

THAIFI DAY #2 | 29 AUGUST 2026

หัวข้อบรรยาย

Wi-Fi 7 AP Performance Test in 2026

SPEAKER

Warat Prapinmongkolkarn

Bangkok Datacom



Organized by ThaiFi

Wi-Fi 7 AP Performance Test



2026



WiFi-7 APs

Aruba :	AP-735
EnGenius :	ECW536
Mikrotik :	hAP be3
Peplink :	AP One Enterprise
Reyee :	73HD, 73Pro
TP-Link :	EAP787, EAP783
UniFi :	U7-Pro XG, U7-Pro
Zyxel :	WBE660S , WBE630S

12 models

WiFi-7 APs

2 Spatial Streams (6GHz)

Aruba :	AP-735	(10G LAN)
Mikrotik :	hAP be3	(2.5G LAN)
TP-Link :	EAP787	(10G LAN)
UniFi :	U7-Pro XG	(10G LAN)
	U7-Pro	(2.5G LAN)

WiFi-7 APs

3 Spatial Streams (6GHz)

Reyee : 73Pro (2.5G LAN)

WiFi-7 APs

4 Spatial Streams (6GHz)

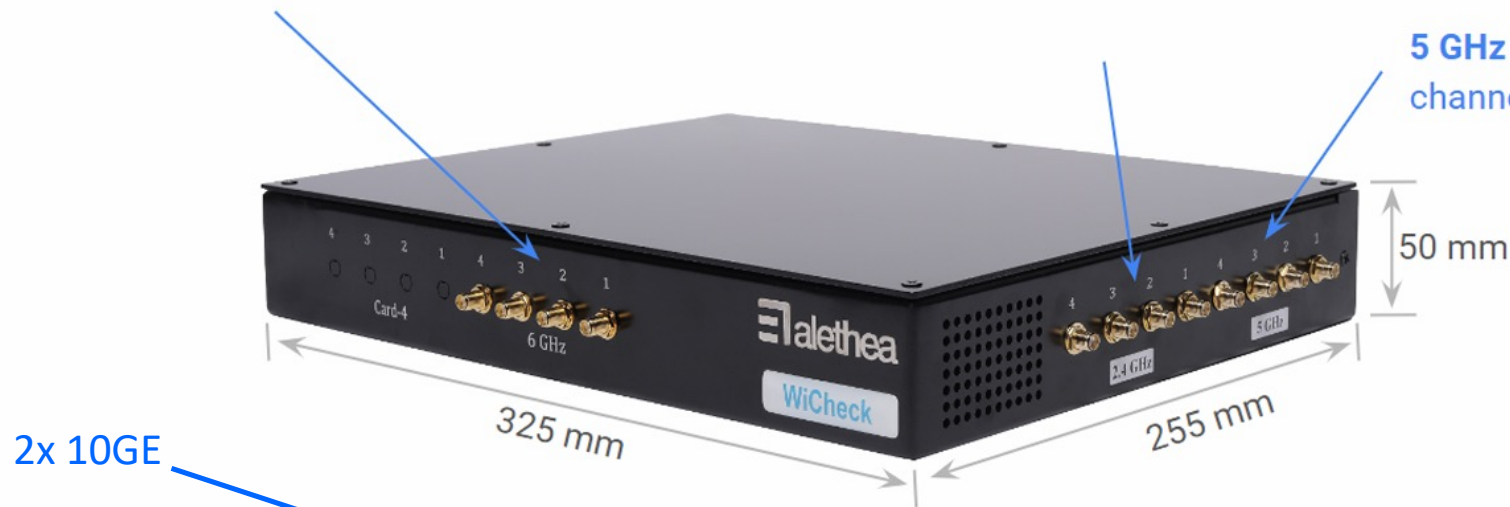
EnGenius :	ECW536	(10G LAN)
Peplink :	AP One Enterprise	(10G LAN)
Reyee :	73HD	(10G LAN)
TP-Link :	EAP783	(10G LAN)
Zyxel :	WBE660S	(10G LAN)
	WBE630S (Dual band)	(2.5G LAN)

Tester Spec (1)

6 GHz Radios: Supports up to 4x4 MIMO in channels of up to 320 MHz.

2.4 GHz Radio: Supports 4x4 MIMO in channels of up to 40 MHz.

5 GHz Radio: Supports 4x4 MIMO in channels of up to 160 MHz.



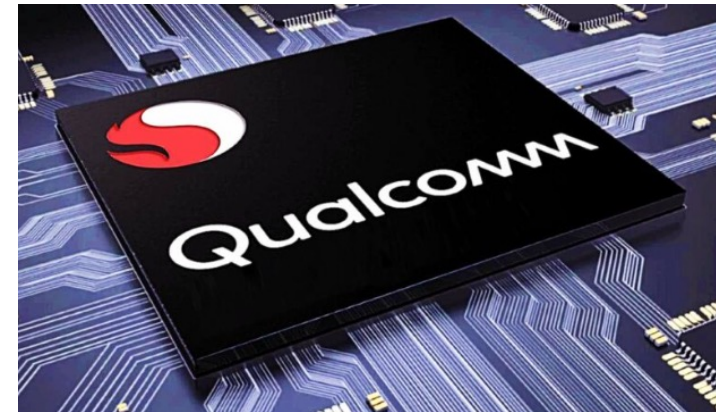
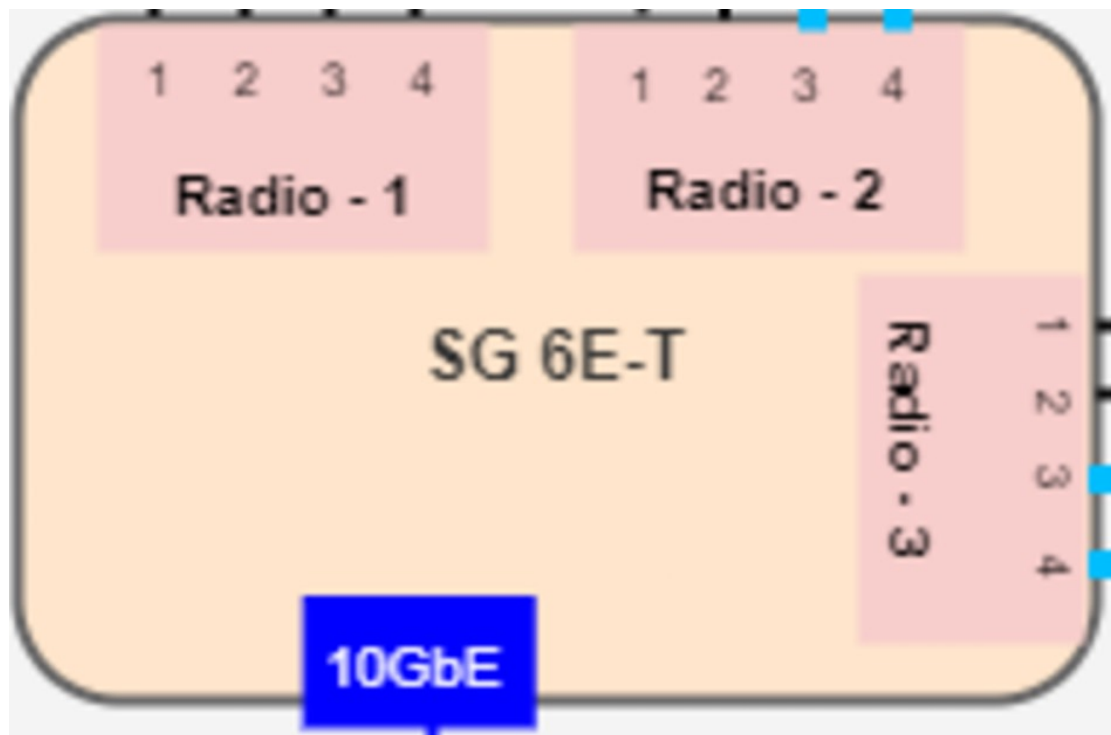
2x 10GE



Tester Spec (2)

2.4 GHz

5 GHz



6 GHz

Tester Spec (3)

