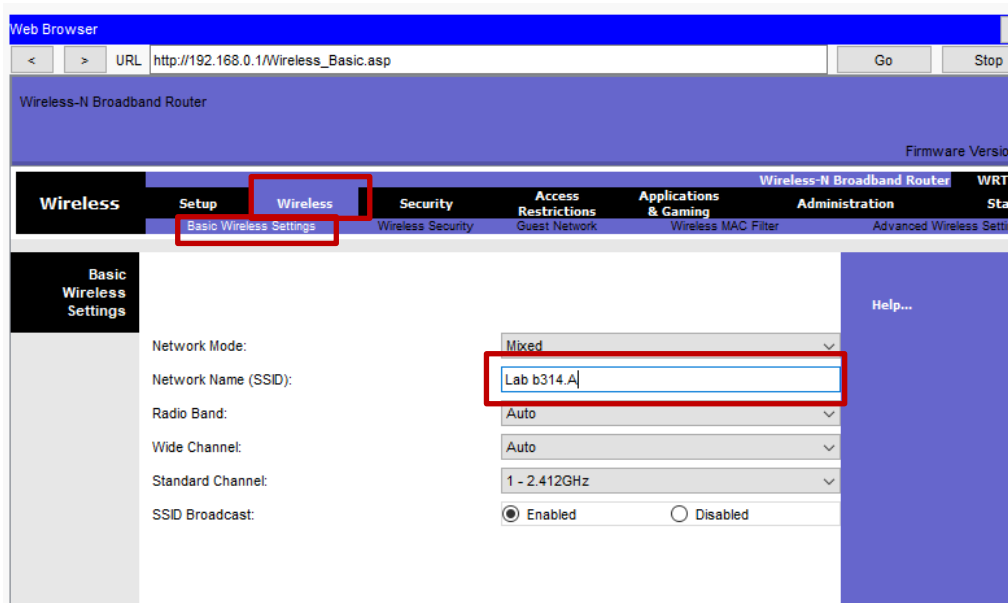
14. As of now, the network is fully connected and you can check the connectivity as described in **T4: section**.

### Configuring a Secure Wireless Network

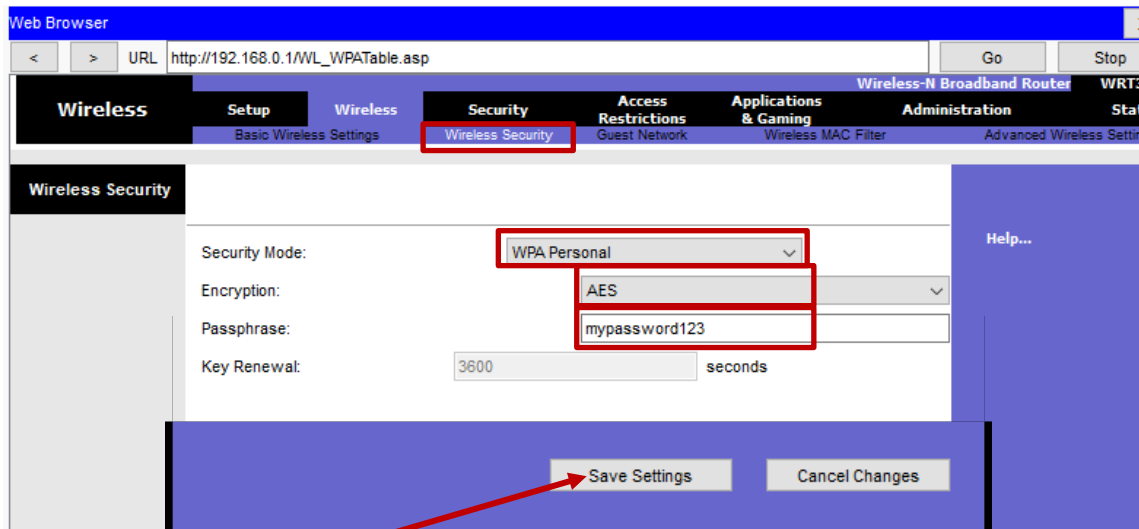
15. Login to the router's configuration page via a PC. (can also be done via **RW1.b314.A->GUI**)
16. To login to the router, we need to find out the IP address of the router (a.k.a Gateway address)
  - a. Click on **PC\_L1.b314.A or any connected (wired/wireless) PC** and go to **Desktop->Command Prompt**
  - b. Type **ipconfig** command and observe the default gateway address (Default gateway address is also available at **Desktop->Config->Settings**)
17. Next, go to **Desktop->Web browser**, type the default gateway address at the address bar to login to Router's configuration page.



