Assignment

Task 01

This is the first of the three (3) Tasks of the Assignment.

strictly** follow the ***Assignment Guideline document prior to working on this Assignment Task.

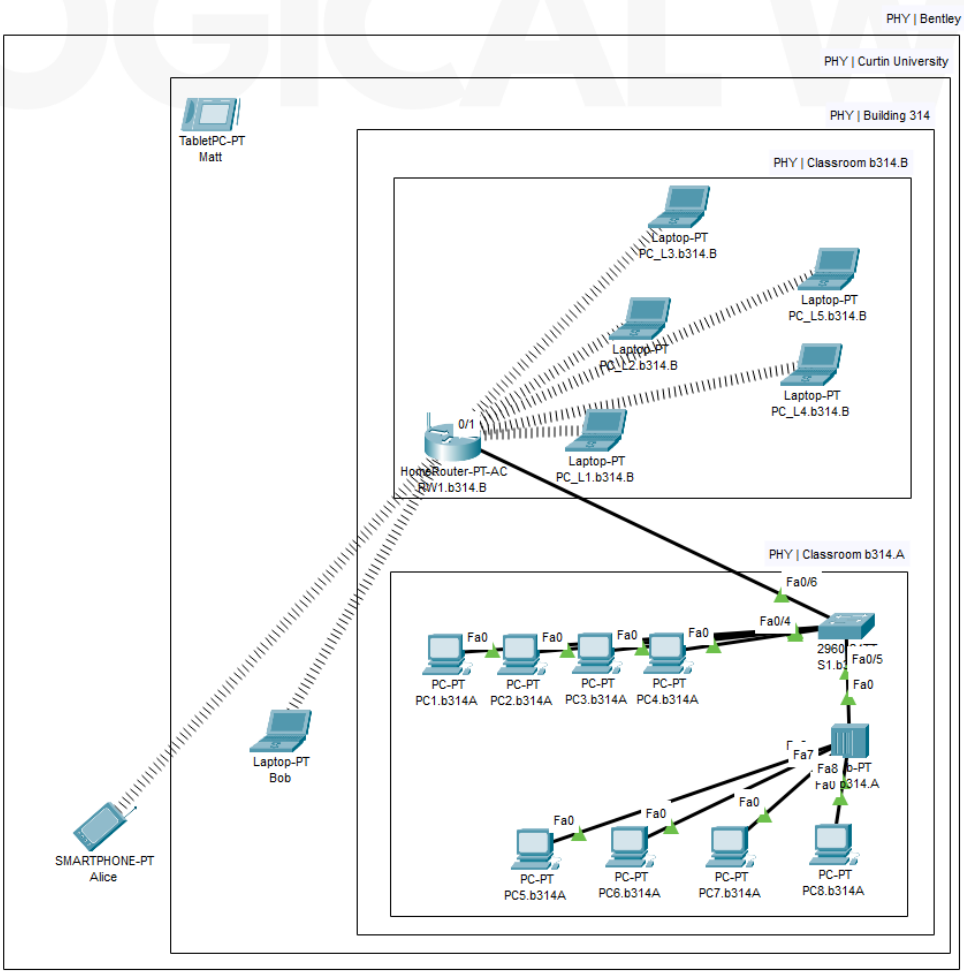
Objectives:

1. Design and understand the physical workspace of a network.
2. Design a basic wired network between two classrooms (use of wall/patch panels).
3. Design a basic network to provide wireless connectivity.
4. Validate and troubleshoot the network connectivity.

Background:

You, as a network engineer, are contracted to build a simple wired and wireless network in Building 314 Classroom b314.A and Classroom b314.B of Curtin University. Since the network needs to connect two physically separated classrooms together, it is essential to manage cabling properly with relevant tools. Furthermore, a secure wireless network for both 2.4Ghz and 5Ghz bands is also required to be configured.

This task consists of THREE **(3) Components.** You will be guided through them to design and build the following network that satisfies the requirements stated above:



C1: Design the Physical Workspace in Packet Tracer (PT)

1. Open the **"PT Assignment T01.pka"** file downloaded from Blackboard and switch to the Physical View.
2. Create containers according to the following table:

Container Name	Container Type	Width (m)	Length (m)	Notes
Intercity	Intercity	12410	5500	-
Bentley	City	4500	2500	City must be inside intercity container
Curtin University	Generic Container	1350	1800	Generic Container for Curtin University must be inside Bentley
Building 314	Generic Container	109	59	Generic Container for Building 314 must be inside Curtin University
Classroom b314.A	Generic Container	40	21	Generic Container for Classroom b314.A must be inside Building 314
Classroom b314.B	Generic Container	40	21	Generic Container for Classroom b314.B must be inside Building 314

