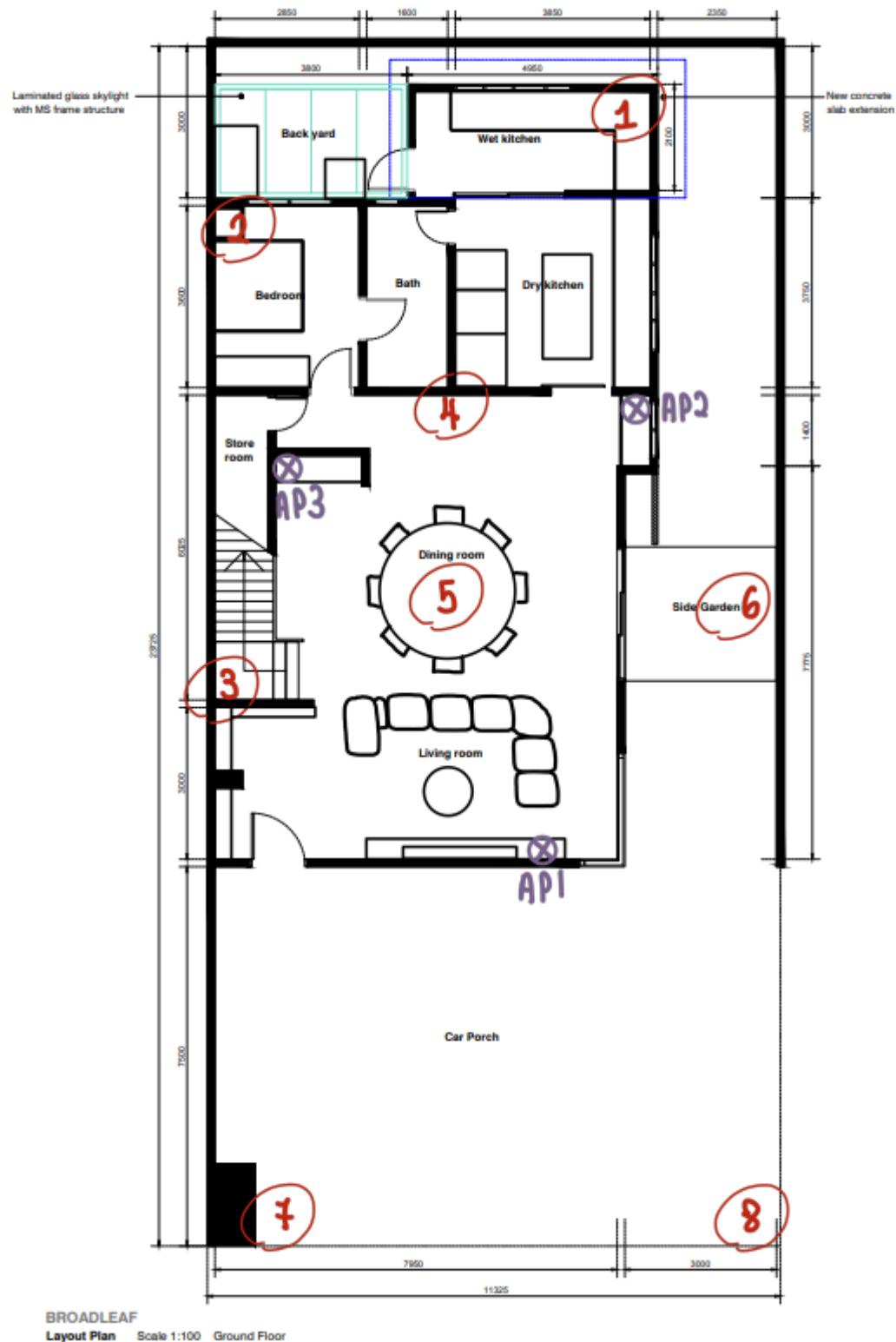


STUDENT ID = 33085625  
STUDENT NAME = FOO KAI YAN

**Task 1.1:**

The image below is the floor plan of testing location which is calculated to have area of at least  $268.69m^2$ :



The 8 tables below are the Tabulated Data where 1 table is at one test point:

Access Point (AP)		AP1	AP2	AP3
SSID		Toonglim328-5 G@unifi	SokChoo	李帝努
MAC Address		54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
Security		WPA2 Personal	WPA2 Personal	WPA2 Personal
802.11 version supported		802.11ax	802.11n	802.11n
Frequency Band (GHz)		5	2.4	2.4
Frequency Channels Used		157+1	6	11
LOCATION 1 : TOP-RIGHT-CORNER OF WET KITCHEN	Signal Strength	Signal (dBm)	-60	No signal
	Signal Strength	Percentage of current signal (%)	42	No signal
	Signal Strength	Minimum value of signal (dBm)	-60	-96
	Signal Strength	Maximum value of signal (dBm)	-39	-51
	Signal Strength	Average value of signal (dBm)	-43	-57
	Upload Speed (Mbps)		88.75	0.22
Download Speed (Mbps)		171.37	2.5	Too weak to test

Access Point (AP)		AP1	AP2	AP3
SSID		Toonglim328-5 G@unifi	SokChoo	李帝努
MAC Address		54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
Security		WPA2 Personal	WPA2 Personal	WPA2 Personal
802.11 version supported		802.11ax	802.11n	802.11n
Frequency Band (GHz)		5	2.4	2.4
Frequency Channels Used		157+1	6	11
LOCATION 2 : TOP-LEFT-CORNER OF GUEST BEDROOM	Signal Strength	Signal (dBm)	-56	No signal
	Signal Strength	Percentage of current signal (%)	47	No signal
	Signal Strength	Minimum value of signal (dBm)	-63	-96
	Signal Strength	Maximum value of signal (dBm)	-39	-51
	Signal Strength	Average value of signal (dBm)	-44	-57
	Download Speed (Mbps)		171.37	-55

	Upload Speed (Mbps)	94.84	0.28	Too weak to test
	Download Speed (Mbps)	170.03	1.41	Too weak to test
LOCATION 3 : BOTTOM-LEFT-CORNER OF STAIRS	Access Point (AP)	AP1	AP2	AP3
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal
	802.11 version supported	802.11ax	802.11n	802.11n
	Frequency Band (GHz)	5	2.4	2.4
	Frequency Channels Used	157+1	6	11
	Signal Strength	Signal (dBm)	-43	No signal
		Percentage of current signal (%)	62	No signal
		Minimum value of signal (dBm)	-63	-96
		Maximum value of signal (dBm)	-39	-51
		Average value of signal (dBm)	-45	-57
	Upload Speed (Mbps)	113.88	Too weak to test	0.24
	Download Speed (Mbps)	347.1	Too weak to test	2.56
LOCATION 4 : ABOVE-MIDDLE-PART OF DINING ROOM	Access Point (AP)	AP1	AP2	AP3
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal
	802.11 version supported	802.11ax	802.11n	802.11n
	Frequency Band (GHz)	5	2.4	2.4
	Frequency Channels Used	157+1	6	11
	Signal Strength	Signal (dBm)	-42	No signal
		Percentage of current signal (%)	63	No signal
		Minimum value of signal (dBm)	-45	-96
		Maximum value of signal (dBm)	-39	-51
		Average value of signal (dBm)	-44	-56

		Average value of signal (dBm)	-42	-57	-50
		Upload Speed (Mbps)	113.85	0.28	0.22
		Download Speed (Mbps)	388.47	1.41	1.99
LOCATION 5 : MIDDLE-PA RT OF DINING ROOM	Access Point (AP)	AP1	AP2	AP3	
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努	
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA	
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal	
	802.11 version supported	802.11ax	802.11n	802.11n	
	Frequency Band (GHz)	5	2.4	2.4	
	Frequency Channels Used	157+1	6	11	
	Signal Strength	Signal (dBm)	-42	-59	-51
		Percentage of current signal (%)	63	43	52
		Minimum value of signal (dBm)	-45	-65	-59
		Maximum value of signal (dBm)	-41	-51	-41
		Average value of signal (dBm)	-43	-57	-50
	Upload Speed (Mbps)	113.96	0.22	0.21	
	Download Speed (Mbps)	455.51	2.11	3.23	
LOCATION 6 : RIGHT-SIDE -NEAR-FEN CE-WALL OF SIDE GARDEN	Access Point (AP)	AP1	AP2	AP3	
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努	
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA	
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal	
	802.11 version supported	802.11ax	802.11n	802.11n	
	Frequency Band (GHz)	5	2.4	2.4	
	Frequency Channels Used	157+1	6	11	
	Signal Strength	Signal (dBm)	-34	No signal	-53
		Percentage of current signal (%)	72	No signal	50
		Minimum value of signal (dBm)	-63	-96	-81
		Maximum value of signal (dBm)	-34	-51	-41
		Average value of signal (dBm)	-44	-57	-55