2.4 GHz = 25 clients , 4 SS , 40 MHz

5 GHz = 25 clients , 4 SS , 160 MHz

6 GHz = 25 clients , 4 SS , 320 MHz

Download Flow



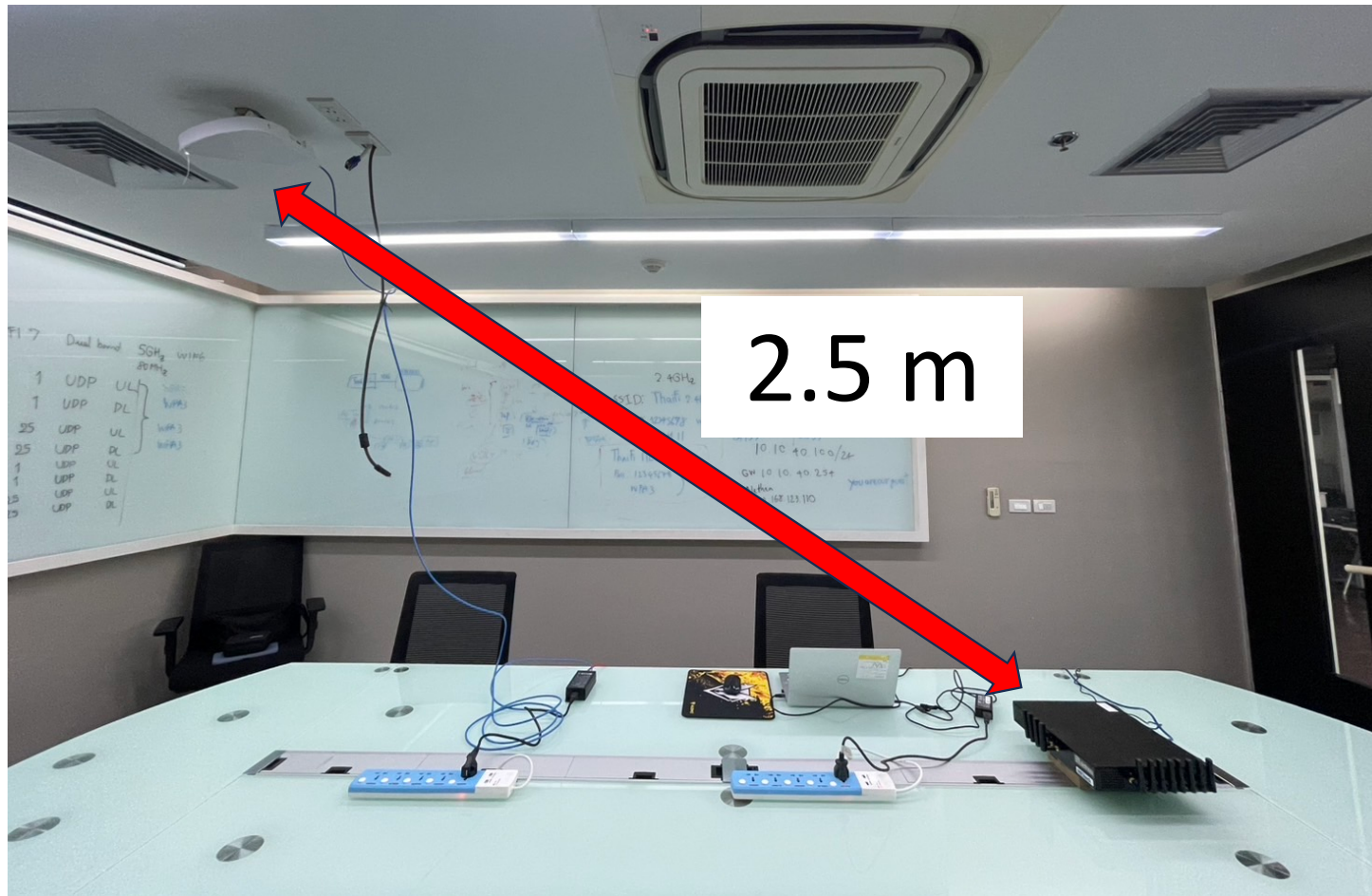
Upload Flow



Control Environment

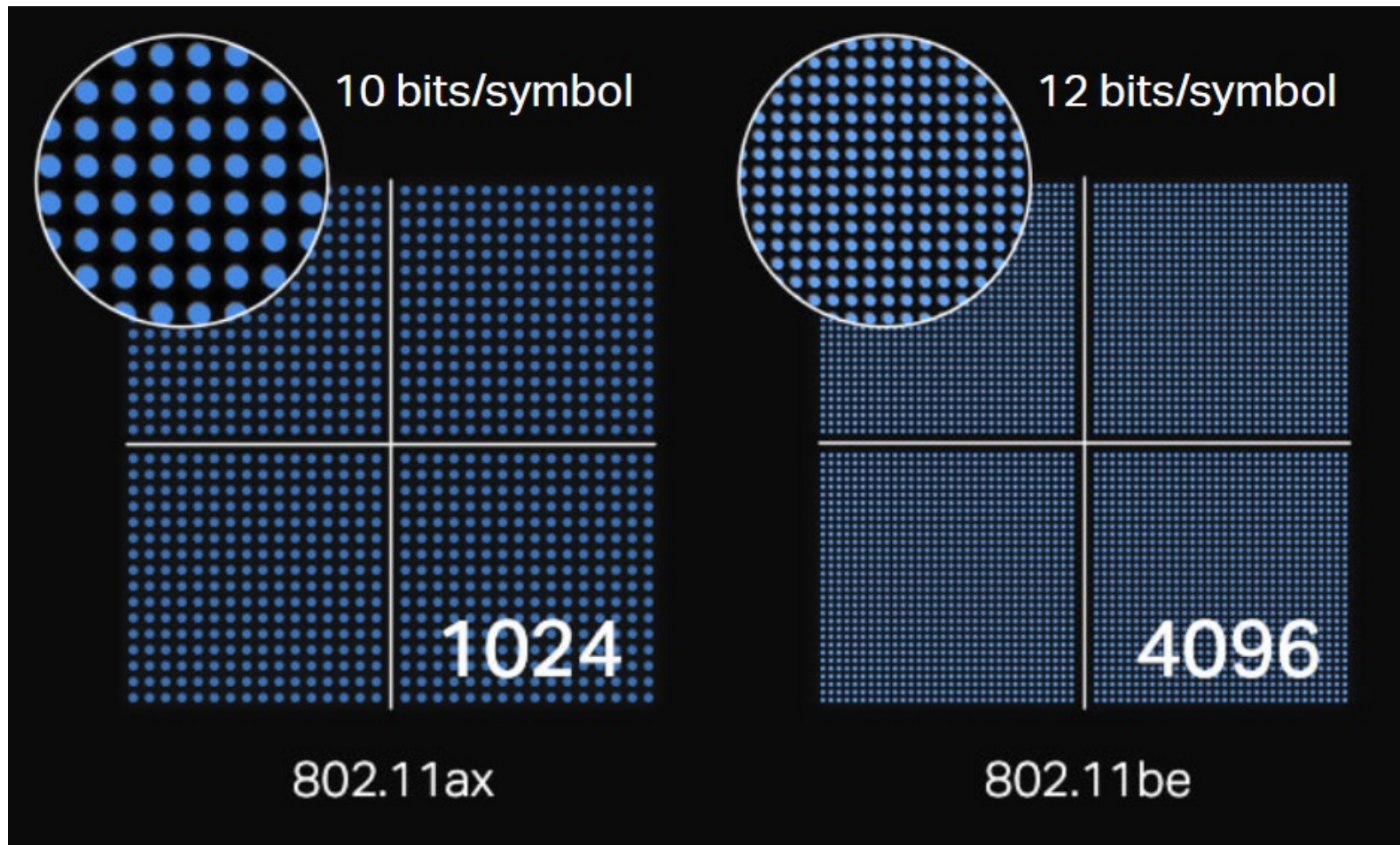


Control Environment



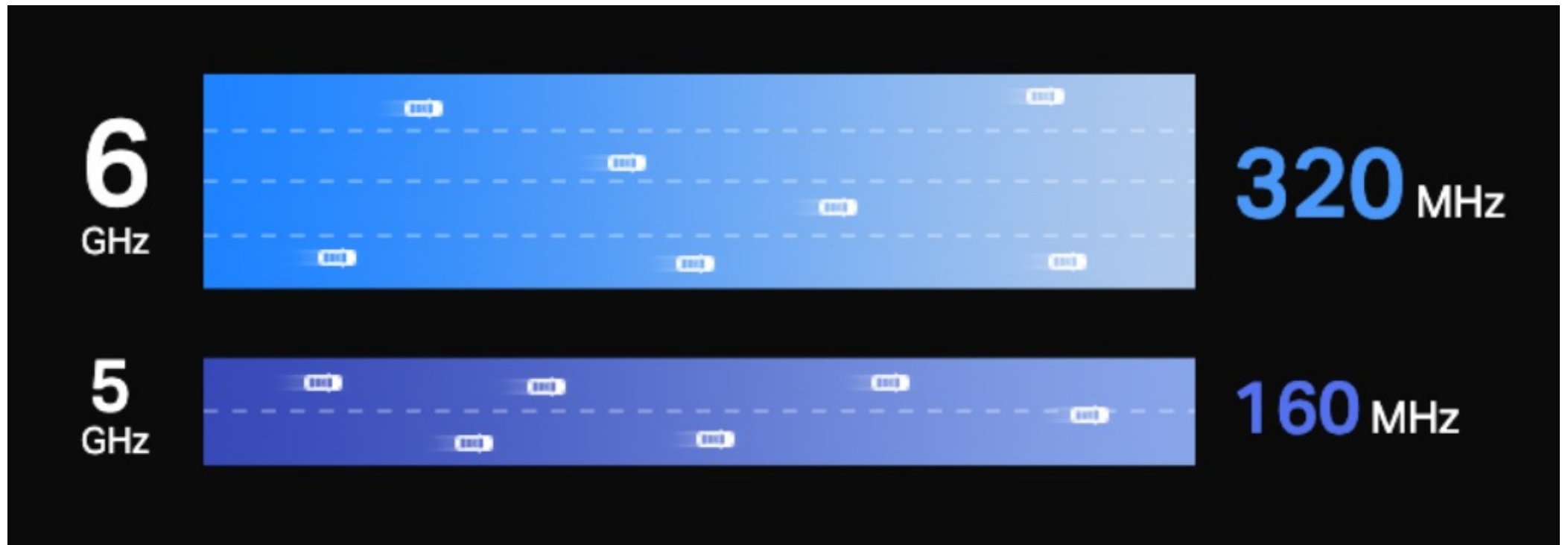
Wi-Fi 7 Key Features

4096 QAM



Source :
TP-Link website

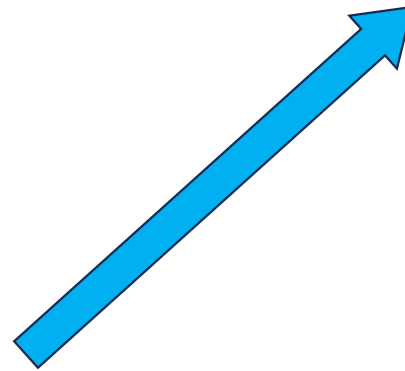
320 MHz , 6GHz band



Source : TP-Link website

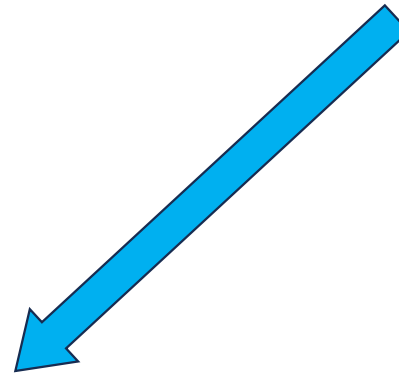
Test Case (1)

1 Client
Upload