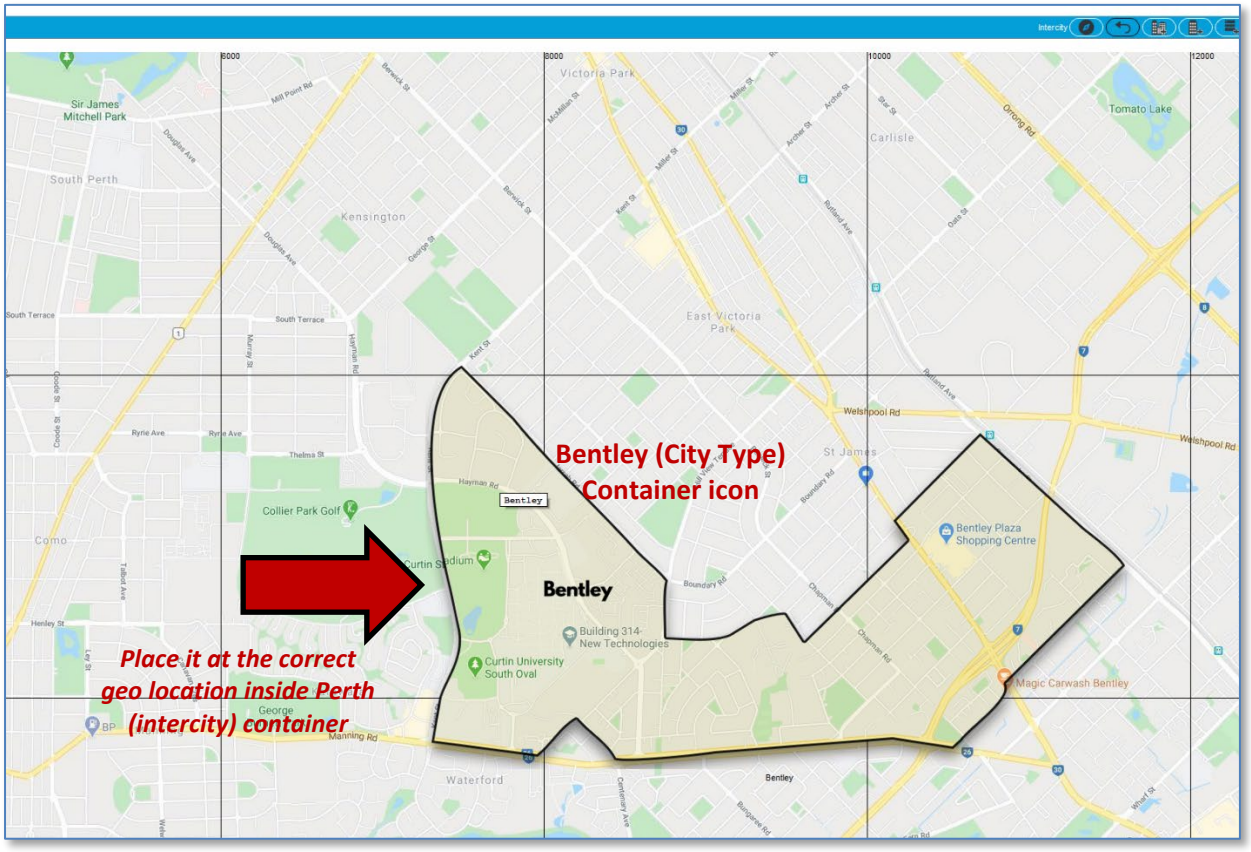
3. Change the container background and icon using the images provided in **Resources/Map Tiles**

Container Name	Container Type	Background Image	Container Icon
Intercity	Intercity	L00 Perth.png	
Bentley	City	L01 Bentley.png	L01 Bentley Thumb.png
Curtin University	Generic Container	L02 Curtin.png	L02 Curtin Thumb.png
Building 314	Generic Container	L03 b314.png	L03 b314 Thumb.png
Classroom b314.A	Generic Container	L04 b314.A.png	L04 b314.A Thumb.png
Classroom b314.B	Generic Container	L04 b314.B.png	L04 b314.B Thumb.png

4. Change the grid preferences and grid line color for Intercity, City, Generic Container as shown below *(make sure to tick the checkbox against each container type listed below to show the modified gridlines):*

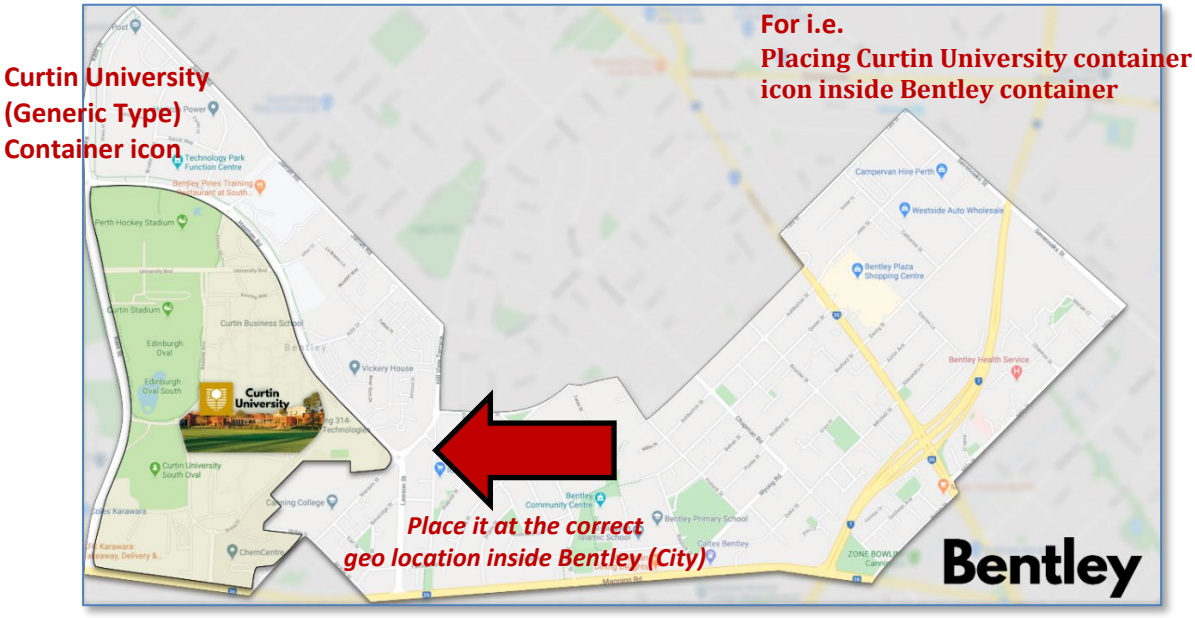
Container Type	Grid-X (m)	Grid-Y (m)
Intercity	2000	2000
City	500	500
Generic Container	500	500

5. Start from Perth (intercity) container and place the child container (Bentley) icon at the correct location as shown below:



Continue to place the child container icons at correct geo locations in the same way for

- Curtin University container icon inside Bentley container
- Building 314 container icon inside Curtin University container
- Classroom b314.A and Classroom b314.B container icons inside Building 314