	Upload Speed (Mbps)	113.85	104.83	0.25
	Download Speed (Mbps)	366..14	112.39	1.82
LOCATION 7 : BOTTOM-LEFT-CORNER OF CAR PORCH	Access Point (AP)	AP1	AP2	AP3
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal
	802.11 version supported	802.11ax	802.11n	802.11n
	Frequency Band (GHz)	5	2.4	2.4
	Frequency Channels Used	157+1	6	11
	Signal Strength	Signal (dBm)	-60	No signal
		Percentage of current signal (%)	42	No signal
		Minimum value of signal (dBm)	-63	-96
		Maximum value of signal (dBm)	-34	-51
		Average value of signal (dBm)	-45	-57
	Upload Speed (Mbps)	99.85	Too weak to test	Too weak to test
	Download Speed (Mbps)	175.32	Too weak to test	Too weak to test
LOCATION 8 : BOTTOM-RIGHT-CORNER OF CAR PORCH	Access Point (AP)	AP1	AP2	AP3
	SSID	<a href="#">Toonglim328-5 G@unifi</a>	SokChoo	李帝努
	MAC Address	54:E1:05:64:08 :F9	F6:E5:5F:57:4B :3F	6A:73:20:20:99 :CA
	Security	WPA2 Personal	WPA2 Personal	WPA2 Personal
	802.11 version supported	802.11ax	802.11n	802.11n
	Frequency Band (GHz)	5	2.4	2.4
	Frequency Channels Used	157+1	6	11
	Signal Strength	Signal (dBm)	-62	No signal
		Percentage of current signal (%)	40	No signal
		Minimum value of signal (dBm)	-63	-96
		Maximum value of signal (dBm)	-34	-51
		Average value of signal (dBm)	-44	-57

	Upload Speed (Mbps)	113.59	Too weak to test	Too weak to test
	Download Speed (Mbps)	129.66	Too weak to test	Too weak to test

### **Task 1.2:**

According to the tables from Task 1.1 above, the channel occupied by AP1, AP2 and AP3 does not clash with each other but the channel occupied by AP3 is also occupied by another AP near the testing location so AP3 and the another AP will interfere with each other and hence data will take a longer time to be transmitted from source to specified destination or will encounter collision if the data are transmitted during the same time which may cause possible data corruption or frame loss. AP1, AP2 and AP3 are not configured to use overlapping channels so the data transmitted using these 3 APs will not collide with each other. 2.4GHz have 3 non-overlapping channels which are channels 1, 6 and 11 whereas 5GHz have 24 non-overlapping channels and channel 157 is one of the 24 non-overlapping channels. The channel 157+1 represents channel bonding for 5GHz where channel 157 will bond with neighbouring channel, channel 161 and channel 157+1 basically means channel 159. The configuration can be improved where AP3 can be assigned to use another unused channel like channel 8 from band 2.4GHz, although channel 8 is an overlapping channel which may delay the transmission of data but at least it wouldn't collide with other APs during transmission of data which may cause data corruption or frame loss.

For different APs to reach location 6, Right-Side Near Fence Wall of Side Garden, they have encountered different interference from obstacles like brick walls, glass windows and marble tables. For AP1 to reach location 6, it encountered interferences like brick walls which affects the signal strength of AP1 where the percentage of current signal of AP1 is 72%, 28% away from 100% signal strength. AP2 encountered a thick glass window and metal borders which completely blocked the wireless signals and caused AP2 to have no signal detected. AP3 encountered interference from marble table and glass sliding doors which caused AP3 to have a percentage of current signal of 50%. Due to these obstacles, there is an obvious signal attenuation for different APs which affects the signal strength of these APs to reach various locations.

The access points sufficiently cover the whole floor, although the further the distance the signal strength of the APs is seen to be visibly weaker than when the scanning is done directly in front of the APs. AP1 can be seen to be placed in a good location where its signal can be received at all the 8 tested locations whereas AP2 and AP3 are weak but AP2 and AP3 are mainly weak due to the location generally having a bad line signal from the main internet station. Since AP2 and AP3 are "Personal hotspot" which means it only covers a small area of the floor so these APs do not impact much on the coverage of the floor.

The download and upload speed of each APs are recorded at the last 2 rows for each of the 8 tabulated tables above. AP1 generally has the highest download and upload speed recorded between the 3 APs for each of the 8 locations. The highest download and upload speed is measured and occupied by AP1 which are 455.51Mbps and 113.96Mbps respectively. Whereas for AP2 and AP3, the download and upload speed can't be measured

at certain locations. This may be due to AP1 being a home broadband using a landline router whereas AP2 and AP3 being “Personal hotspot” from 2 different mobile phones. Hence, AP1 has a greater bandwidth compared to AP2 and AP3 which allows heavier internet activities like computer games, streaming and downloading which requires a higher and faster connection speed. AP1 has a good upload and download speed which is a lot more than what has been measured from using AP2 and AP3.

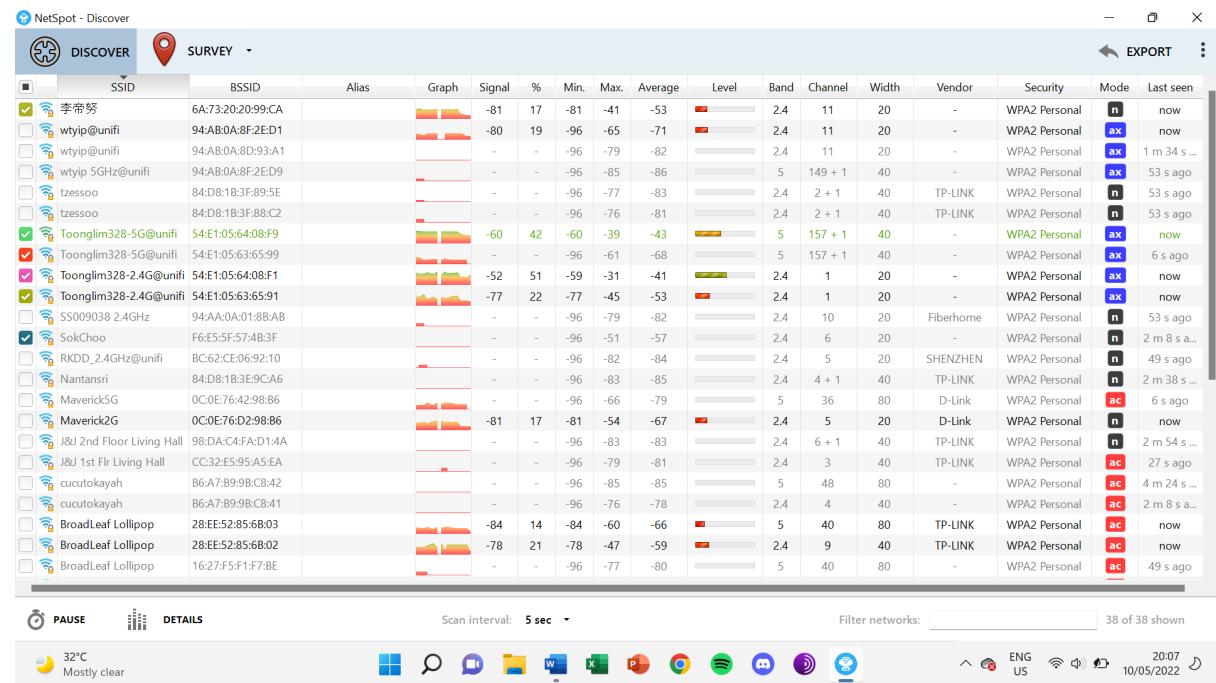
## Appendix:

### 8 different locations naming on floor plan :

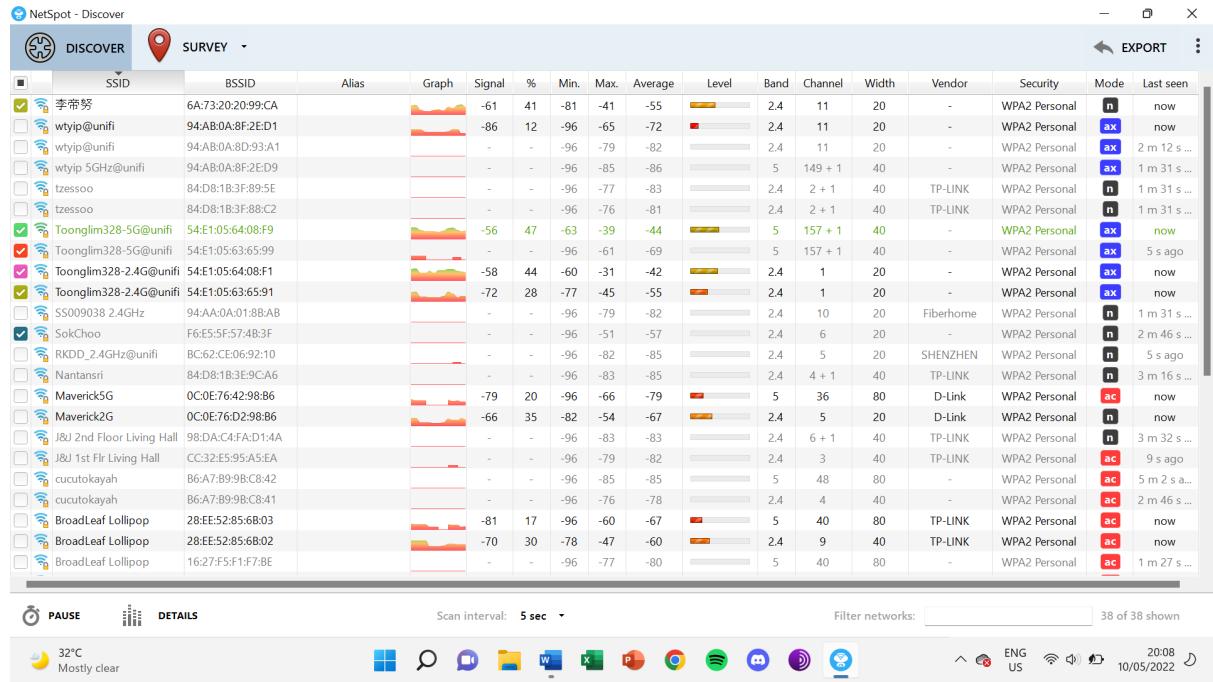
1. Top-Right-Corner of Wet Kitchen
2. Top-Left-Corner of Guest Bedroom
3. Bottom-Left-Corner of Stairs
4. Above-Middle-Part of Dining Room
5. Middle-Part of Dining Room
6. Right-Side-Near-Fence-Wall of Side Garden
7. Bottom-Left-Corner of Car Porch
8. Bottom-Right-Corner of Car Porch