18. **Problem!** what are the credentials to login to the router? Usually those credentials are printed on the device itself when the device is bought off the shelf.
19. In PT, defaults are **UN: admin PW:admin** (you can change the credentials once you log into the router's configuration page)
20. Change the **SSID** as shown below:



21. Next, we'll **secure the Wireless Network** by setting a password on the wireless network



22. Once you save the settings, **all wirelessly connected PCs will be disconnected from the router**. Therefore, you will have to **go to each of those PC's Desktop->PC Wireless** connect to the wireless network with the new SSID and password as shown below:



## Q2: Validating the network connectivity

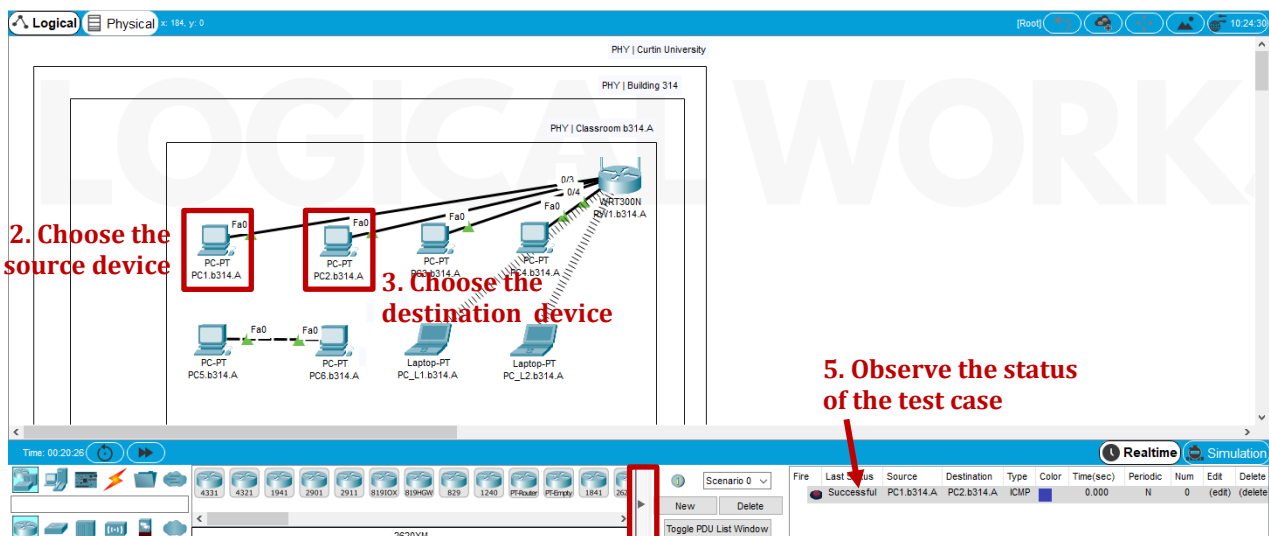
Validating network connectivity involves sending ICMP packets from one device to another and expect a (echo) reply in return. Packet tracer provides two methods to perform this action.

1. Using the Simple PDU (protocol data unit) Tool
2. Using the ping command on the PC (via the command prompt in PC)

For a real network, number 2 is the only applicable method to check the network connectivity.