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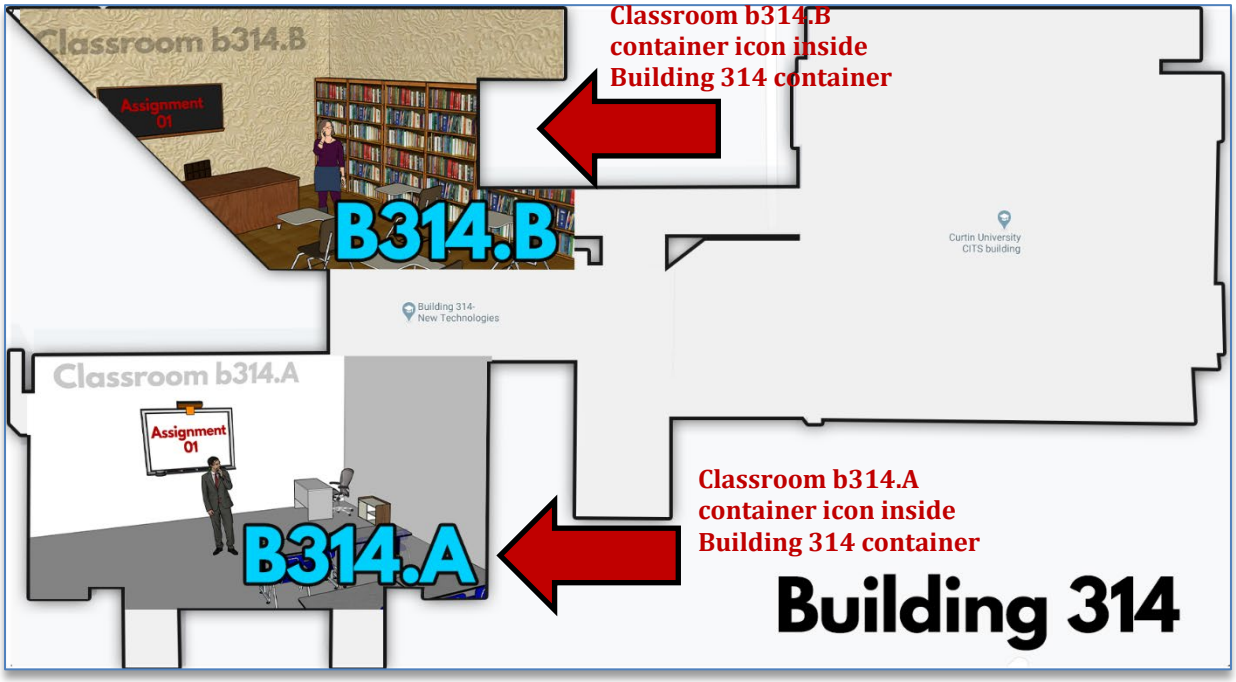

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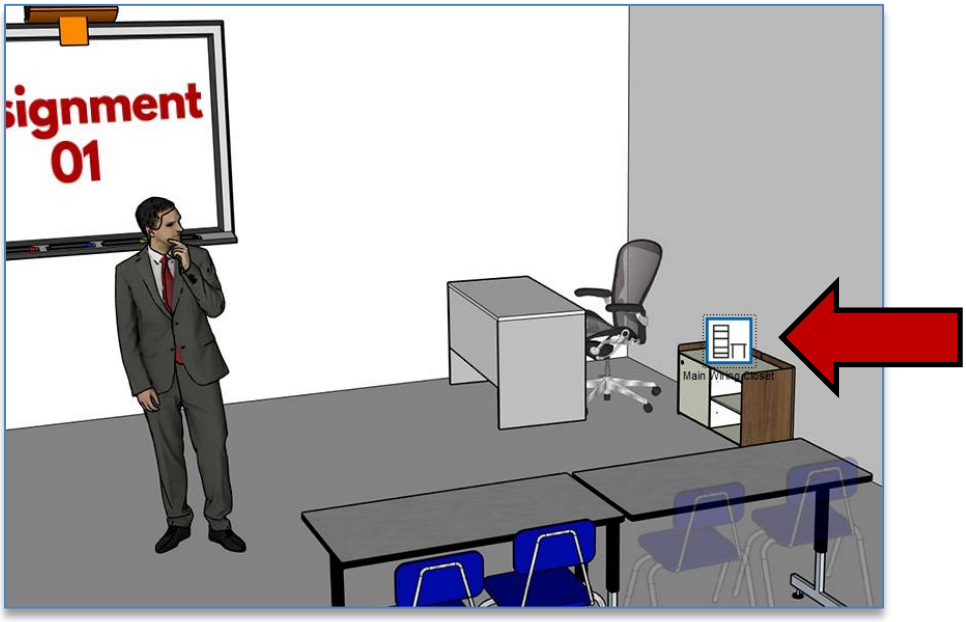
6. Place the existing default wiring closet **"Main Wiring Closet"** (which is not removable) inside Classroom b314.A container and rename it to "**Wiring Closet b314.A"** as shown below:



7. Create and place the following devices in the respective containers:

Device Type	Device Name	Modules to Install	Physical View Icon	Container
PC-PT	PC1.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC2.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC3.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC4.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC5.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC6.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC7.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
PC-PT	PC8.b314.A	-	Desktop_WIN10_large.png	Classroom b314.A
Laptop-PT	PC_L1.b314.B	PT-LAPTOP-NM-1W-AC	Laptop_WIN10_large.png	Classroom b314.B
Laptop-PT	PC_L2.b314.B	PT-LAPTOP-NM-1W-AC	Laptop_WIN10_large.png	Classroom b314.B
Laptop-PT	PC_L3.b314.B	PT-LAPTOP-NM-1W-AC	Laptop_WIN10_large.png	Classroom b314.B
Laptop-PT	PC_L4.b314.B	WPC300N	Laptop_MAC_large.png	Classroom b314.B
Laptop-PT	PC_L5.b314.B	WPC300N	Laptop_MAC_large.png	Classroom b314.B
2960	S1.b314.A	-	2960_large_rect.png	Classroom b314.A-> Wiring Closet -> **Rack**
Hub-PT	H1.b314.A	PT-REPEATER-NM-1CFE x 3	Hub_medium_sqr.png	Classroom b314.A -> Wiring Closet -> **Rack**
HomeRouter-PT-AC	RW1.b314.B	-	HomeRouter_medium_sqr.png	Classroom b314.B
Laptop-PT	Bob	WPC300N	Laptop Man_small.png	Curtin University
TabletPC-PT	Matt	-	Tablet Man_small.png	Curtin University
SmartPhone-PT	Alice	-	SmartPhone Lady_small.png	Bentley

(Hint: You may remove the Ethernet Module of the Laptop to install WPC300N wireless module)