### Screenshots of NetSpot scanning result of 8 different locations on floor plan :

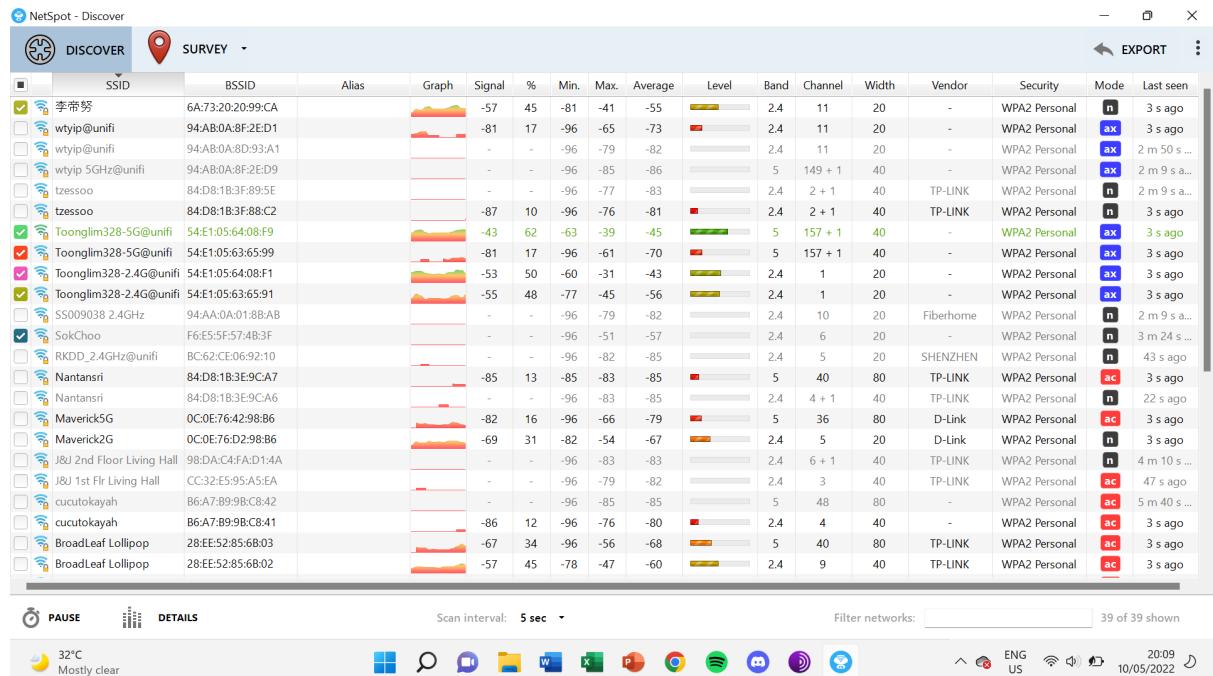
#### 1. Top-Right-Corner of Wet Kitchen



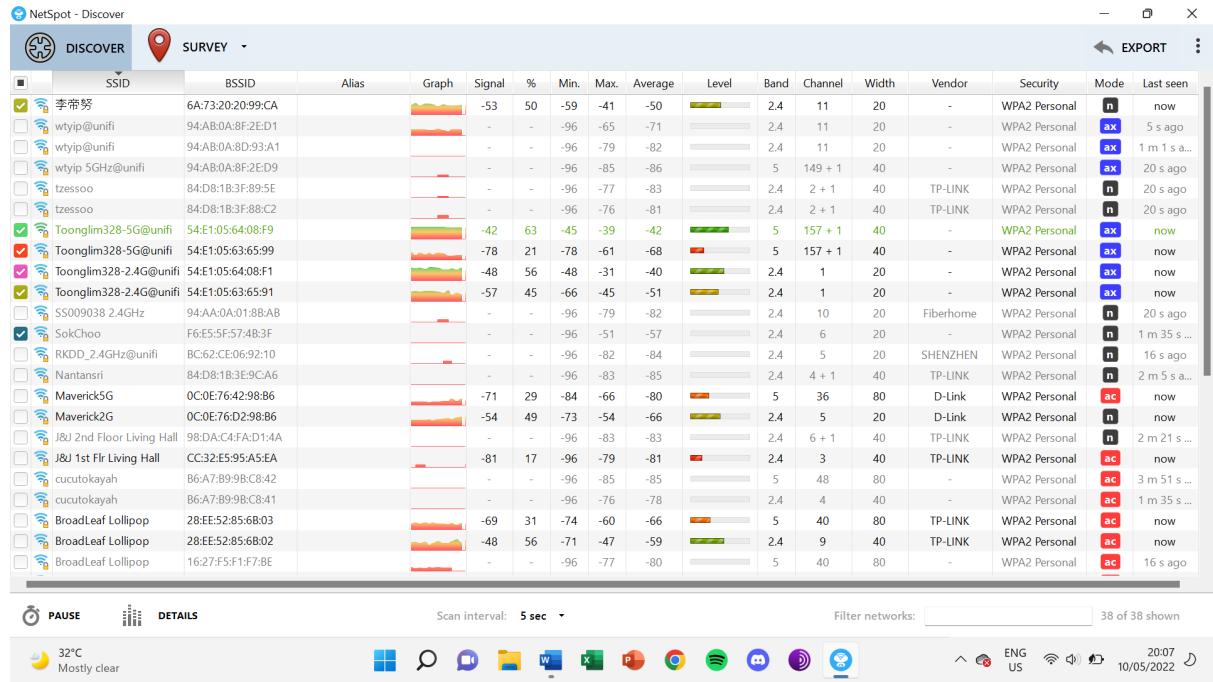
#### 2. Top-Left-Corner of Guest Bedroom