6 GHz , 320MHz



Test Case (2)

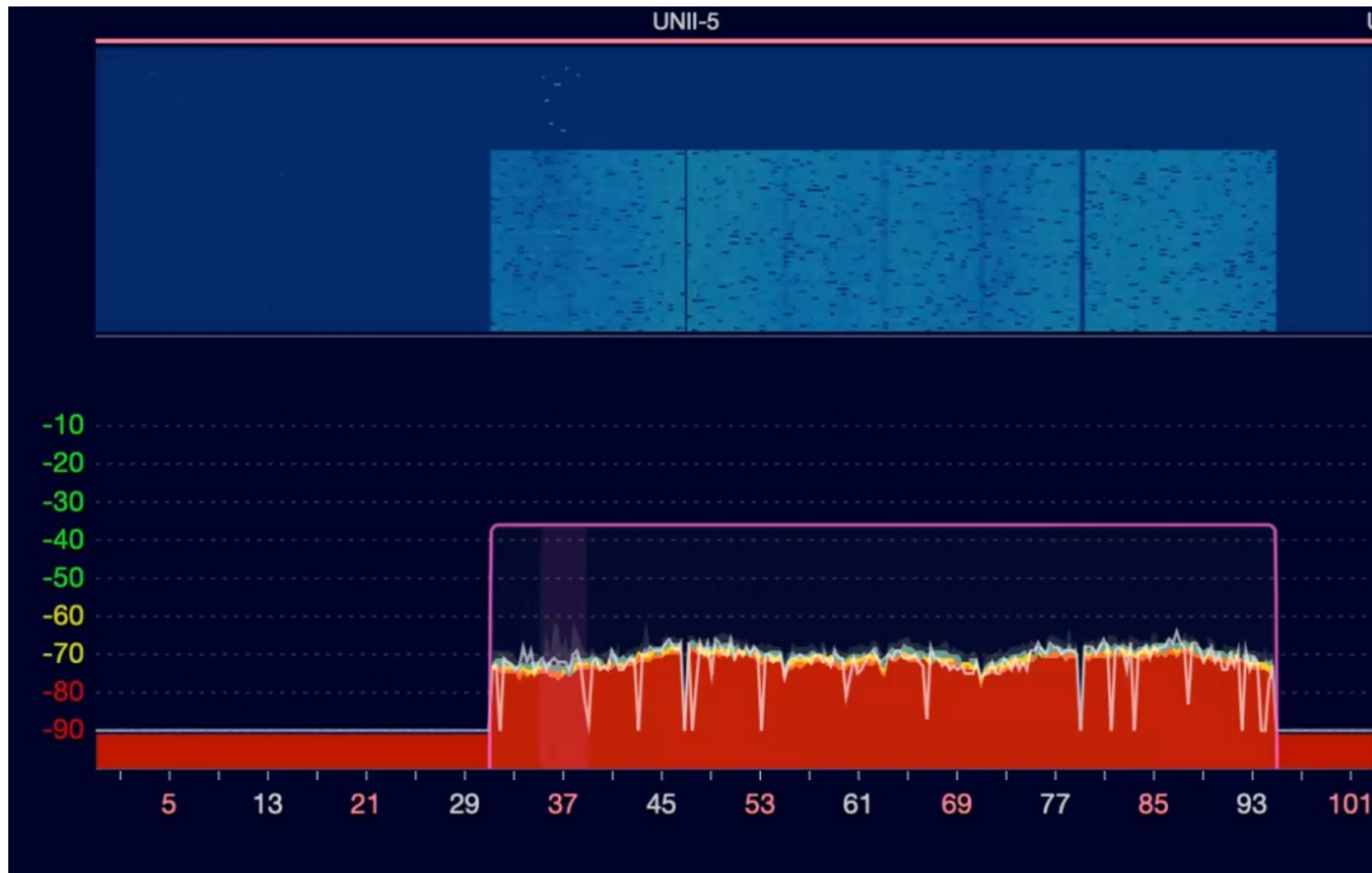
1 Client
Download
6 GHz , 320MHz



AP Configuration

6 GHz	Channel :	5e or 37e
	Channel width :	320 MHz
	Security :	WPA3
	Tx power :	Tx High

Spectrum Analyzer



MCS Index , 2 SS , 320MHz

Index		Spatial Stream	Modulation	Coding	4x996-tone RU / 320 MHz		
HE	EHT				3.2μs GI	1.6μs GI	0.8μs GI
10	10	2	1024-QAM	3/4	3675.0	4083.3	4323.5
11	11	2	1024-QAM	5/6	4083.3	4537.0	4803.9
	12	2	4096-QAM	3/4	4410.0	4900.0	5188.2
	13	2	4096-QAM	5/6	4900.0	5444.4	5764.7