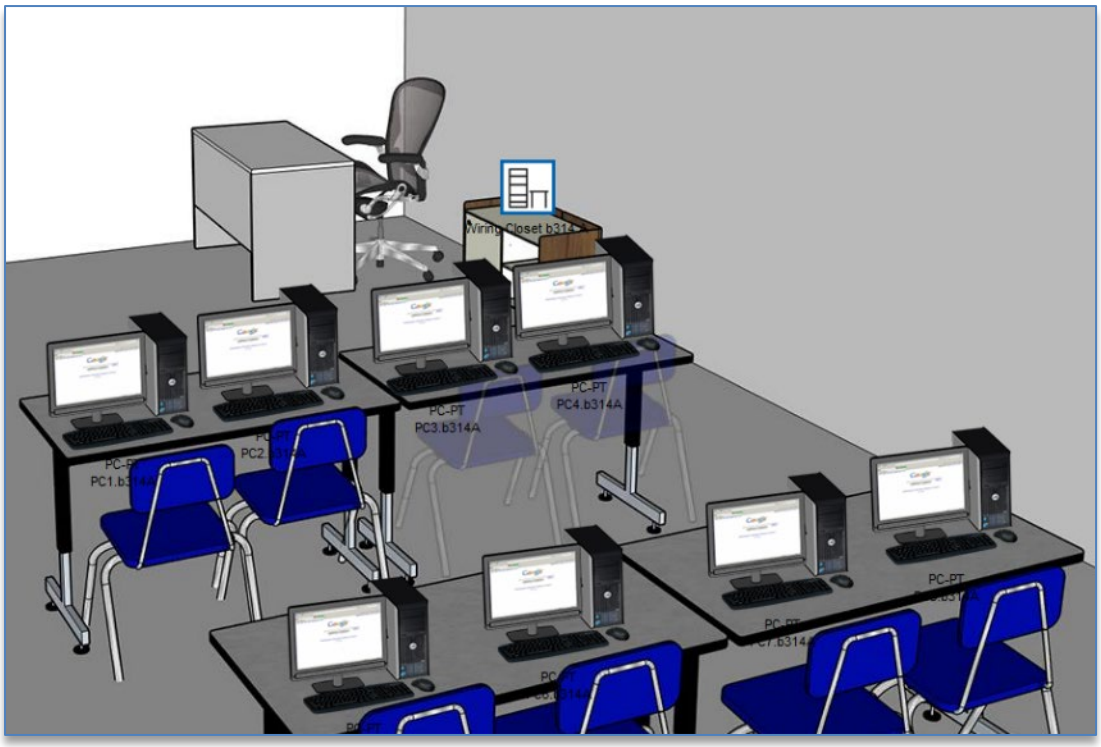
Note that the MAC books, Bob, Alice, Matt PCs are only able to connect to 2.4Ghz wireless network, since of their respective wireless adapters only support connection to 2.4Ghz (IEEE802.11n/g/b) networks, but not 5Ghz networks (IEEE802.11ac – WiFi5, IEEE802.11ax – WiFi6)

IMPOTANT: Do not add devices from MISC devices category in the device toolbar

8. Arrange the PCs inside Classroom b314.A container as shown below:

   Front Table: *from Left to Right* (PC1.b314.A – PC4.b314.A)

   Back Table: *from Left to Right* (PC5.b314.A – PC8.b314.A)



9. Arrange the PCs and the Wireless Router inside Classroom b314.B container as shown below:

   Front Row: *from Left to Right* (PC1.b314.B – PC3.b314.B)

   Back Row: *from Left to Right* (PC4.b314.B – PC5.b314.B)