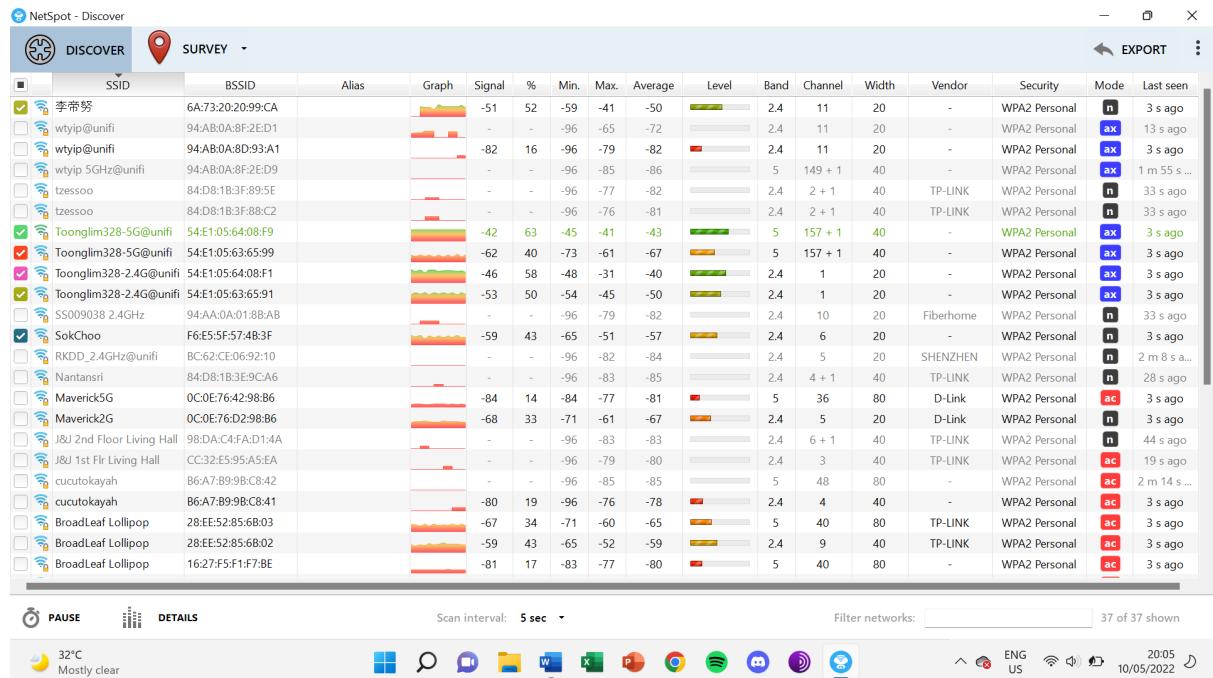
### 3. Bottom-Left-Corner of Stairs



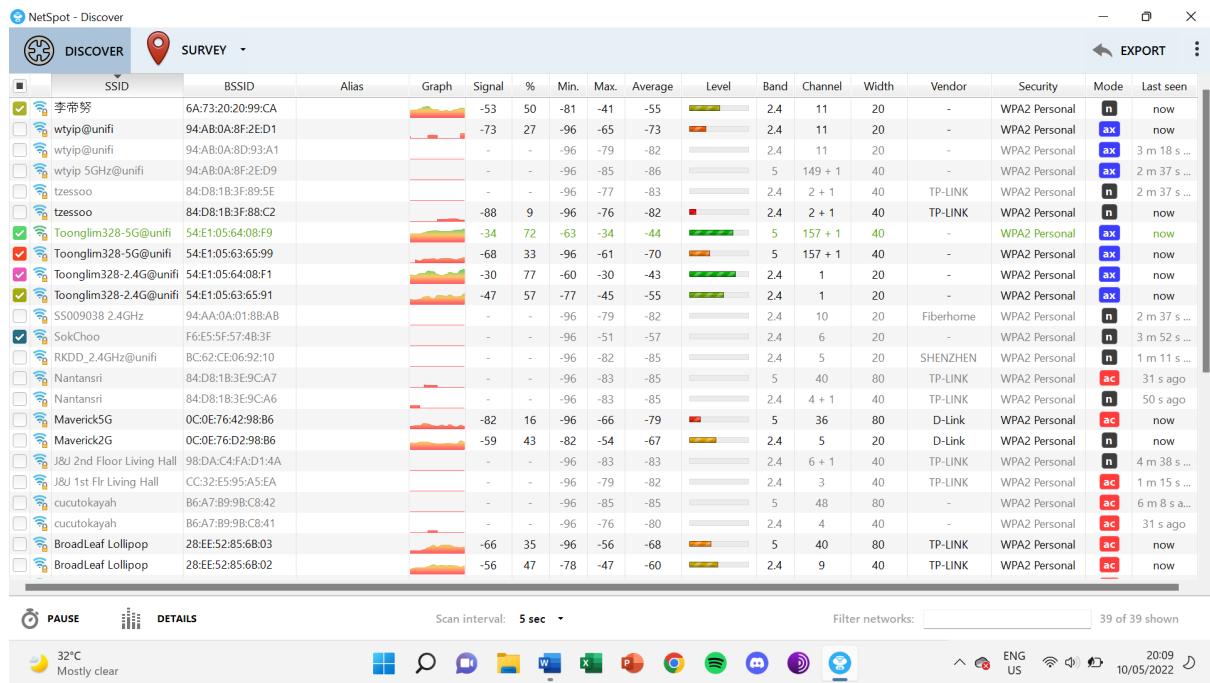
### 4. Above-Middle-Part of Dining Room



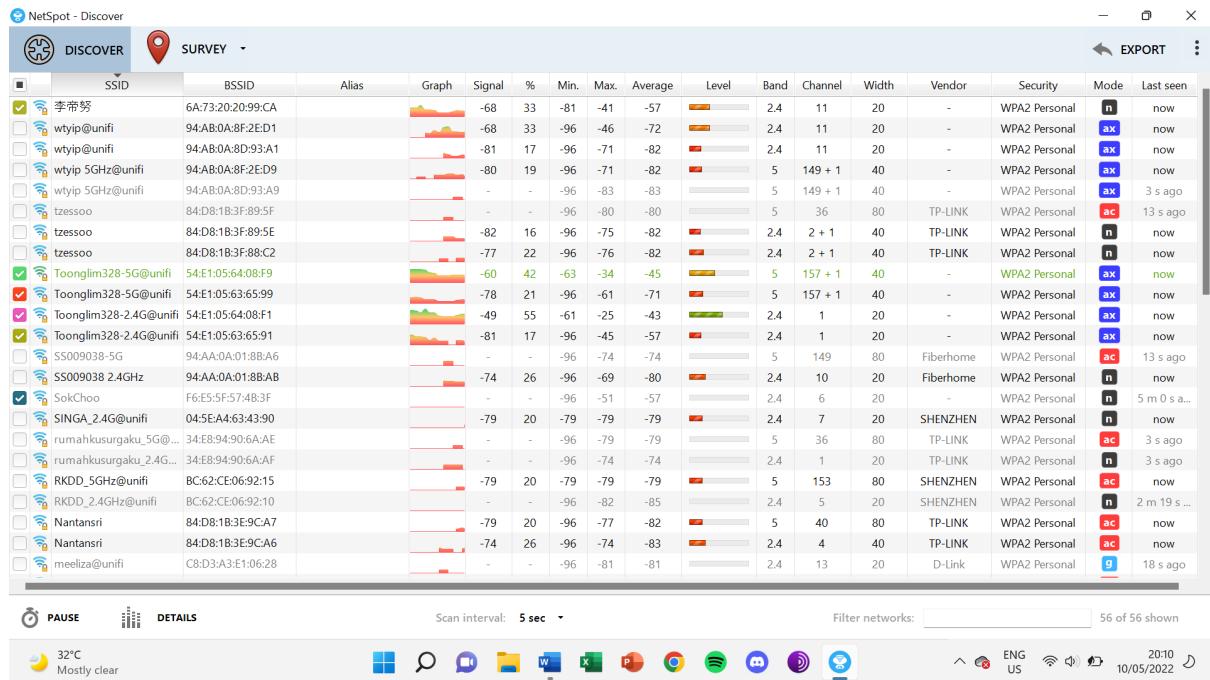
## 5. Middle-Part of Dining Room



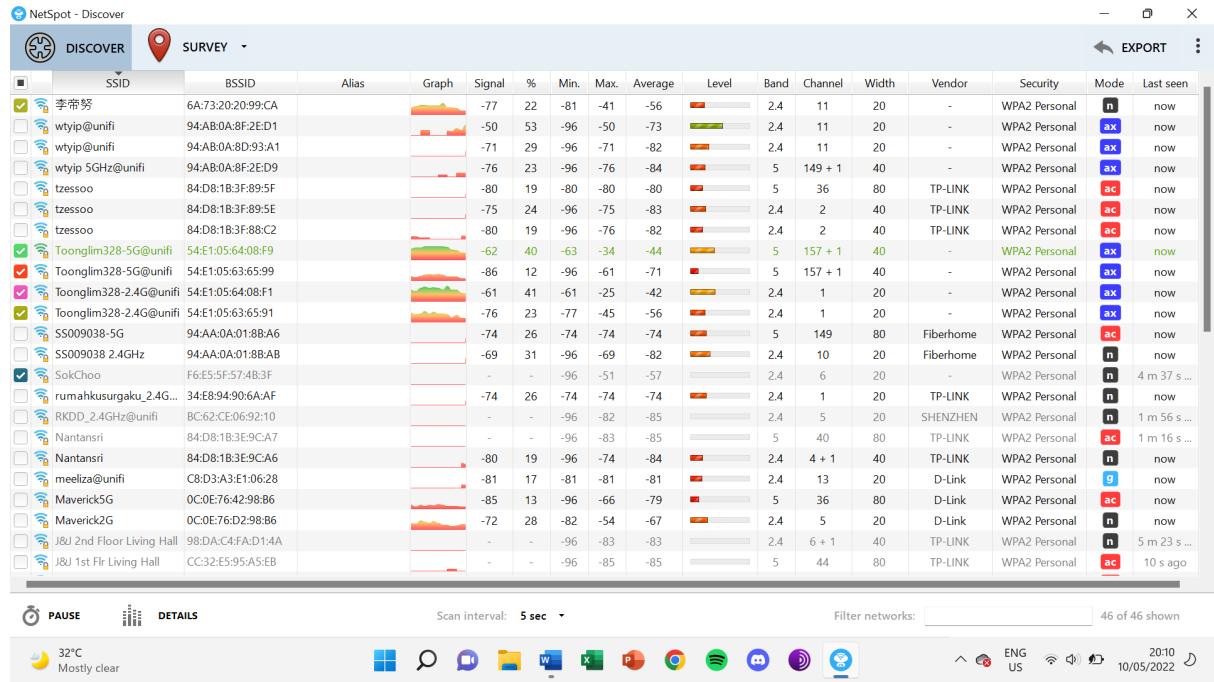
## 6. Right-Side-Near-Fence-Wall of Side Garden