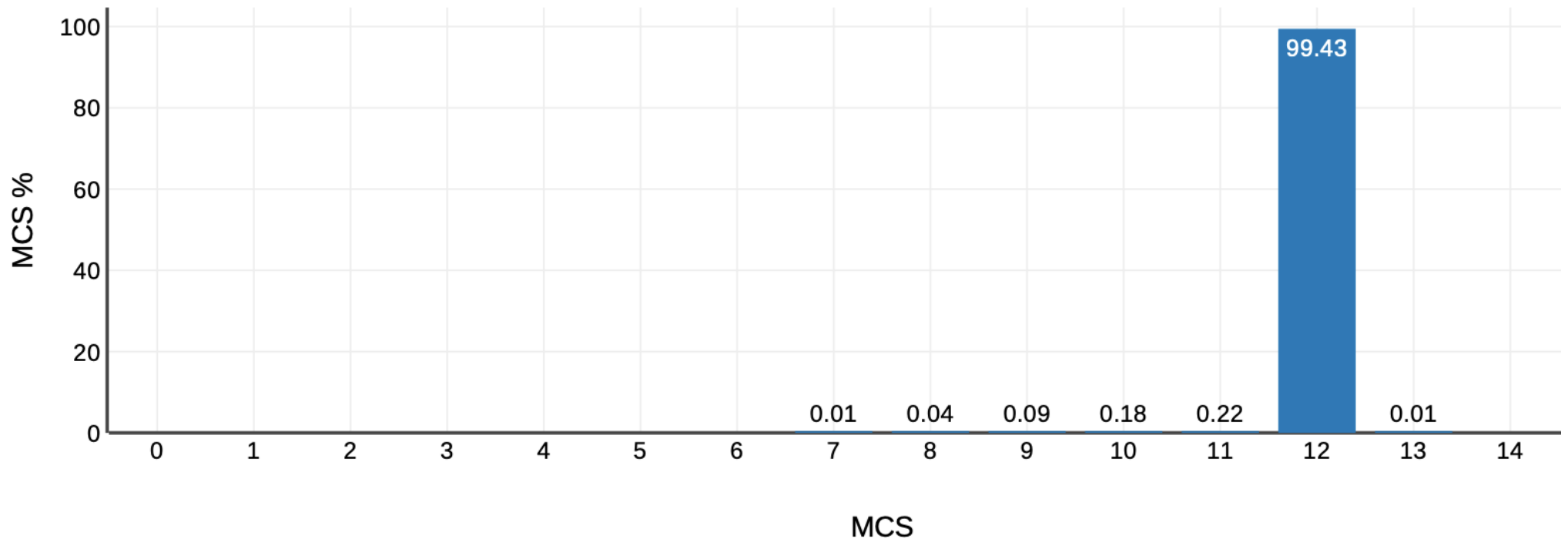
Source :
mcsindex.net

1 client result (2 SS)

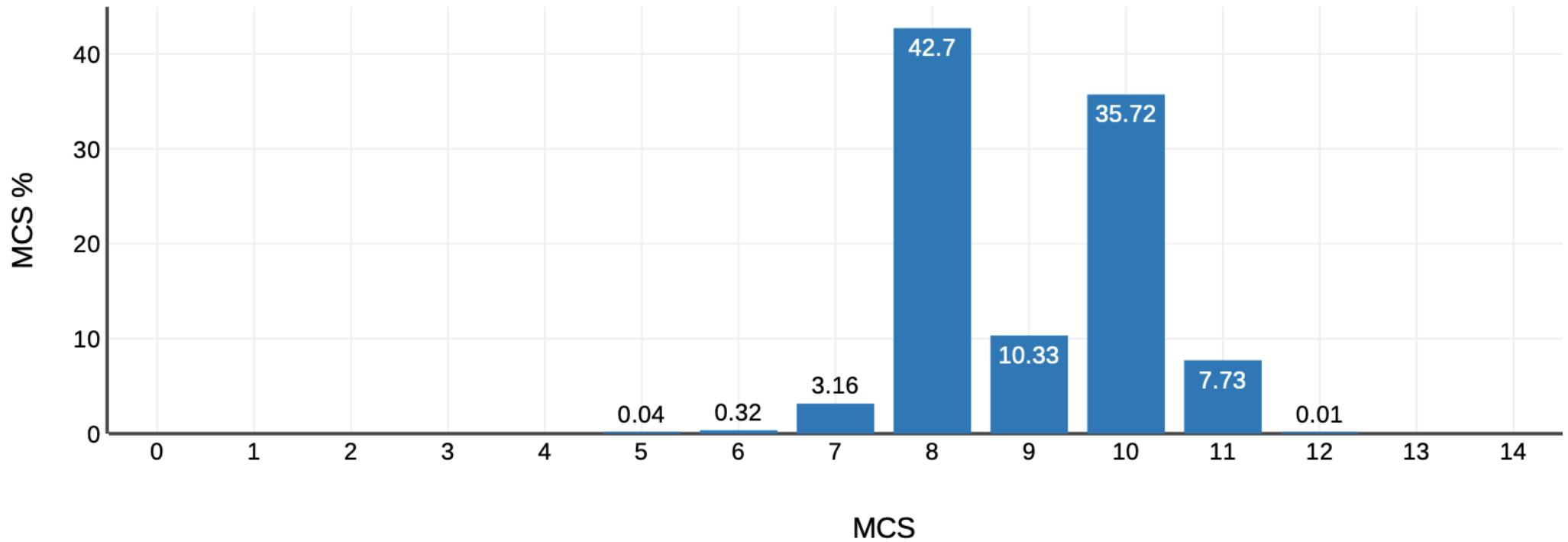
Upload	Average	Min	Max	Sample No.
2.5G port	2.35 Gbps	2.26 Gbps	2.39 Gbps	3
10G port	3.69 Gbps	3.48 Gbps	3.91 Gbps	3

Download	Average	Min	Max	Sample No.
2.5G port	2.25 Gbps	1.98 Gbps	2.39 Gbps	3
10G port	4.26 Gbps	3.97 Gbps	4.53 Gbps	3

High Throughput



Low Throughput



1 client result (2 SS)

Upload	Average	Min	Max	Sample No.
2025 (5/10G)	2.35 Gbps	1.49 Gbps	3.16 Gbps	7
2026 (10G)	3.69 Gbps	3.48 Gbps	3.91 Gbps	3

Download	Average	Min	Max	Sample No.
2025 (5/10G)	2.95 Gbps	2.57 Gbps	3.79 Gbps	7
2026 (10G)	4.26 Gbps	3.97 Gbps	4.53 Gbps	3

MCS Index 4 SS , 320MHz

Index		Spatial Stream	Modulation	Coding	4x996-tone RU / 320 MHz		
HE	EHT				3.2μs GI	1.6μs GI	0.8μs GI
10	10	4	1024-QAM	3/4	7350.0	8166.7	8647.1
11	11	4	1024-QAM	5/6	8166.7	9074.1	9607.8
	12	4	4096-QAM	3/4	8820.0	9800.0	10376.5
	13	4	4096-QAM	5/6	9800.0	10888.9	11529.4

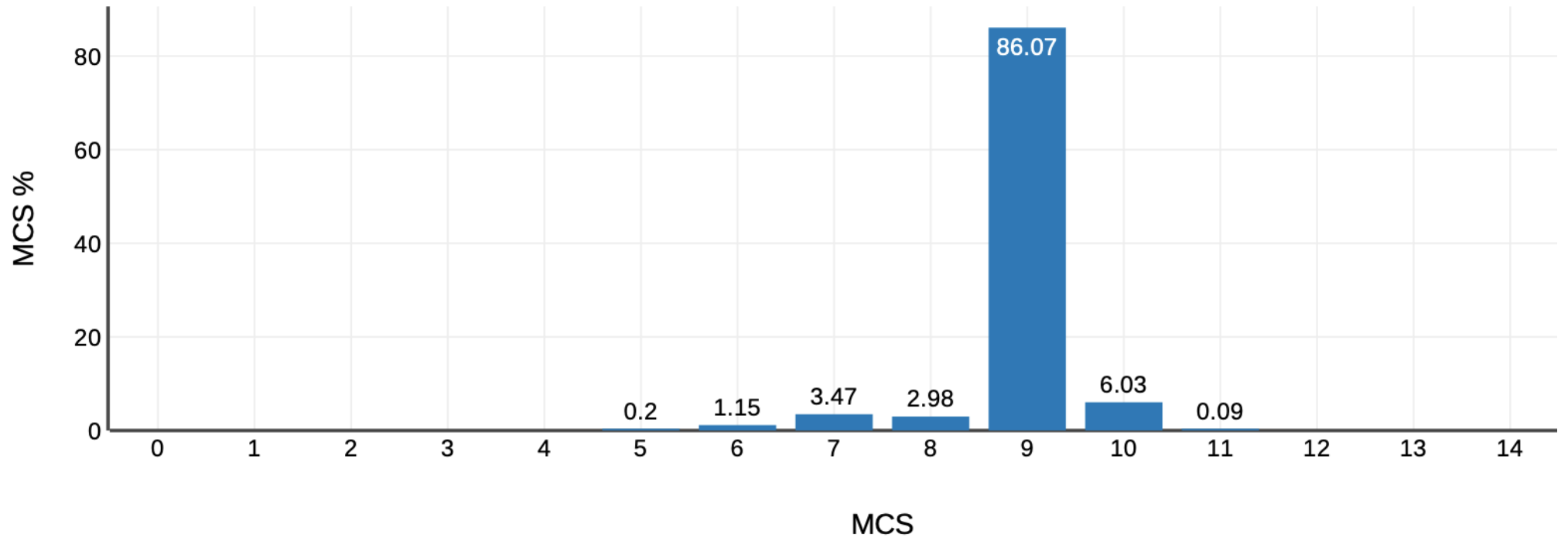
Source :
mcsindex.net

1 client result (4 SS)