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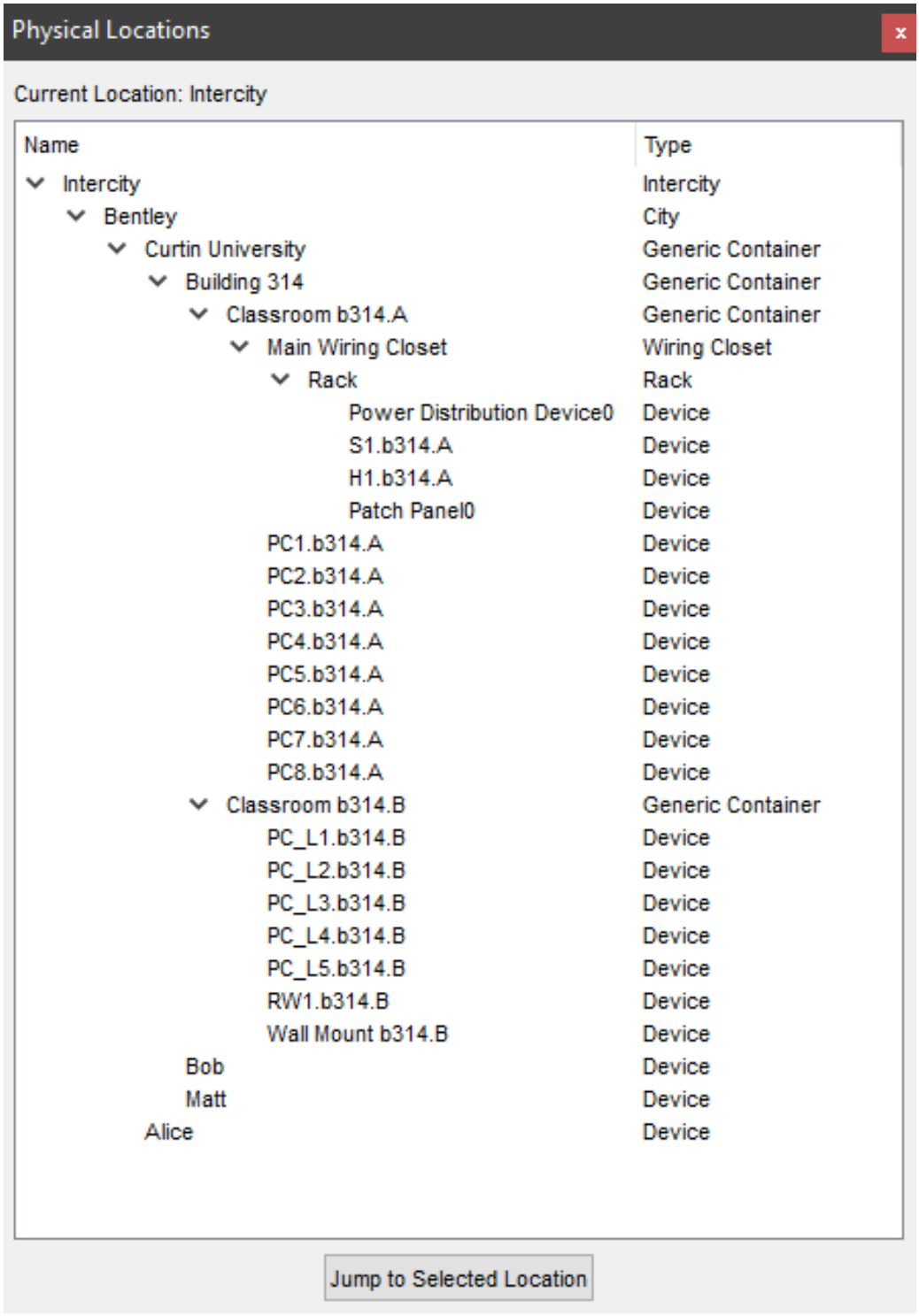
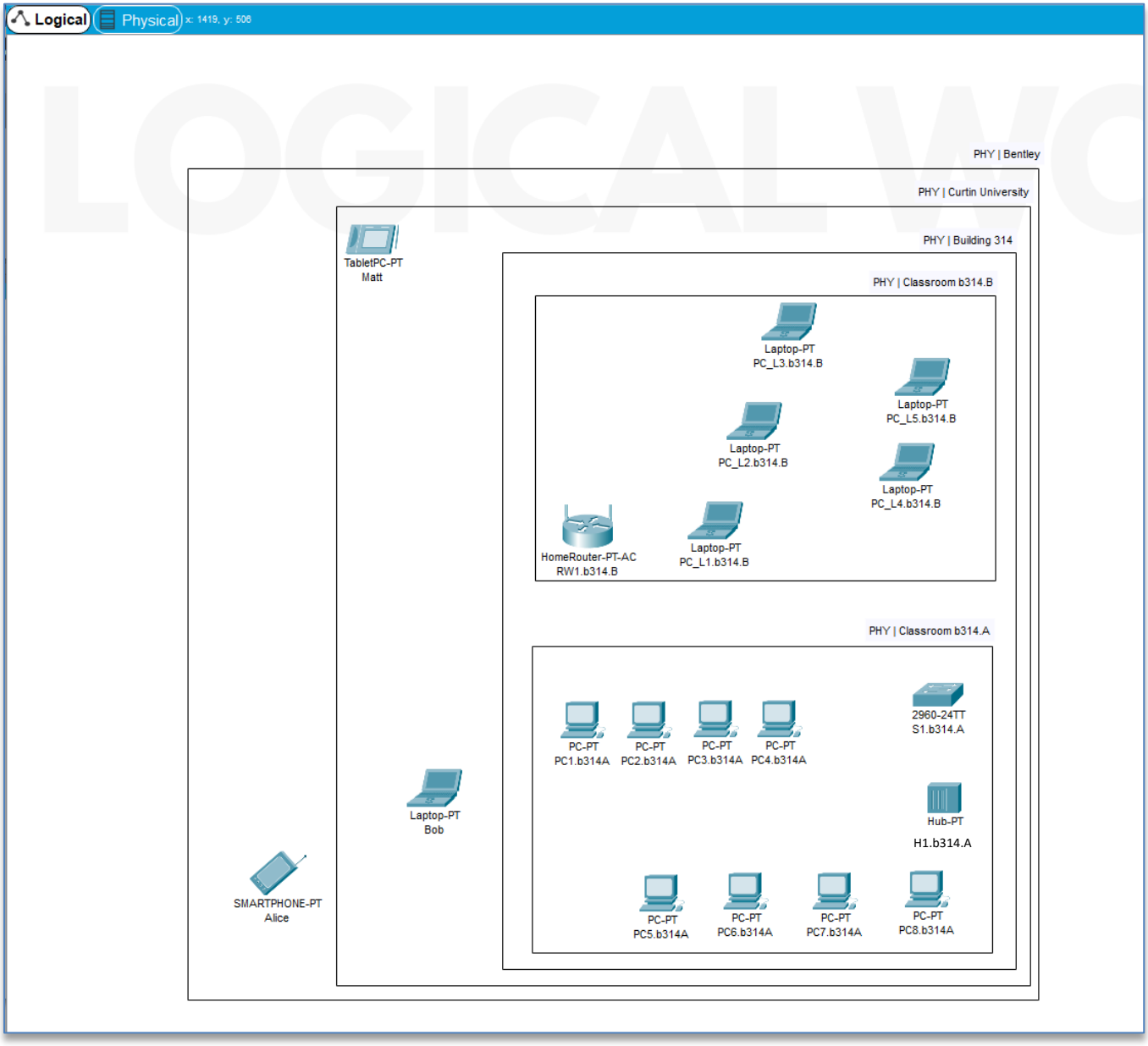
10. Check the network element placements according to the physical locations window as shown below:



11. Switch to the **logical view**
12. Change the background to **Resources/Map Tiles/L00 Title_logical_workspace.png**
13. Draw the physical boundaries, name them, and arrange the elements as shown below:

    ***DO NOT** use "Place Note" tool on the drawing palette to name the rectangles (boundaries).



C2: Design a Basic Wired and Wireless Network in PT

1. Configure the Wireless Network in Classroom b314.B

i) Go to RW1.b314.B -> GUI to perform the following configurations

(*do not forget to save each setting page on the router before you move to another setting page)

a. Wireless Network Settings

Wireless Band	SSID	SSID Broadcast	Network Mode	Security Mode	Passphrase
2.4Ghz	WN.b314.B	Enabled	Auto	WPA2 Personal	cisco_RW1.b314.B
5Ghz - 1	WN.b314.B – 5G	Enabled	Auto	WPA2 Personal	cisco_RW1.b314.B_5G
5Ghz - 2	Default	Disabled	Disabled	Disabled	-

b. Network Setup (GUI -> Basic Setup)

Setting Name	Value
Routers IP	192.168.20.1 / 255.255.255.0
DHCP Server	Enabled
DHCP Server – Start IP Address	192.168.20.11

c. In order to secure the router, configure a login password on the router.