## 7. Bottom-Left-Corner of Car Porch



## 8. Bottom-Right-Corner of Car Porch

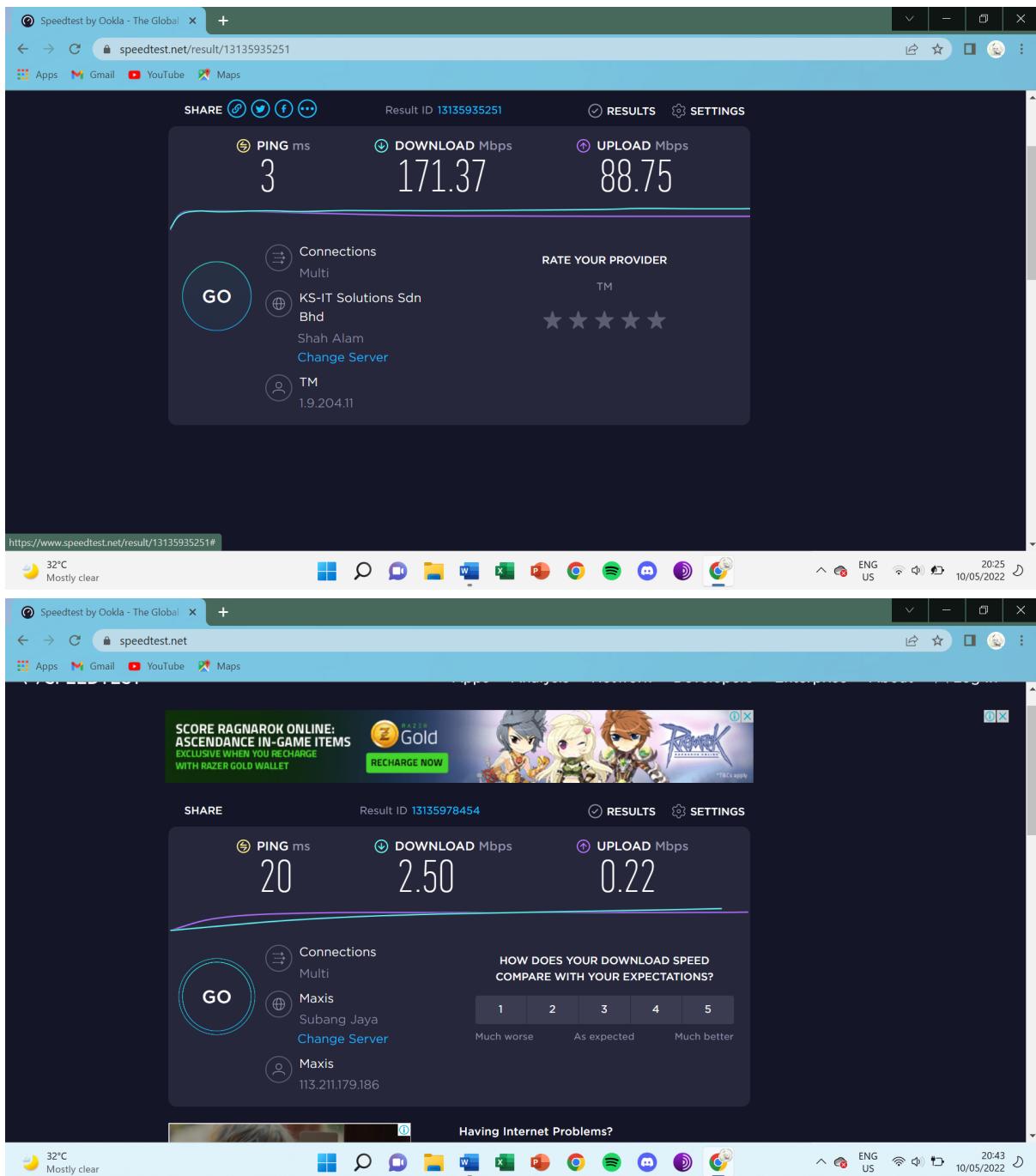


### SnipShots of SpeedTest scanning result of 8 different locations on floor plan :

Other information :

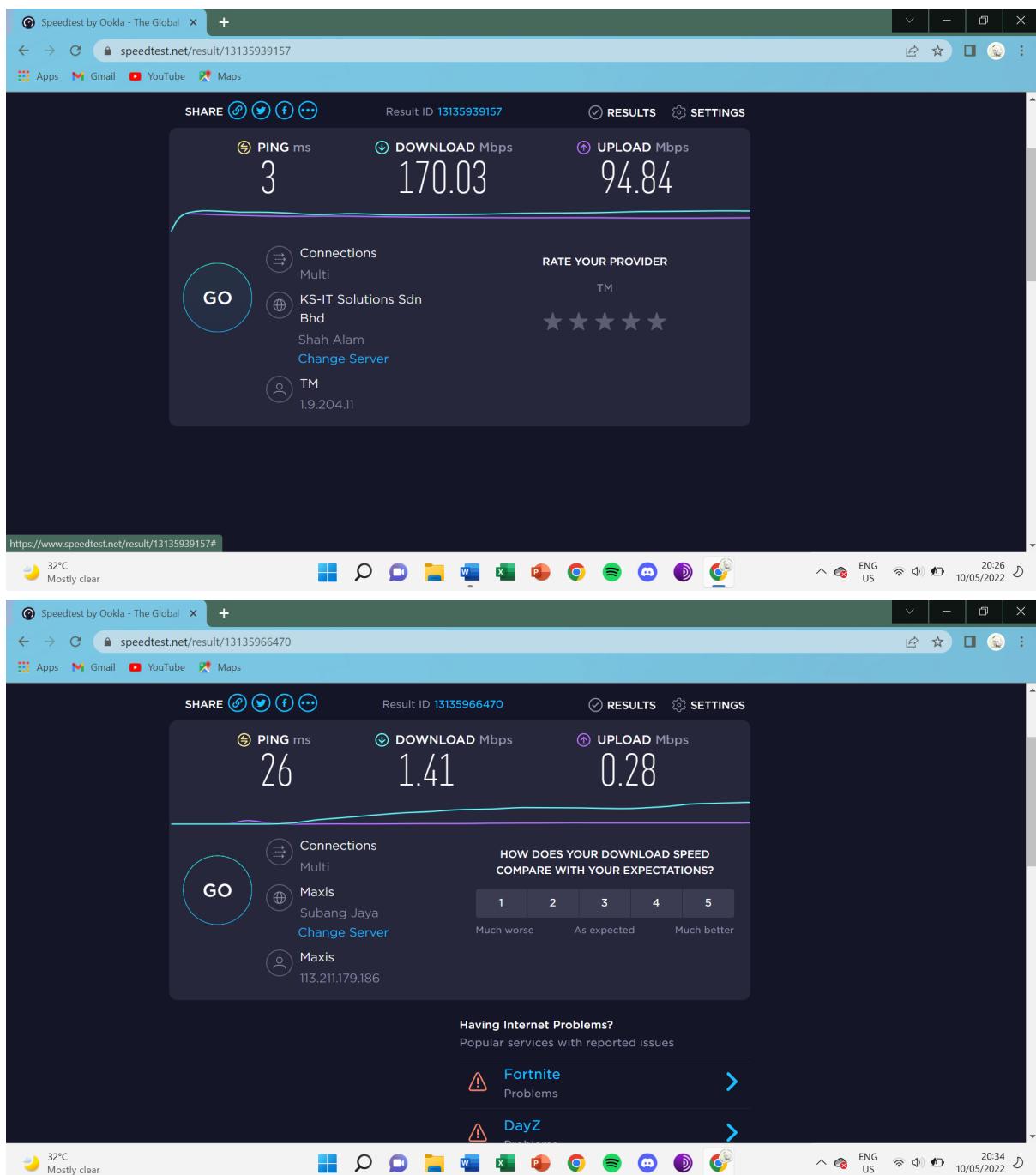
- ⇒ First screenshot SSID used = Toonglim328-5G@unifi
- ⇒ Second screenshot SSID used = SokChoo
- ⇒ Third screenshot SSID used = 李帝努