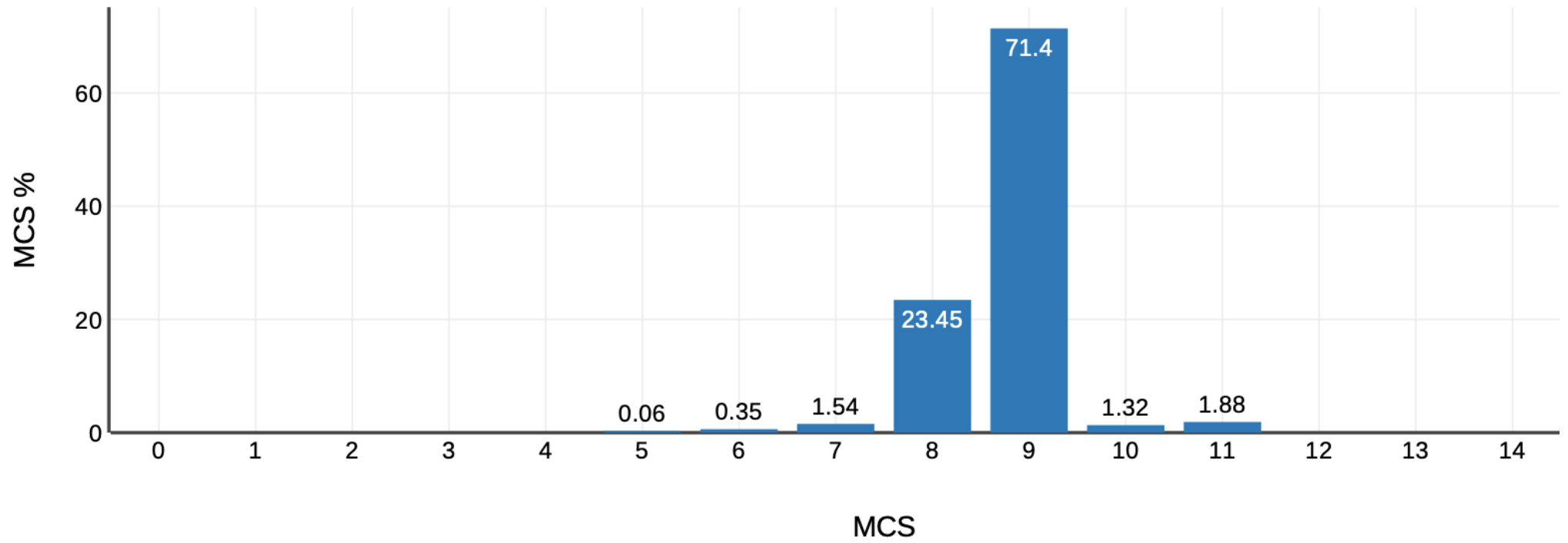
Upload	Average	Min	Max	Sample No.
2025	4.07 Gbps	2.93 Gbps	5.28 Gbps	3
2026	5.08 Gbps	2.18 Gbps	6.24 Gbps	5

Download	Average	Min	Max	Sample No.
2025	3.17 Gbps	2.31 Gbps	3.95 Gbps	3
2026	5.03 Gbps	3.41 Gbps	6.07 Gbps	5