GUI -> Administration

Router Password: cisco_RW1.b314.B_admin

ii) Connect the Laptops to the wireless networks as shown below:

Device Name	Wireless Network
PC_L1.b314.B	WN.b314.B – 5G
PC_L2.b314.B	WN.b314.B – 5G
PC_L3.b314.B	WN.b314.B – 5G
PC_L4.b314.B	WN.b314.B
PC_L5.b314.B	WN.b314.B

Note that the speed of the connections for **PC_L1.b314.B** and **PC_L3.b314.B** should be around 1300 Mbps (WiFi - 5Ghz Band) while the speed of the connections for **PC_L4.b314.B** and **PC_L5.b314.B** should be around 300 Mbps (WiFi – 2.4Ghz Band).

2. Configure the Wired Network in Classroom b314.A

i) The following connections must be made for the PCs (PC1.b314.A – PC8.b314.A), Switch and Hub.

Device Name	Interface	Device Name	Interface
PC1.b314.A	Fa0	S1.b314.A	Fa0/1
PC2.b314.A	Fa0	S1.b314.A	Fa0/2
PC3.b314.A	Fa0	S1.b314.A	Fa0/3
PC4.b314.A	Fa0	S1.b314.A	Fa0/4
PC5.b314.A	Fa0	H1.b314.A	Fa5
PC6.b314.A	Fa0	H1.b314.A	Fa6
PC7.b314.A	Fa0	H1.b314.A	Fa7
PC8.b314.A	Fa0	H1.b314.A	Fa8
S1.b314.A	Fa0/5	H1.b314.A	Fa0

ii) In each PC, set the IP configuration to DHCP to obtain an IP address dynamically from the router which will be connected later.
(PC -> Desktop -> IP Configuration -> DHCP)

iii) In order to connect the Switch (S1.b314.A) in Classroom b314.A to the Router (RW1.b314.A) in Classroom b314.B with a copper cable:

a. Switch to Physical View
b. Insert a **Patch Panel** inside "Wiring Closet b314.A"
c. Arrange the devices on the rack as below:
    i. Power Distribution Device (on top)
    ii. Patch Panel
    iii. Switch (S1.b314.A)
    iv. Hub (H1.b314.A)
d. Insert a Wall Mount inside Classroom b314.A and rename it to **Wall Mount b314.B**
    (Hint: here we insert a wall mount in Classroom b314.A to connect it with the Switch first and later we move it to Classroom b314.B)
e. Connect the Switch, Patch Panel and Wall Mount as shown below:

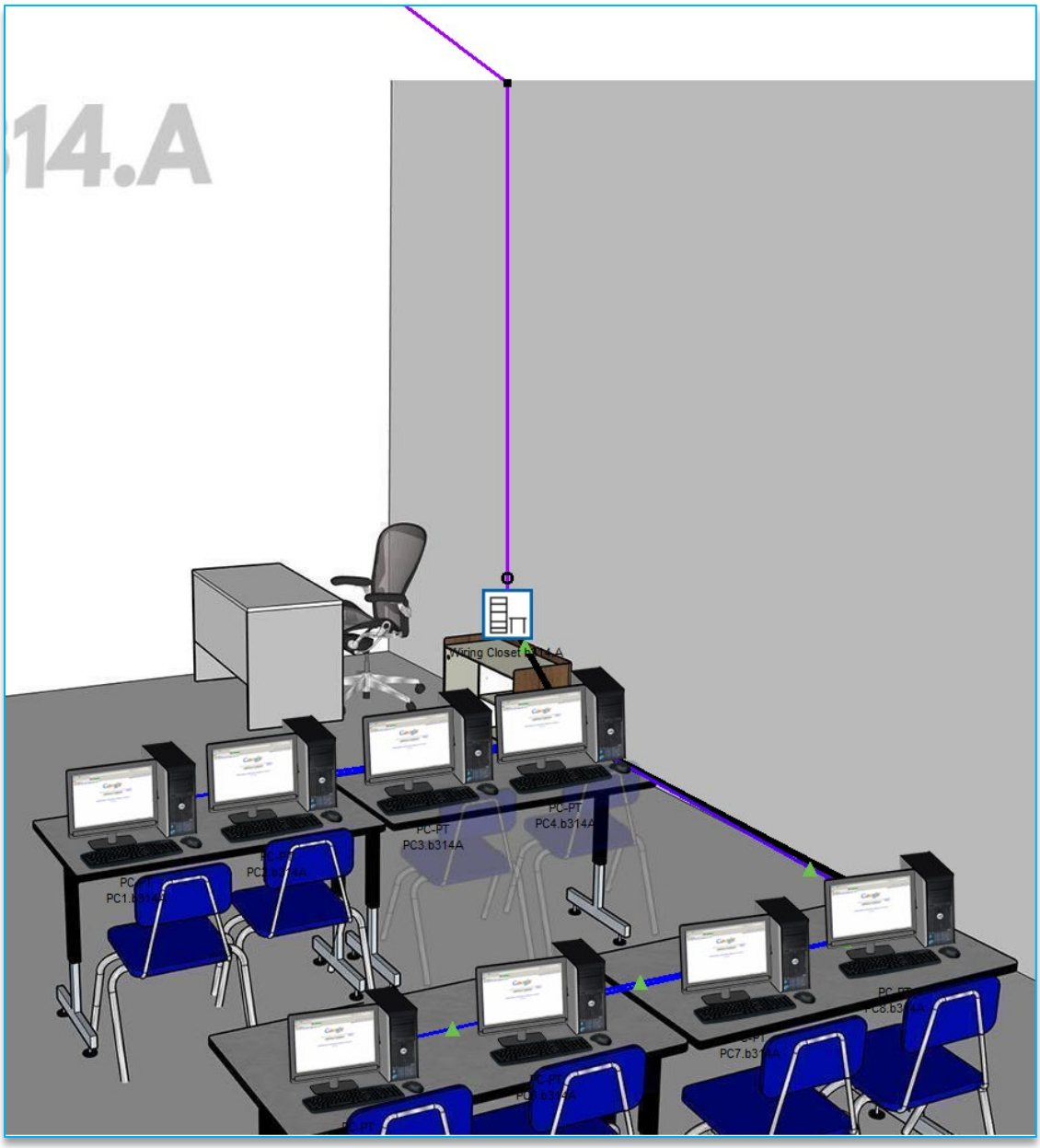
Device Name	Interface	Device Name	Interface
S1.b314.A	Fa0/6	Patch Panel0	Jack0
Wall Mount b314.B	PunchDown0	Patch Panel0	PunchDown0
RW1.b314.B	GigabitEthernet1	Wall Mount b314.B	Jack0

f. Move the Wall Mount b314.B to Classroom b314.B and place it below the Router (RW1.b314.B) in the physical workspace.