### 1. Top-Right-Corner of Wet Kitchen



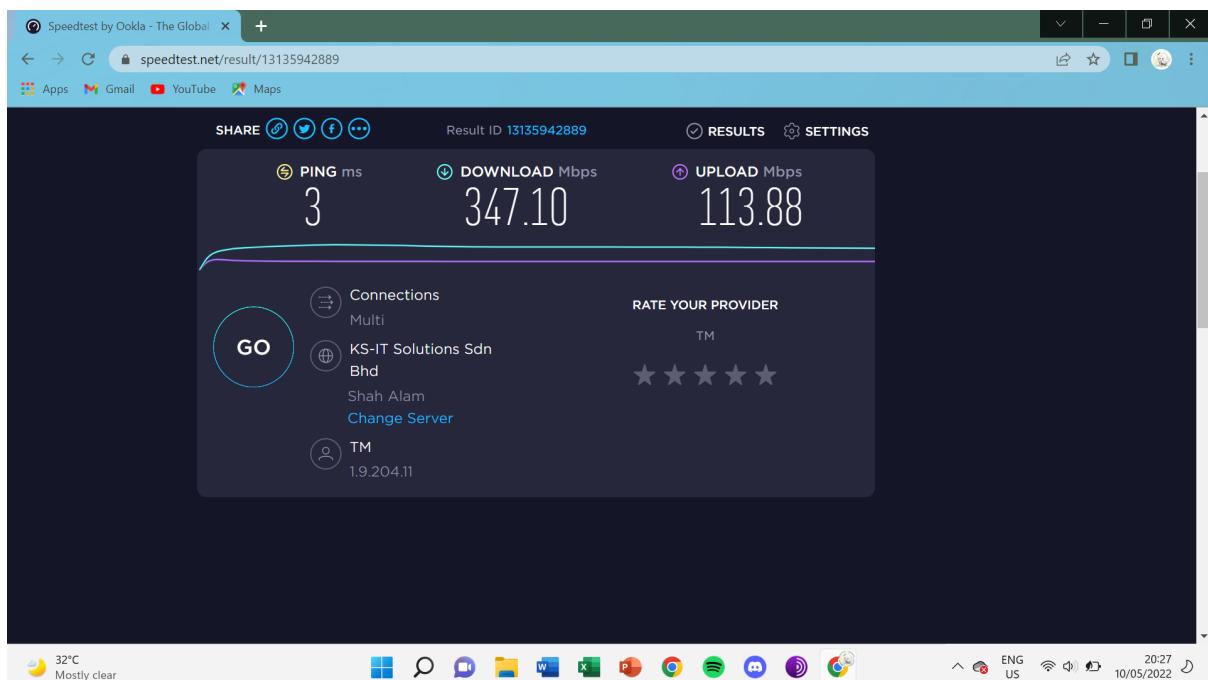
李帝努 = Too weak to test

2. Top-Left-Corner of Guest Bedroom

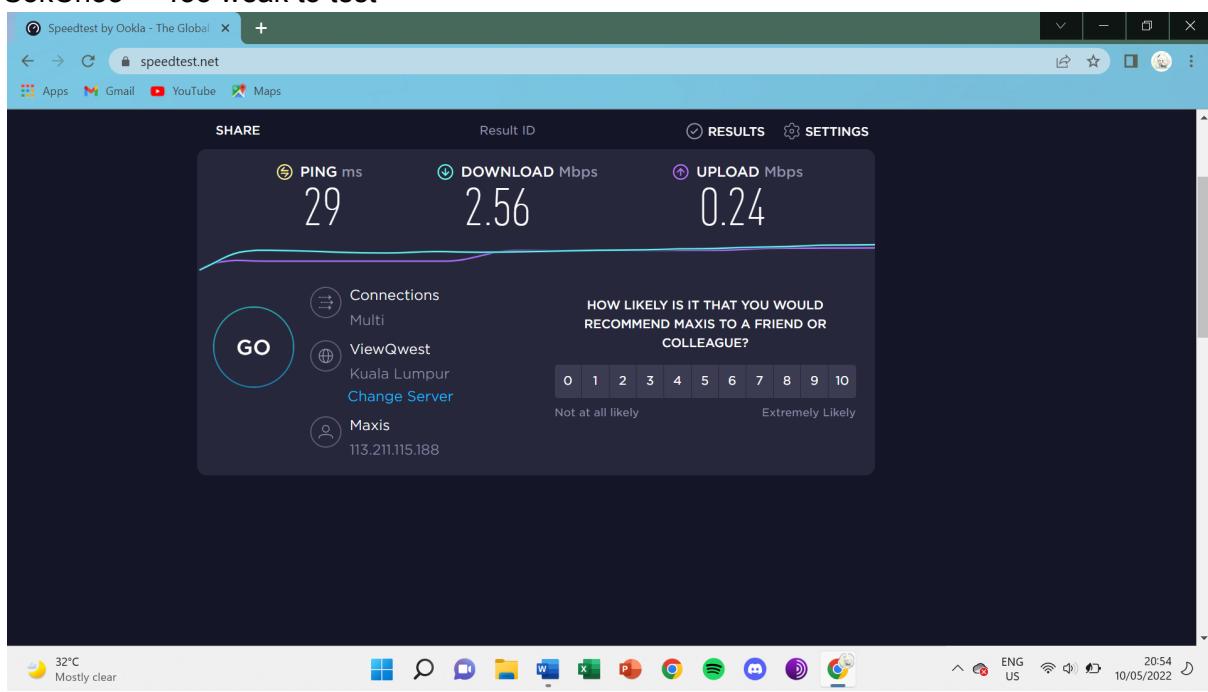


李帝努 = Too weak to test

3. Bottom-Left-Corner of Stairs

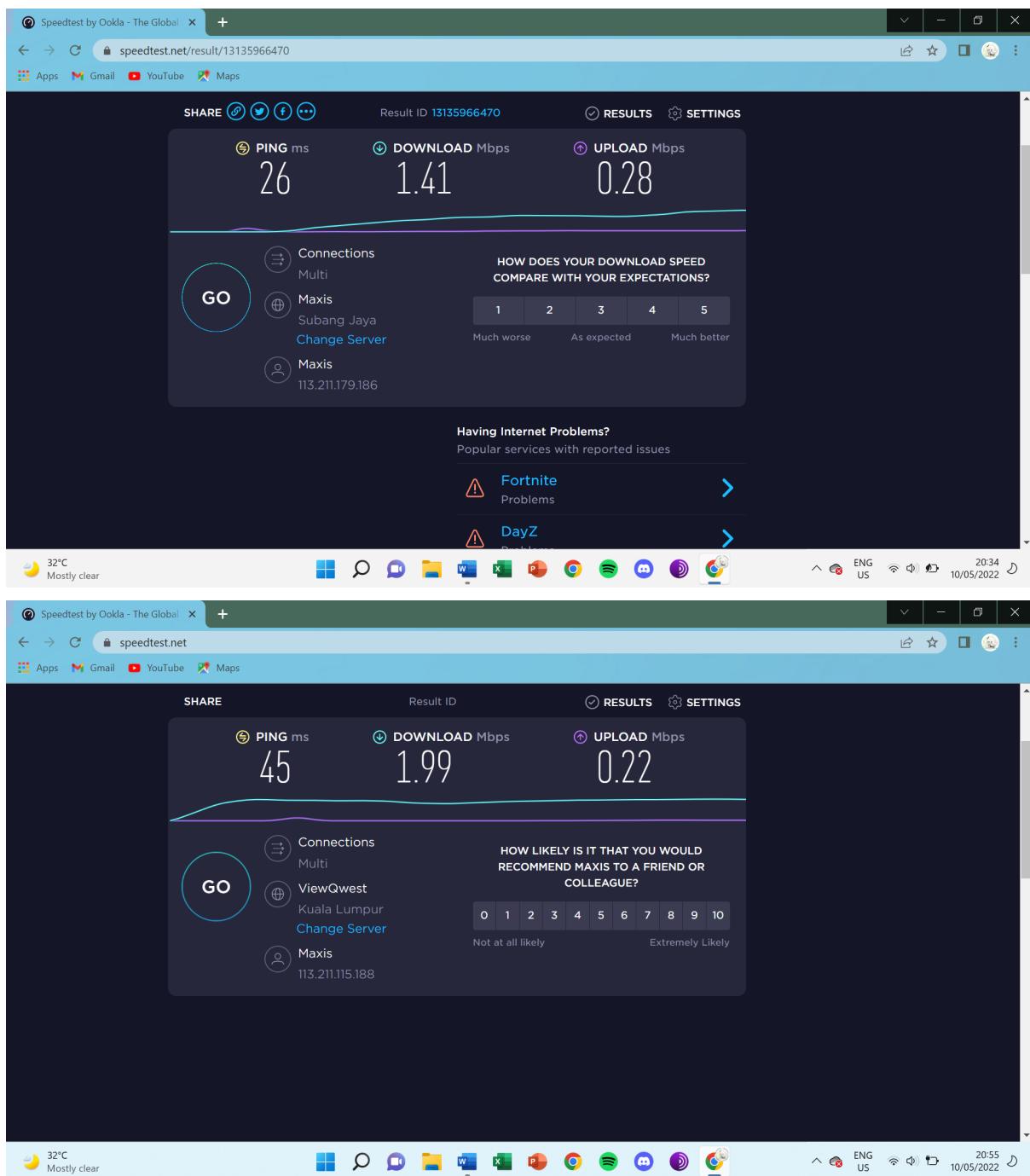


SokChoo = Too weak to test



#### 4. Above-Middle-Part of Dining Room





## 5. Middle-Part of Dining Room

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SHARE Result ID 13135912924 RESULTS SETTINGS