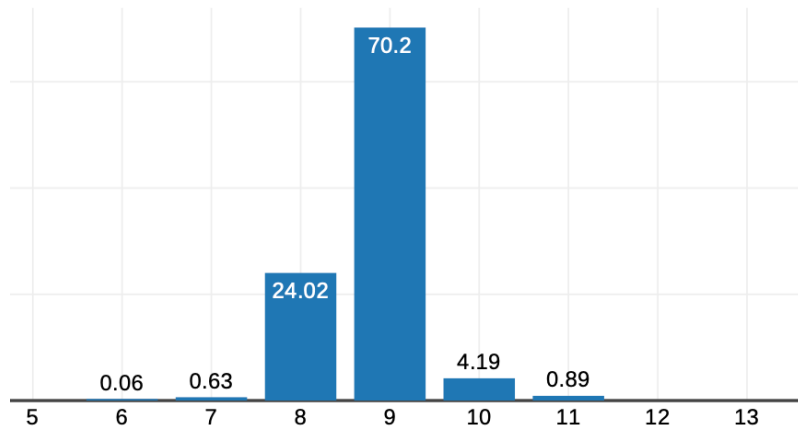
6.24 Gbps



6.07 Gbps

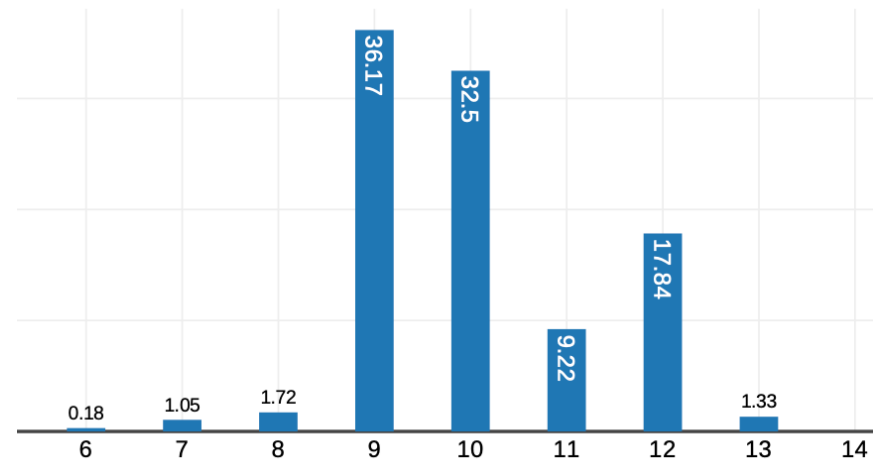


Adjust Channel Width



320 MHz

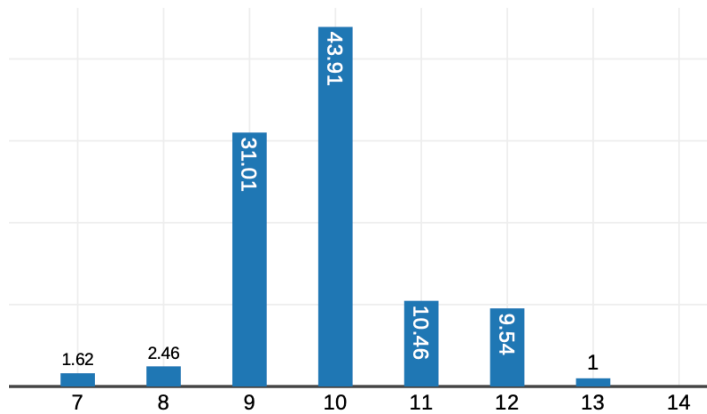
RSSI = -37dBm



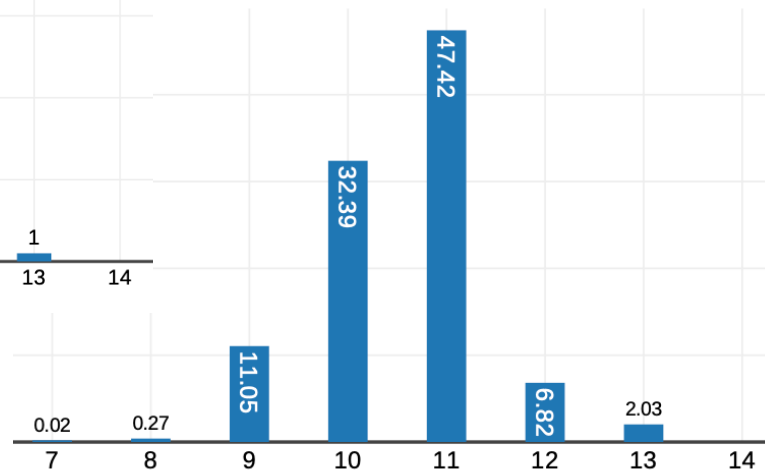
160 MHz

RSSI = -19dBm

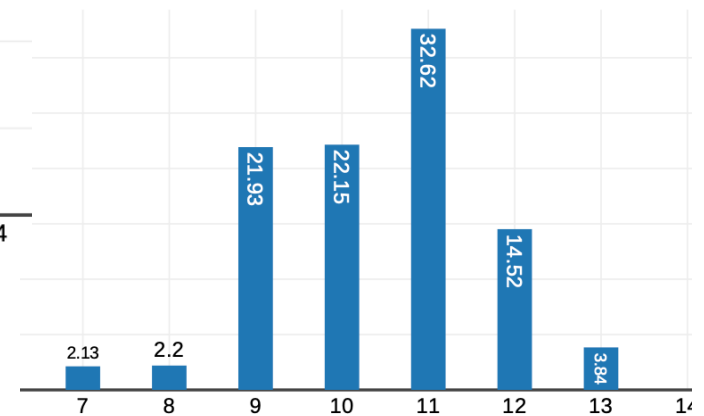
Adjust Channel Width



80 MHz



40 MHz



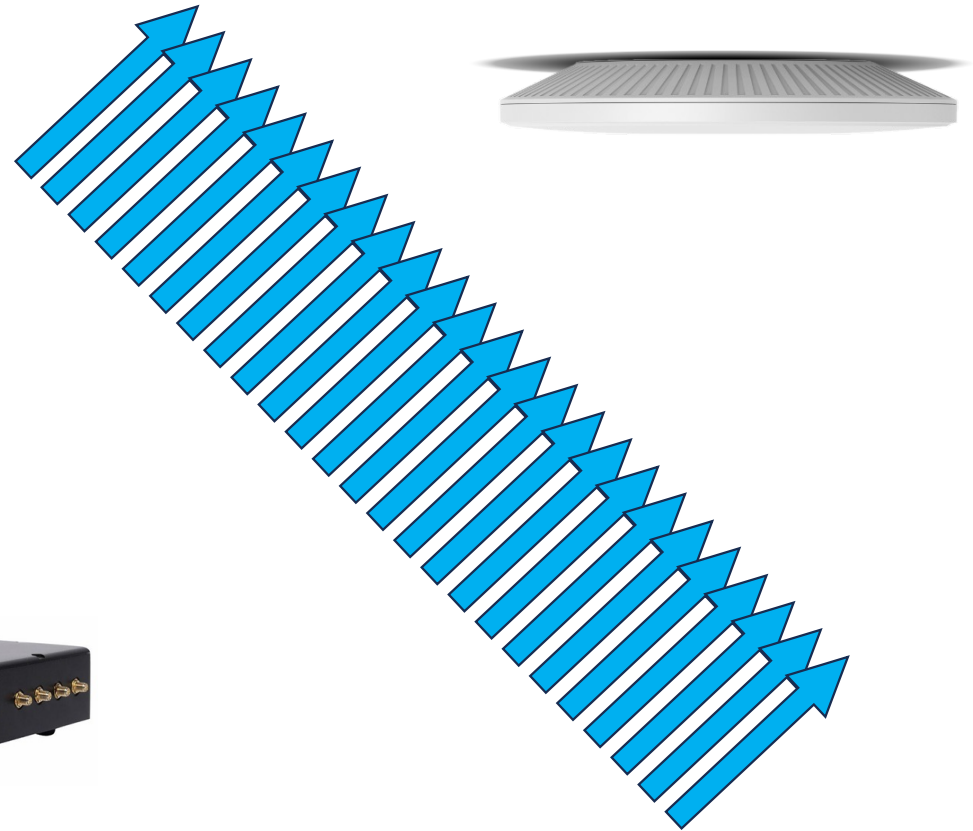
20 MHz

Test Case (3)

25 Clients

Upload

6 GHz , 320MHz

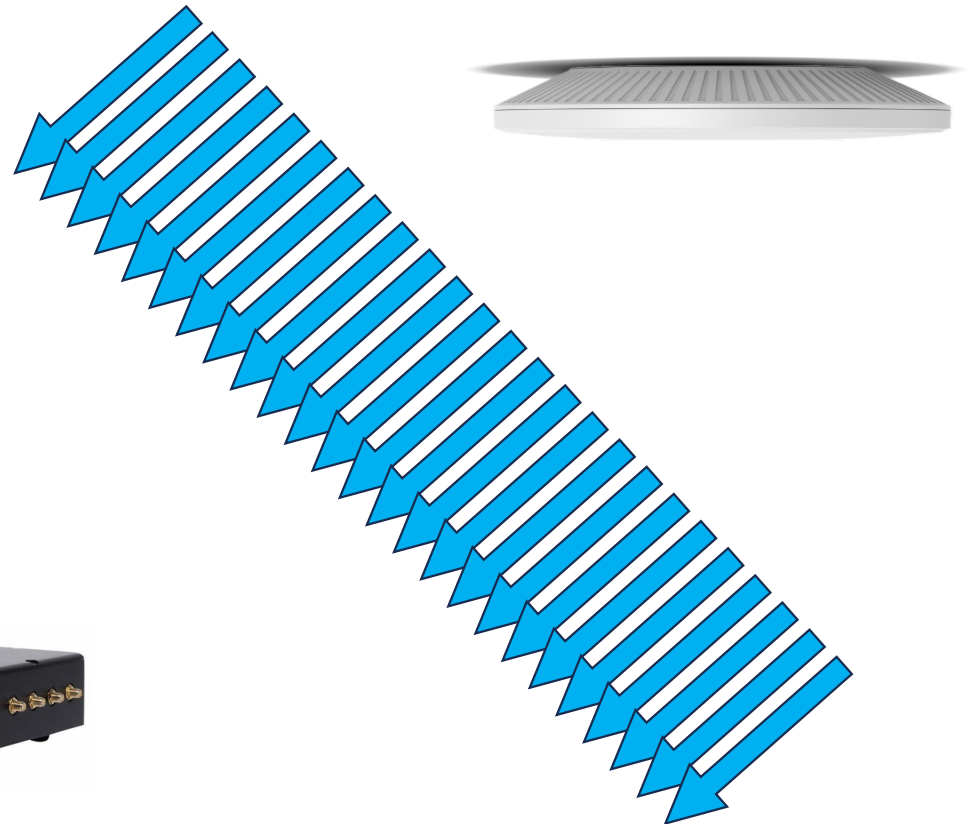


Test Case (4)

25 Clients

Download

6 GHz , 320MHz



25 clients result (2 SS)

Upload	25 clients avg	1 client avg	%
2025 (5/10G)	2.09 Gbps	2.35 Gbps	-11%
2026 (10G)	3.17 Gbps	3.69 Gbps	-14%

Download	25 clients avg	1 client avg	%
2025 (5/10G)	3.07 Gbps	2.95 Gbps	+4%
2026 (10G)	3.67 Gbps	4.26 Gbps	-14%

25 clients result (4 SS)

Upload	25 clients avg	1 client avg	%
2025	2.74 Gbps	4.07 Gbps	-32%
2026	3.45 Gbps	5.08 Gbps	-32%

Download	25 clients avg	1 client avg	%
2025	3.19 Gbps	3.17 Gbps	+1%
2026	4.49 Gbps	5.03 Gbps	-11%

MLO

WiFi 7

Multi-Link



Simultaneous MLO*

5/6 GHz

2.4 GHz

Aggregation



Alternating MLO**

6 GHz

5 GHz

Seamless switching

Source :
TP-Link website

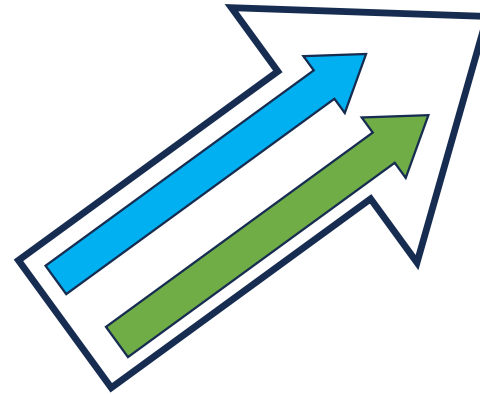
Test Case (5)