**Hint: you may refer to PT -> Official Video Tutorial Help -> 15.4 Enhanced Layer One Functions for more details on using patch/wall panels*

g. Tidy the physical workspace of **Classroom b314.A** and **Classroom b314.B** by using bend points and colors on wired connections as shown below:

Classroom b314.A



Classroom b314.B

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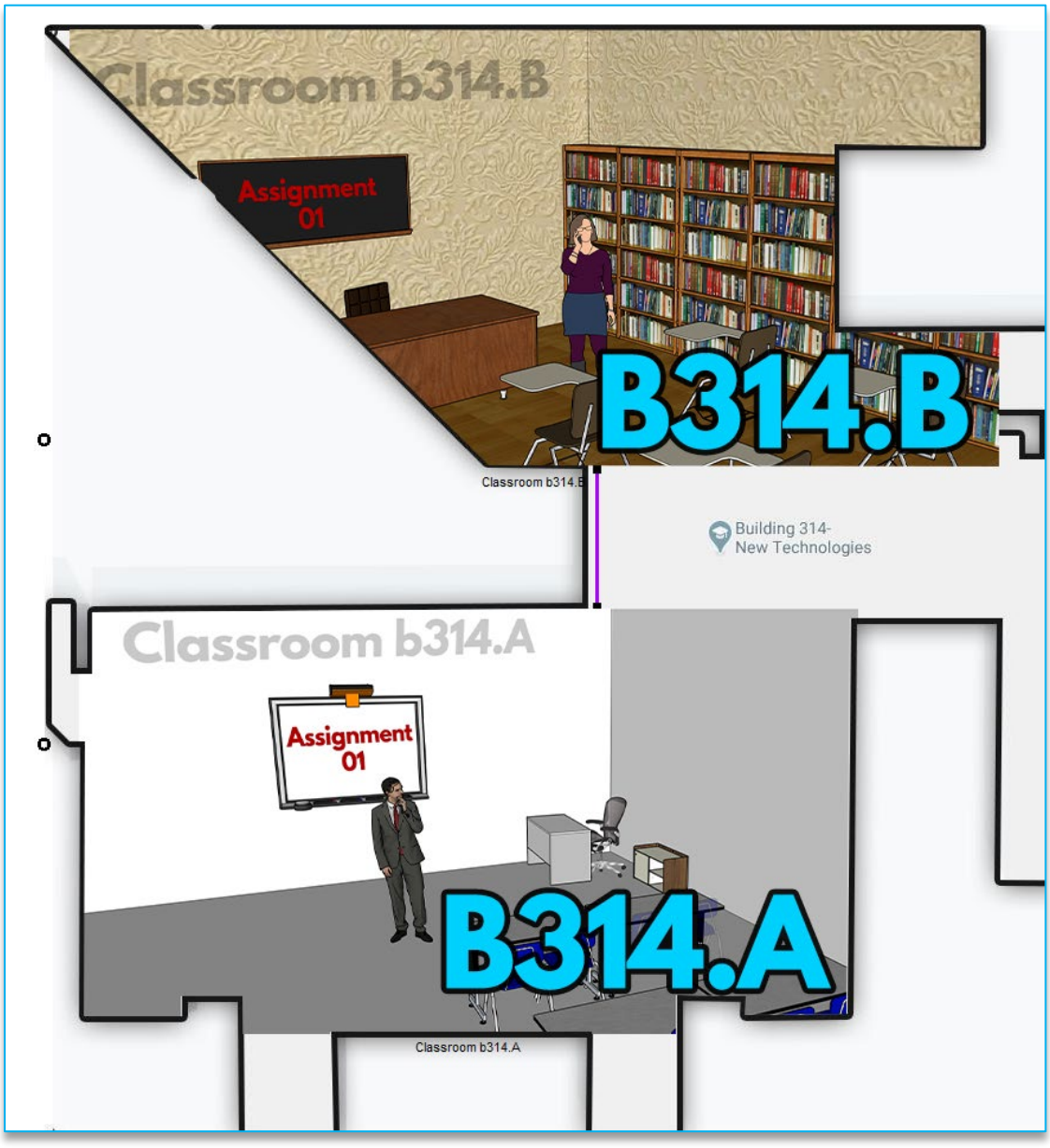
Building 314



*Blue color is used on the copper cables connecting PCs with the Hub and Switch in Classroom b314.A

*Purple color is used on the copper cable connecting the Patch Panel in Classroom b314.A with the Wall Mount b314.B in Classroom b314.B

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3. Connect Bob, Matt, Alice to the Wireless Network

i) Make sure Bob (Laptop), Matt (Tablet) and Alice (SmartPhone) are all configured properly with the wireless credentials (SSID: WN.b314.B, PW: cisco_RW1.b314.B)

ii) Switch to the Physical View:

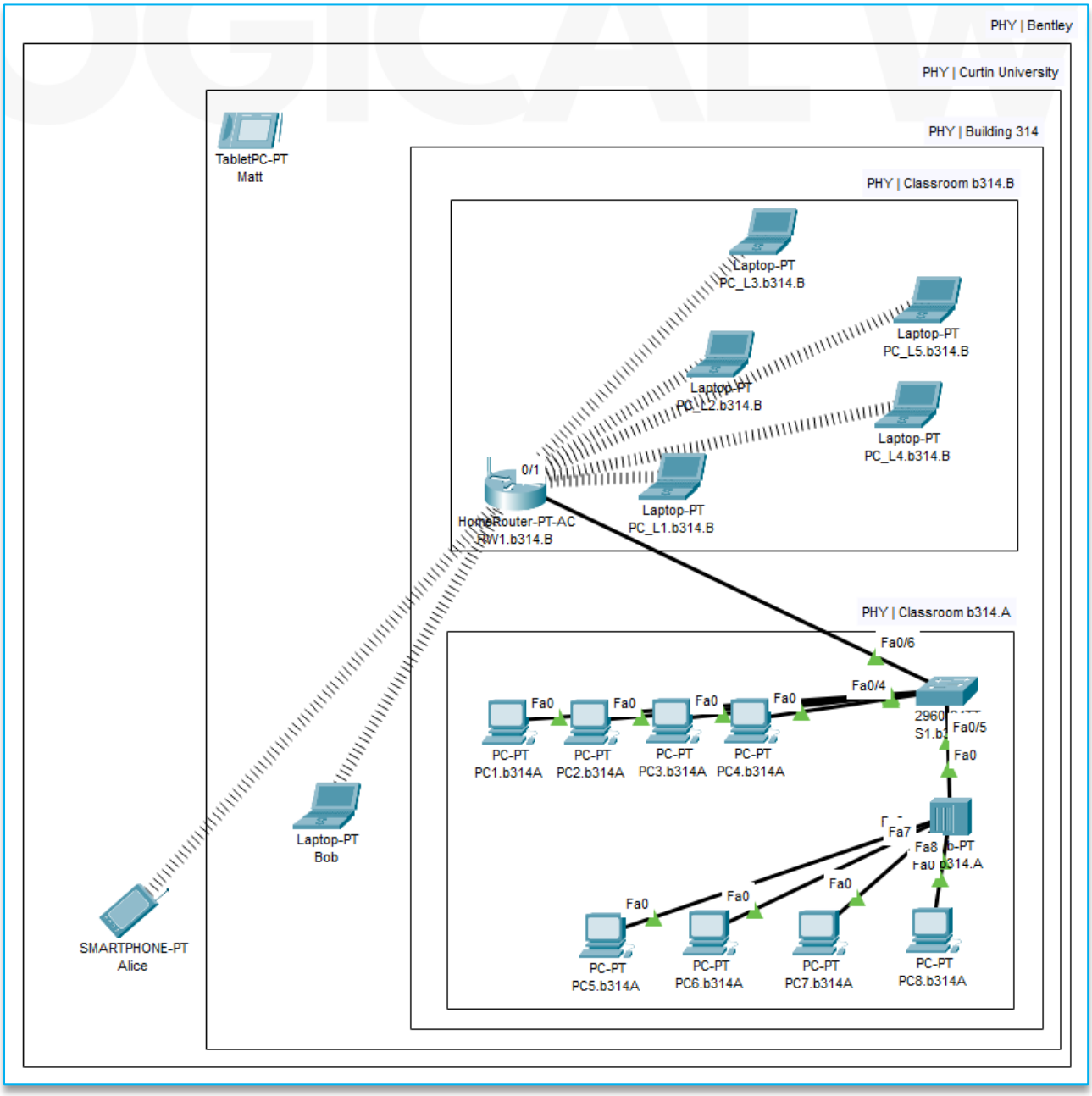
a. Place Matt near Curtin Stadium inside Curtin University container

b. Place Bob at some place inside Curtin University container where he can connect to the wireless network WN.b314.B

c. Place Alice at some place on Hayman Rd in Bentley container where she can connect to the wireless network WN.b314.B

(Hint: Since Matt is out of the wireless range of RW1.b314.b he should not be able to connect wirelessly.)

4. Complete the Logical View



Once all the configurations are done, click on the **Power Cycle Device** to turn on/off all devices. This is to get rid of any connection glitches on the simulated environment inside Packet Tracer.

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C3: Test the Network Connectivity

i) Test that the device connections shown by the gridline patterns in the Logical View are really connected to the router:

- **To check the wireless connectivity, there are a few methods:**
  - **a. Method 01:**
    - i. Go to PC -> Desktop -> IP Configuration -> change to static and then switch back to DHCP
    - ii. If connected to the wireless router: The device must obtain an IP from the router in (192.168.10.0 / 255.255.255.0) Network within the IP allocation range 192.168.20.11-60 of the router.
    - iii. If not connected to the wireless router: "DHCP Request Failed" message should be displayed and link local address (which is not an IP address of 192.168.20.0 / 255.255.255.0 network) will be used.
  - **b. Method 02:**
    - i. Turn off the PC and turn it on after some time
    - ii. Follow **Method 01.ii** and **Method 01.iii**

ii) Validate the connectivity in **Classroom b314.A** according to the following table:

Source Device	Destination Device	Comment
PC1.b314.A	PC4.b314.A	Must be successful
PC5.b314.A	PC8.b314.A	Must be successful
PC1.b314.A	PC8.b314.A	Must be successful
PC2.b314.A	PC7.b314.A	Must be successful
PC3.b314.A	PC6.b314.A	Must be successful
PC4.b314.A	PC5.b314.A	Must be successful

iii) Validate the connectivity in **Classroom b314.B** according to the following table:

Source Device	Destination Device	Comment
PC_L1.b314.B	PC_L4.b314.B	Must be successful
PC_L3.b314.B	PC_L5.b314.B	Must be successful
PC_L4.b314.B	PC_L5.b314.B	Must be successful

iv) Validate the connectivity across all connected devices according to the following table:

Source Device	Destination Device	Comment
Bob	Alice	Must be successful
Bob	PC_L1.b314.B	Must be successful
Bob	PC1.b314.A	Must be successful
Bob	PC5.b314.A	Must be successful
Alice	PC_L1.b314.B	Must be successful
Alice	PC1.b314.A	Must be successful
Alice	PC5.b314.A	Must be successful
PC_L1.b314.B	PC1.b314.A	Must be successful
PC_L1.b314.B	PC5.b314.A	Must be successful
PC_L4.b314.B	PC1.b314.A	Must be successful
PC_L4.b314.B	PC5.b314.A	Must be successful
Matt	**(any connected device on the network)**	**Must be unsuccessful**

Summary:

Congratulations, you have completed the Assignment – Task 01

C1: Design the Physical Workspace in PT

C2: Design a basic wired and wireless network in PT

C3: Test the Network Connectivity