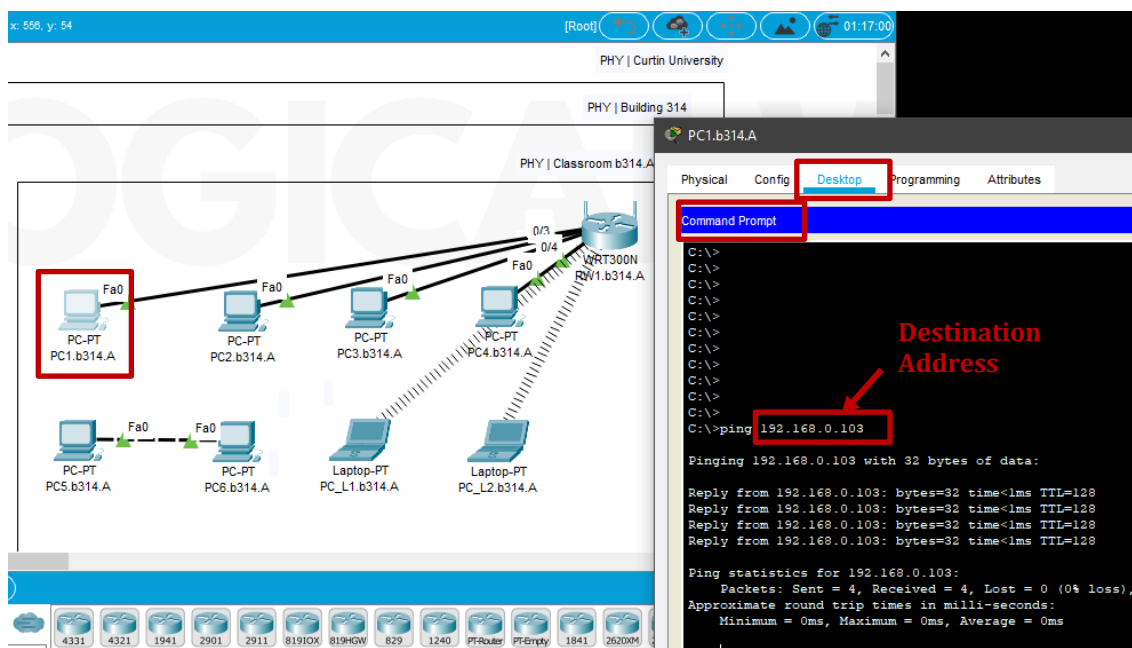
### Using the Simple PDU Tool

1. Click on Simple PDU Tool

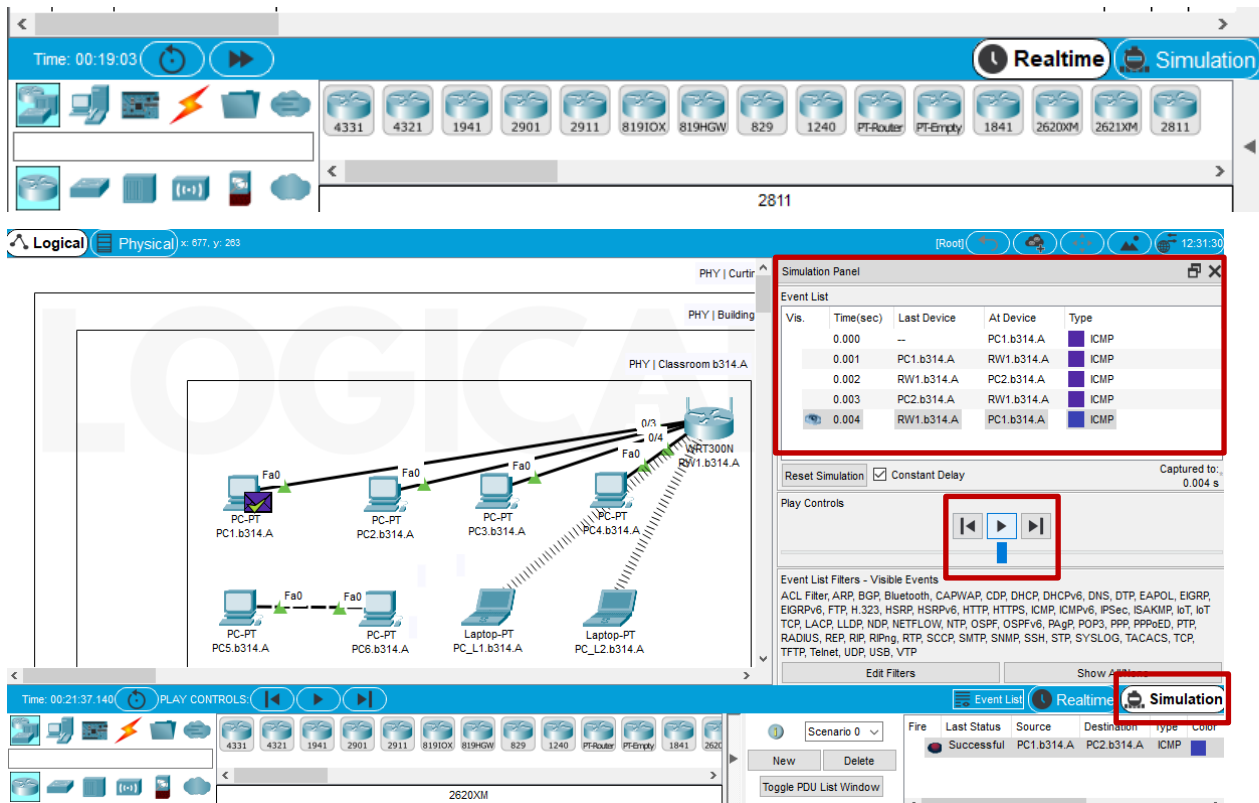


4. Expand this window

### Using the ping command in command prompt on a PC



## Switching to Simulation Mode

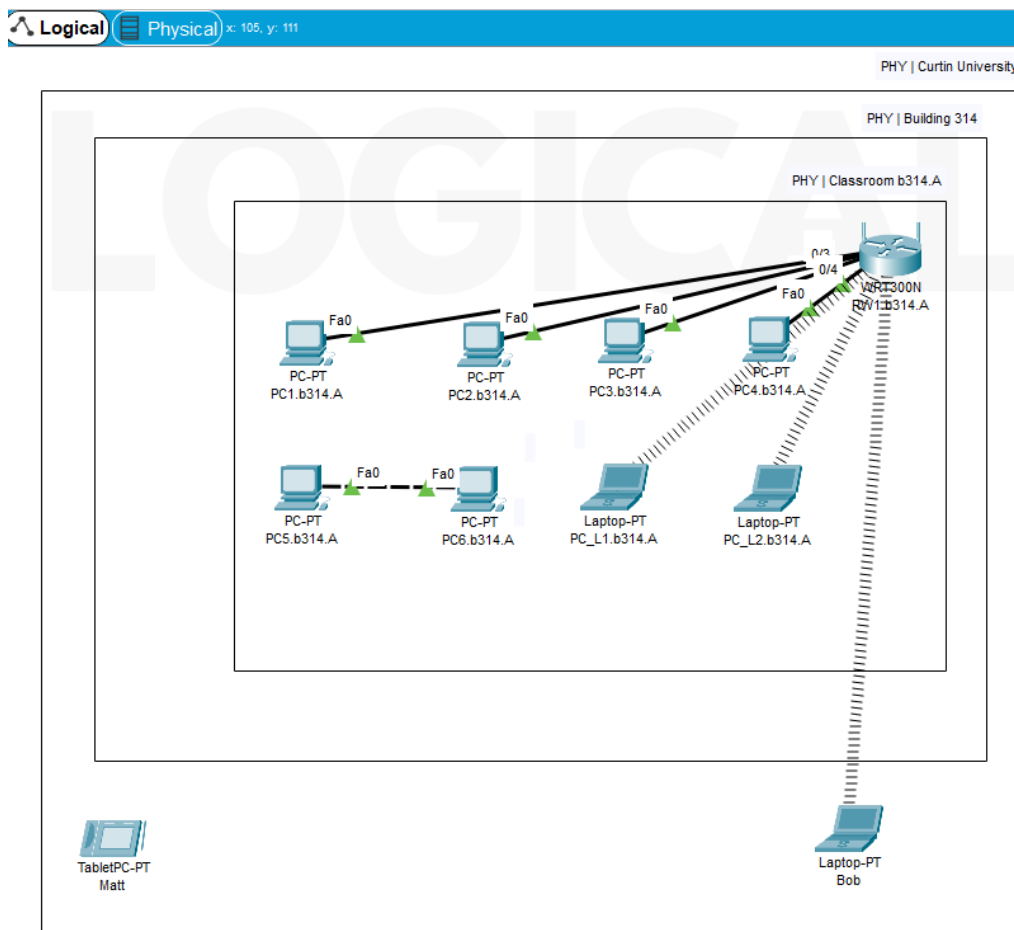


The screenshot shows the network simulation software interface. At the top, the mode is set to 'Realtime'. Below the mode selector, there is a toolbar with various icons. The main workspace displays a network diagram of Classroom b314.A, showing several PC-PT devices (PC1.b314.A to PC6.b314.A) and Laptop-PT devices (Laptop-PT PC\_L1.b314.A, Laptop-PT PC\_L2.b314.A) connected to a central router (WRT300N RW1.b314.A). The 'Simulation Panel' on the right is open, showing an 'Event List' with the following data:

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC1.b314.A	ICMP
	0.001	PC1.b314.A	RW1.b314.A	ICMP
	0.002	RW1.b314.A	PC2.b314.A	ICMP
	0.003	PC2.b314.A	RW1.b314.A	ICMP
	0.004	RW1.b314.A	PC1.b314.A	ICMP