1 Client MLO

Upload

6 GHz , 320MHz

5 GHz , 80 MHz



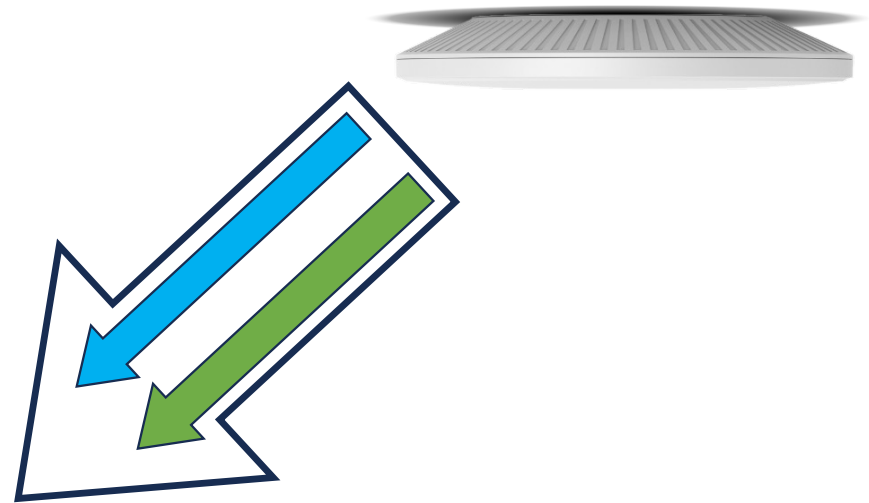
Test Case (6)

1 Client MLO

Download

6 GHz , 320MHz

5 GHz , 80 MHz

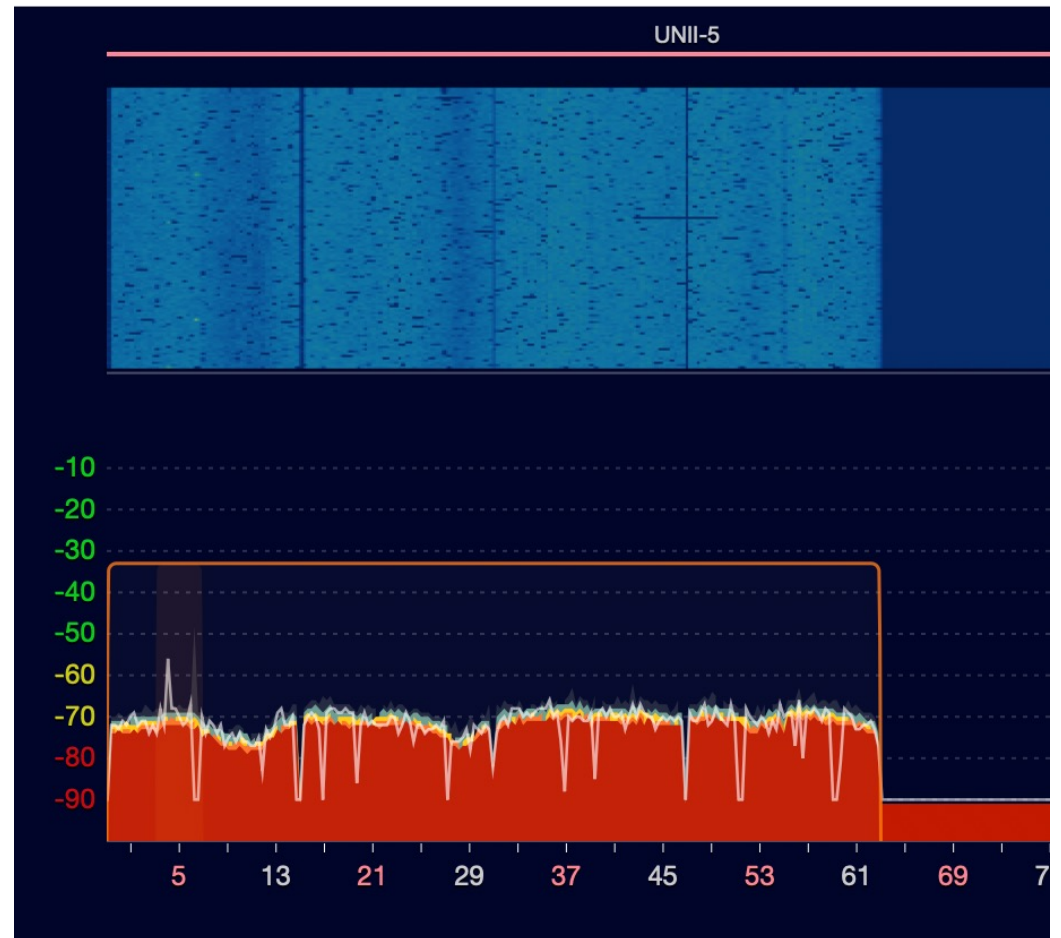
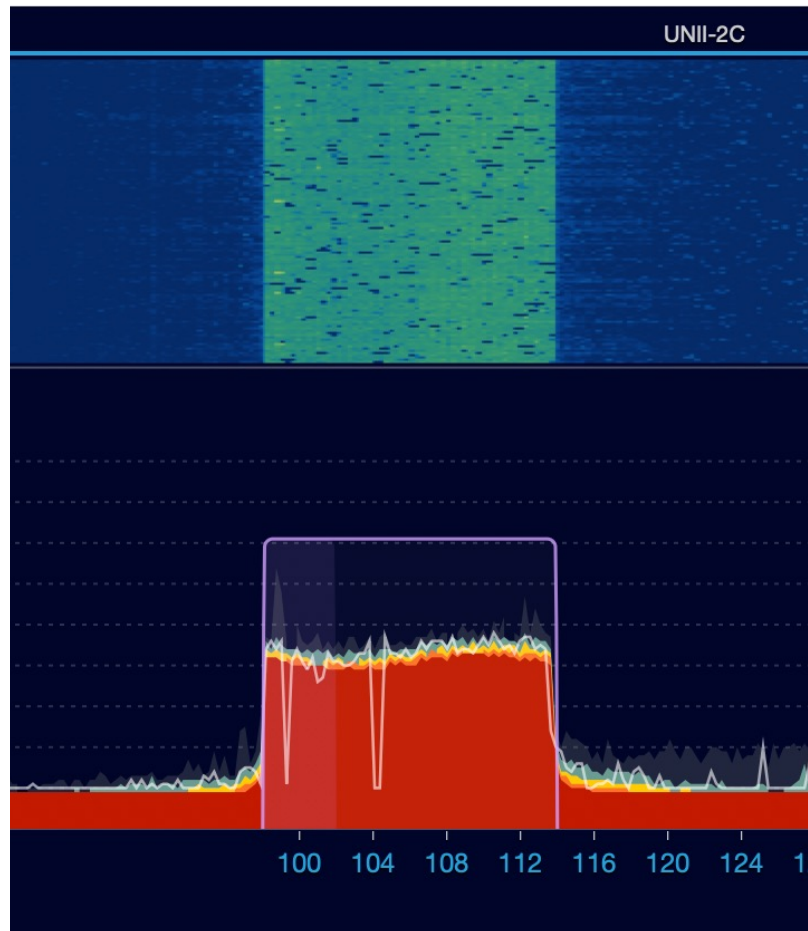


AP Configuration

5 GHz = CH 100 , 80 MHz , WPA3 , Tx High

6 GHz = CH 5e / 37e , 320 MHz, WPA3, Tx High

Spectrum Analyzer



1 client MLO UL result

No.	AP_1 (10G)	AP_2 (10G)	AP_3 (10G)	AP_4 (10G)
MLO Upload	5.39 Gbps	6.80 Gbps	2.84 Gbps	6.33 Gbps
Upload	6.10 Gbps	6.24 Gbps	5.70 Gbps	5.17 Gbps
Diff	-12%	+9%	-50%	+22%

1 client MLO DL result

No.	AP_1 (10G)	AP_2 (10G)	AP_3 (10G)	AP_4 (10G)
MLO Download	6.59 Gbps	6.82 Gbps	6.01 Gbps	6.34 Gbps
Download	6.07 Gbps	5.84 Gbps	5.26 Gbps	4.59 Gbps
Diff	+9%	+17%	+14%	+38%