PING ms DOWNLOAD Mbps UPLOAD Mbps

3 455.51 113.96

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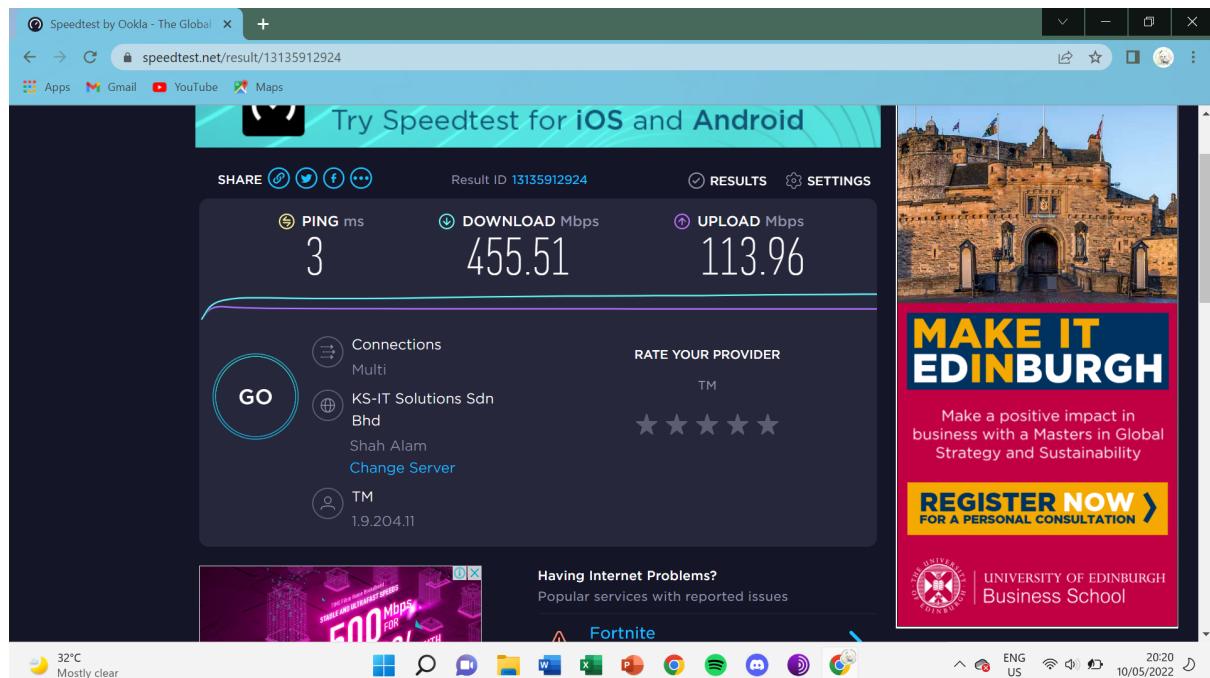
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speedtest.net

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Result ID 13135978454

SHARE RESULTS SETTINGS

PING ms DOWNLOAD Mbps UPLOAD Mbps

77 2.11 0.22

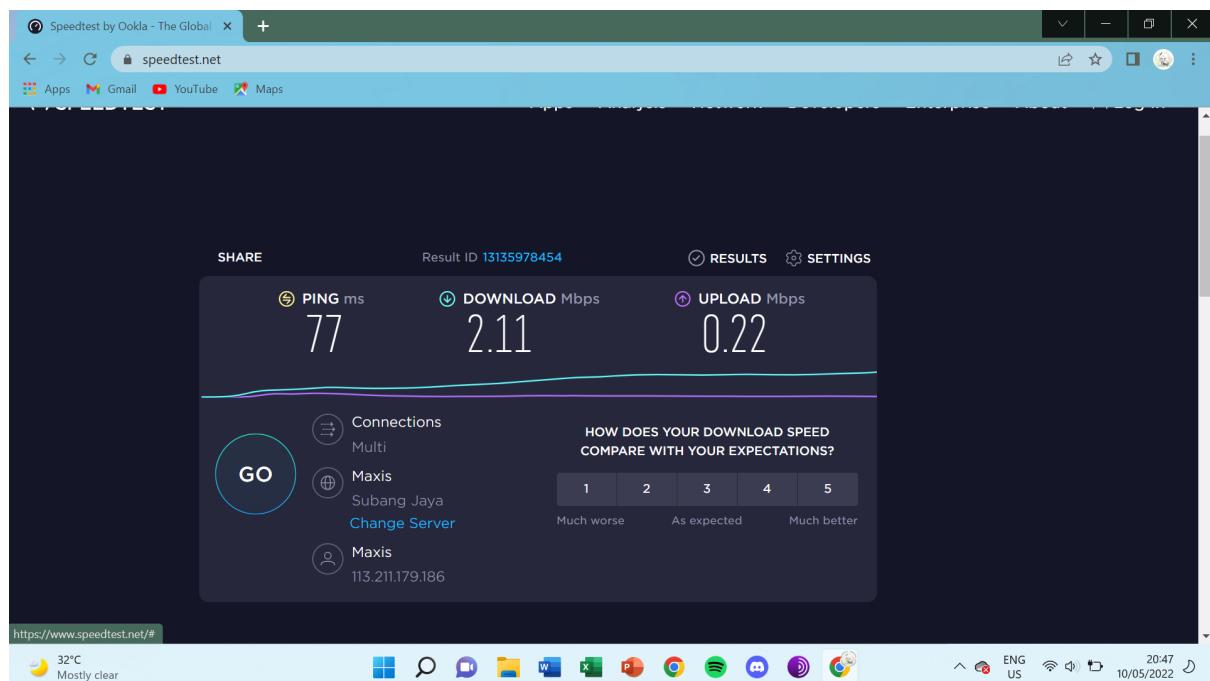
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Maxis Subang Jaya Change Server  
Maxis 113.211.179.186

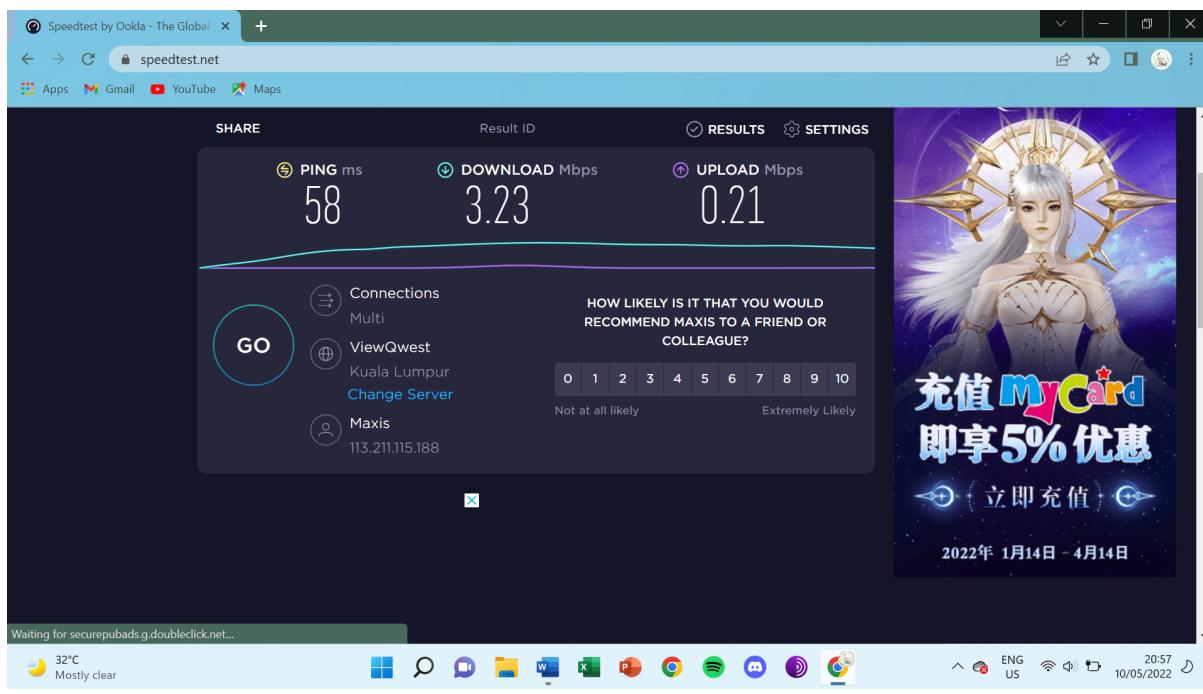
HOW DOES YOUR DOWNLOAD SPEED COMPARE WITH YOUR EXPECTATIONS?  
1 2 3 4 5  
Much worse As expected Much better