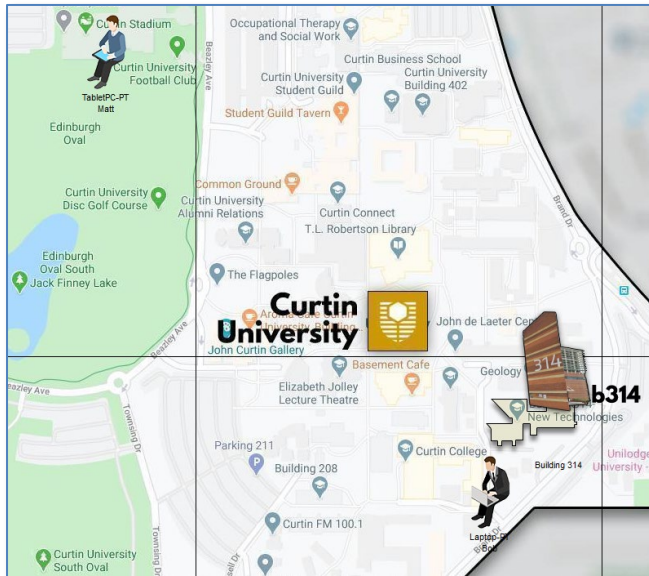
The 'Simulation Panel' also includes 'Play Controls' with buttons for 'Reset Simulation', 'Constant Delay', and 'Captured to: 0.004 s'. Below these are 'Event List Filters - Visible Events' and a 'Show All' button. The bottom status bar shows the time as 00:21:37.140 and the mode as 'Simulation'.

- Now, Check the connectivity of each device in the network in Classroom b314.A, and Bob.





## 2. Let's look at the connectivity for **Bob** and **Matt**

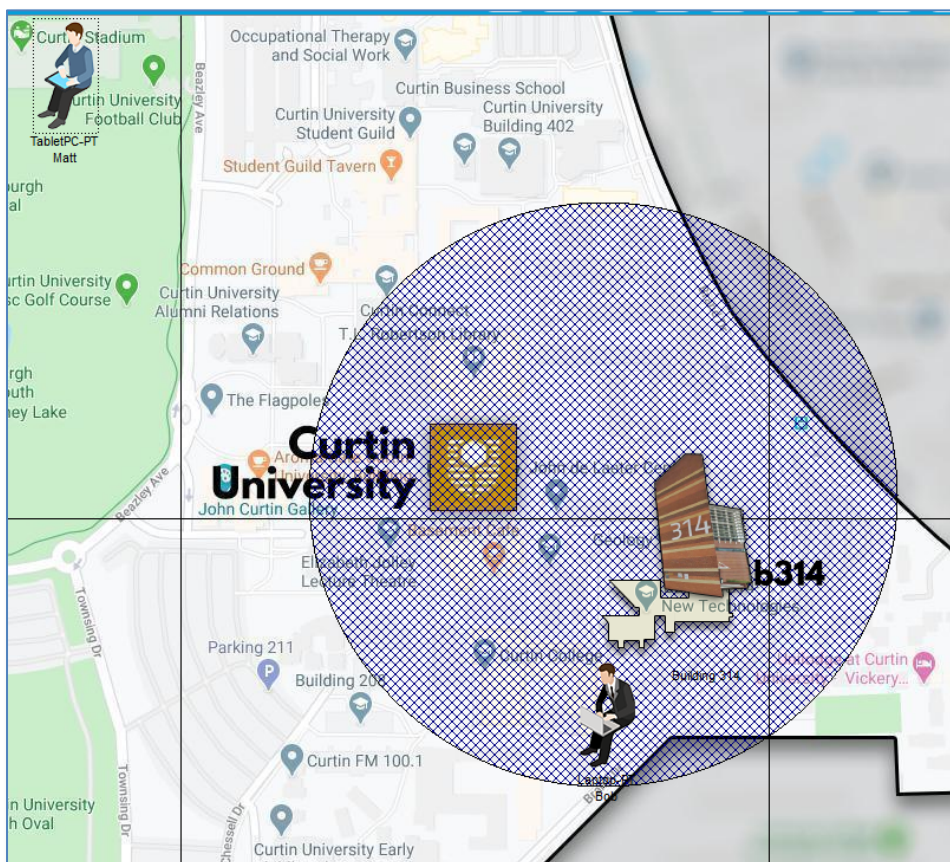


## 3. Why is Bob able to connect to the network but not Matt?

**REMEMBER DISTANCE MATTERS!** (WIFI signal has not got enough reach).

To visualize the Wi-Fi grid on the physical view, go to **Preferences -> Hide -> Show Wireless Grid**

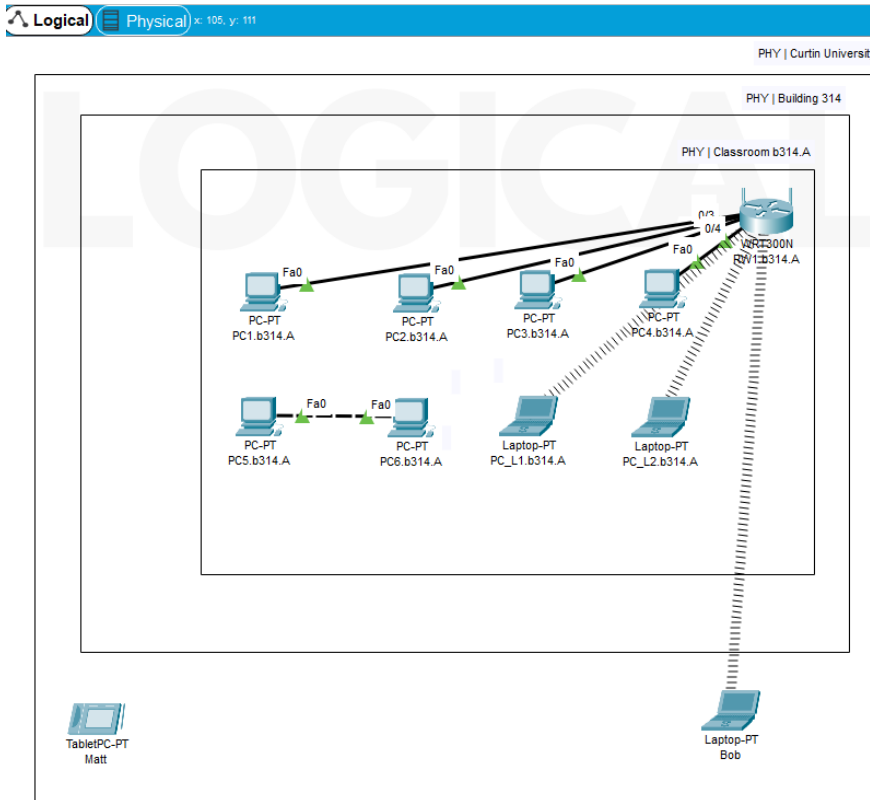
Where does Matt need to walk to be connected to the network?



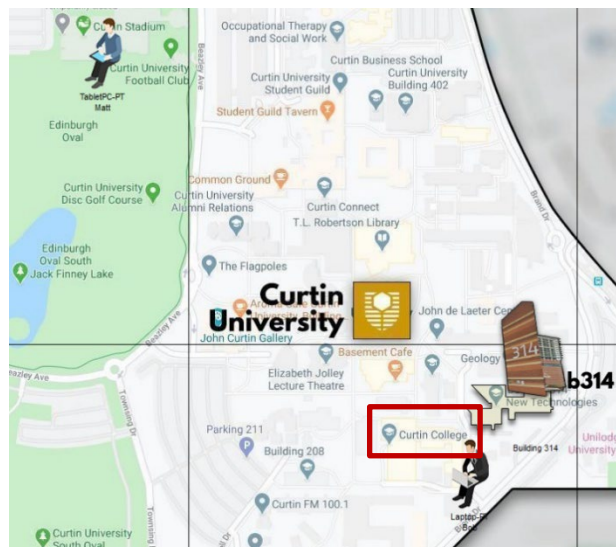


### Q3: Try me! Questions

1. Connect PC5.b314.A and PC6.b314.A with a straight through cable and check its connectivity. Does it work?  
Explain your answer?



2. Can PC5.b314.A and PC6.b314.A communicate with any other device on the network? Why?
3. Convert the whole network into a wireless network. (remove all wired connections and add wireless modules to devices where necessary)
4. Turn off all the devices (by going to the physical view) and turn them back on in random order. Will they be assigned the same IP by the router (DHCP) which they had before the shutdown?
5. Place another WRT300N Wireless Router near Curtin College. Which router will Bob be connected by default? Why?



6. Connect a PC1.b314.A to the modem port of WRT300N with an Ethernet cable. Will it be able to communicate with other devices on the network?

### Summary:

1. Design the physical workspace in PT (with real-world measurements) for:
  - a. Perth city,
  - b. Bentley city,
  - c. Curtin University,
  - d. Building 314
  - e. Classroom 314.A
2. Design a basic wired & wireless network
3. Validate the network connectivity
4. **Try me! Questions**