https://www.speedtest.net/#

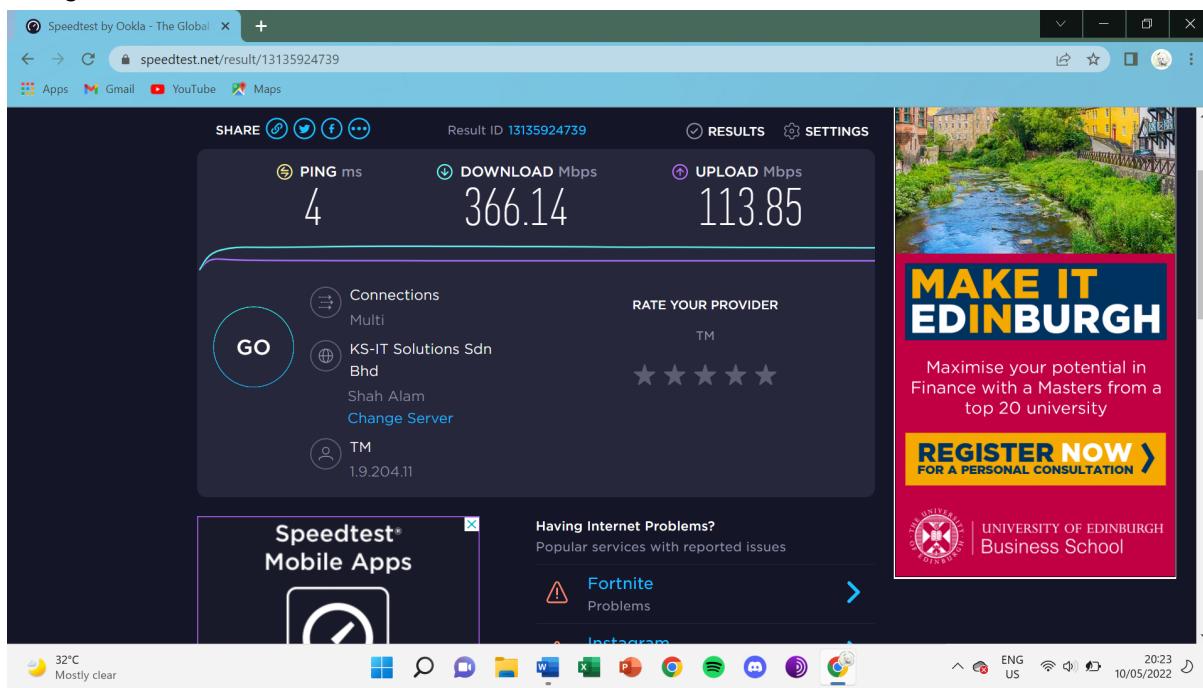
32°C Mostly clear

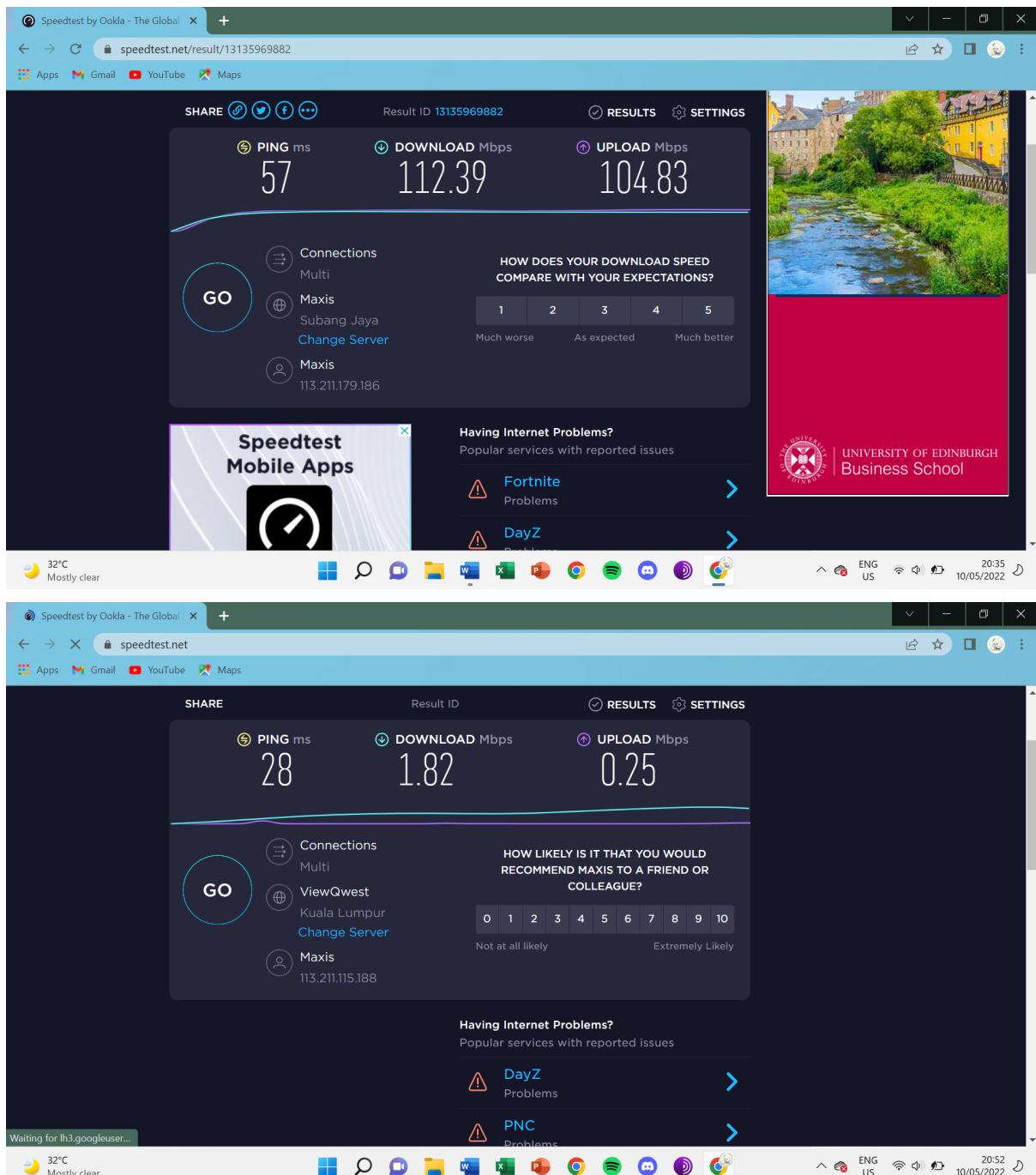
ENG US 20:47 10/05/2022





## 6. Right-Side-Near-Fence-Wall of Side Garden





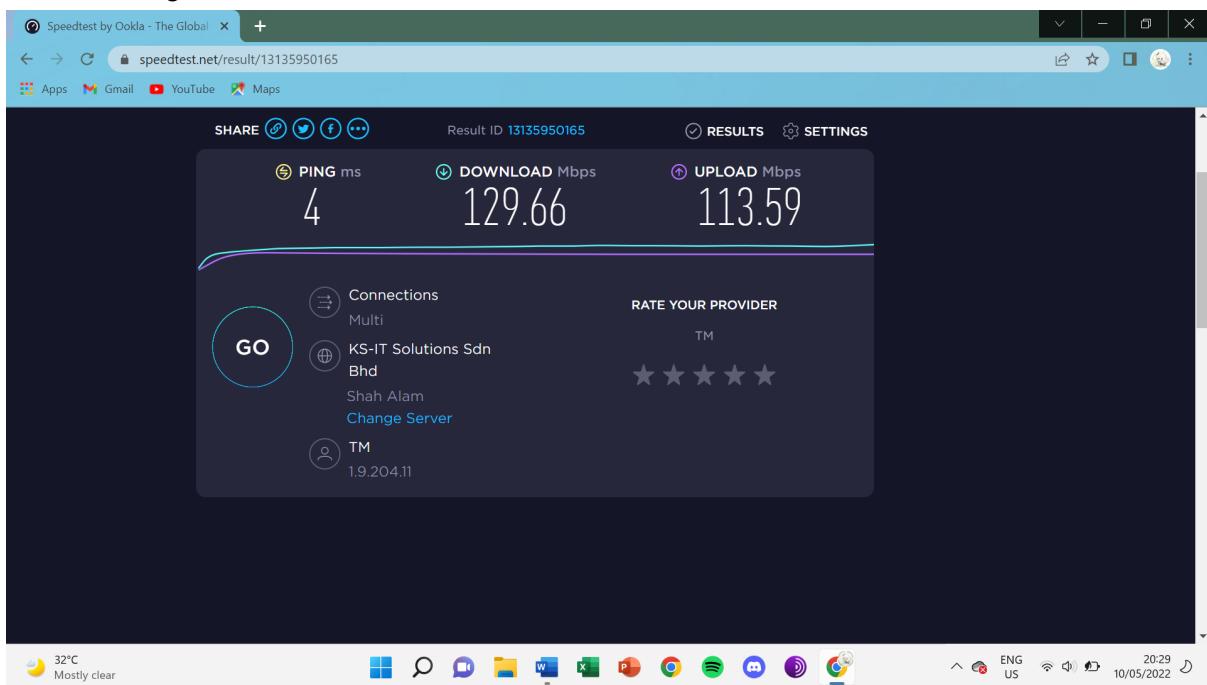
7. Bottom-Left-Corner of Car Porch



SokChoo = Too weak to test

李帝努 = Too weak to test

## 8. Bottom-Right-Corner of Car Porch



SokChoo = Too weak to test

李帝努 = Too weak to test