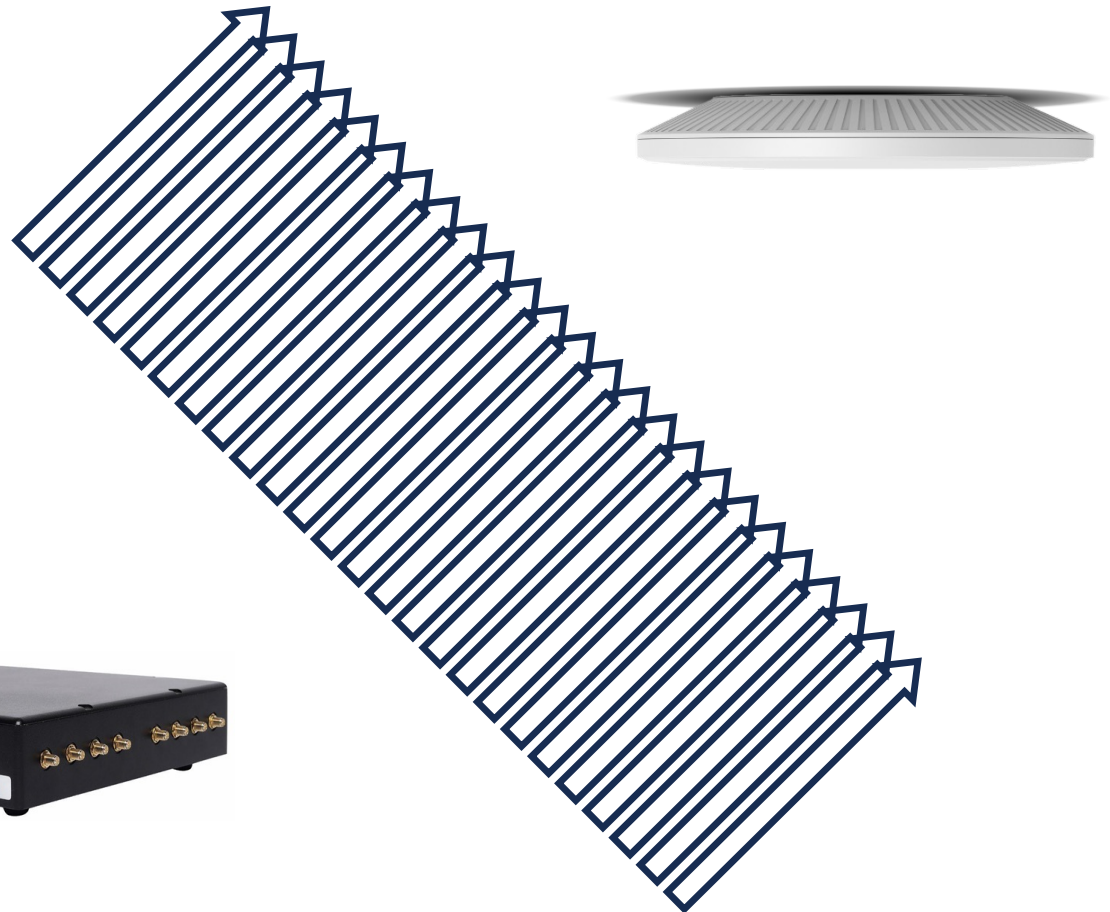
Test Case (7)

25 Clients MLO

Upload

6 GHz , 320MHz

5 GHz , 80 MHz



Test Case (8)

25 Clients MLO

Download

6 GHz , 320MHz

5 GHz , 80 MHz



25 client MLO UL result

No.	AP_1 (10G)	AP_2 (10G)	AP_3 (10G)	AP_4 (10G)
MLO Upload	1.87 Gbps	5.32 Gbps	3.40 Gbps	4.39 Gbps
Upload	1.70 Gbps	5.31 Gbps	4.44 Gbps	4.33 Gbps
Diff	+10%	0%	-23%	+1%

25 client MLO DL result

No.	AP_1 (10G)	AP_2 (10G)	AP_3 (10G)	AP_4 (10G)
MLO Download	4.75 Gbps	5.32 Gbps	5.32 Gbps	5.01 Gbps
Download	5.15 Gbps	5.31 Gbps	4.52 Gbps	5.19 Gbps
Diff	-8%	0%	+18%	-3%

Editor's Choice

UniFi U7 Pro XG



Performance and Value

Editor's Choice

Spatial Stream	2x2x2	2x2x2
Ethernet Port	10G	2.5G
	U7-Pro XG	U7-Pro
Description	Goodput (Mbps)	
1 client UDP UL 6GHz 320MHz	3910	2388
1 client UDP DL 6GHz 320MHz	4528	2390
25 clients UDP UL 6GHz 320MHz	3623	1141
25 clients UDP DL 6GHz 320MHz	4257	2428
MLO 1 client UDP UL (total) 5GHz + 6GHz	3523	2388
MLO 1 client UDP DL (total) 5GHz + 6GHz	4680	2390
MLO 25 clients UDP UL (total) 5GHz + 6GHz	2805	2341
MLO 25 clients UDP DL (total) 5GHz + 6GHz	4218	2428

Editor's Choice

TP-Link EAP783



Best Performance & Improvement

Editor's Choice

	2026	2025	
Description	Goodput (Mbps)		Diff
1 client UDP UL 6GHz	6236	4010	2226
1 client UDP DL 6GHz	5835	3952	1883
25 clients UDP UL 6GHz	5309	3903	1406
25 clients UDP DL 6GHz	5307	4376	931
MLO 1 client UDP UL (total)	6803	3433	3371
MLO 1 client UDP DL (total)	6815	4952	1864
MLO 25 clients UDP UL (total)	5323	3221	2103
MLO 25 clients UDP DL (total)	5317	3966	1351

Testing Result

Mikrotik hAP be3

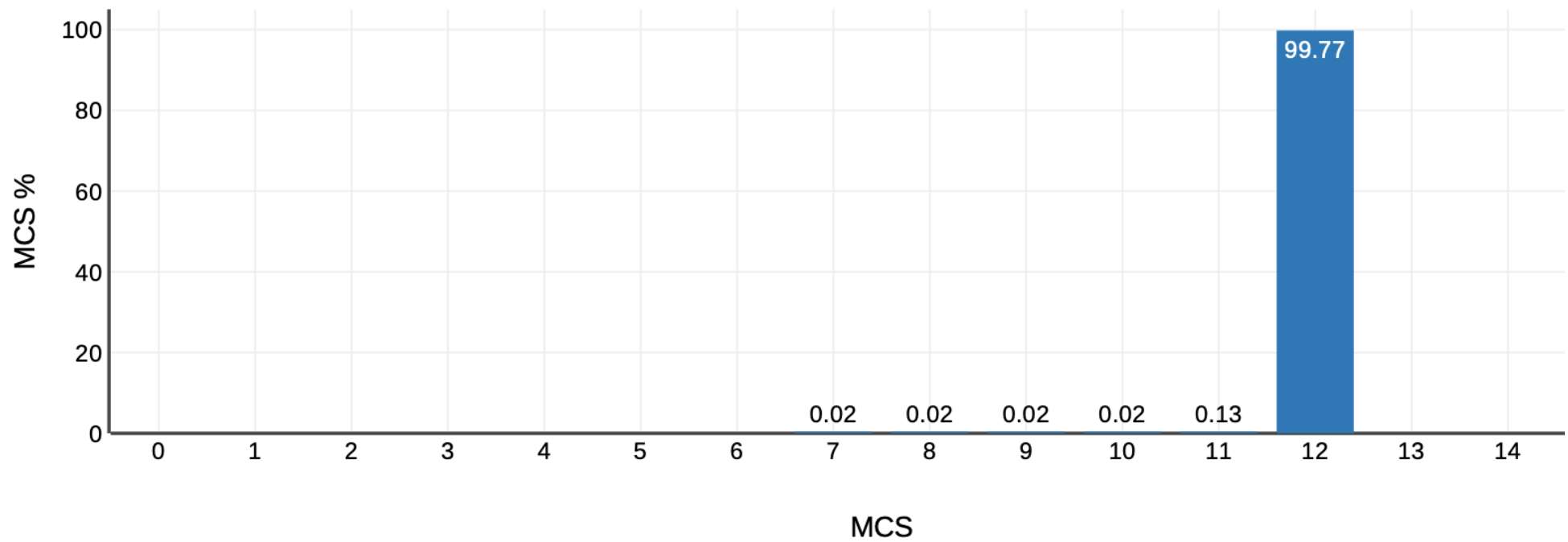


ซื้อได้ แต่อย่าพึ่งใช้ MLO ละกัน

Testing Result

hAP be3	Firmware ver 7.24
Description	Goodput (Mbps)
1 client UDP UL 6GHz	2258
1 client UDP DL 6GHz	1975
25 clients UDP UL 6GHz	1597
25 clients UDP DL 6GHz	2425
MLO 1 client UDP UL (total)	2232
MLO 1 client UDP DL (total)	2387
MLO 25 clients UDP UL (total)	839
MLO 25 clients UDP DL (total)	2420

1 client DL



1 client DL

S	wifi2	WiFi	1500	1560	0 bps
RS	wifi3	WiFi	1500	1560	2.4 Gbps

Resources

Hardware

CPU

IRQ

RPS

Find

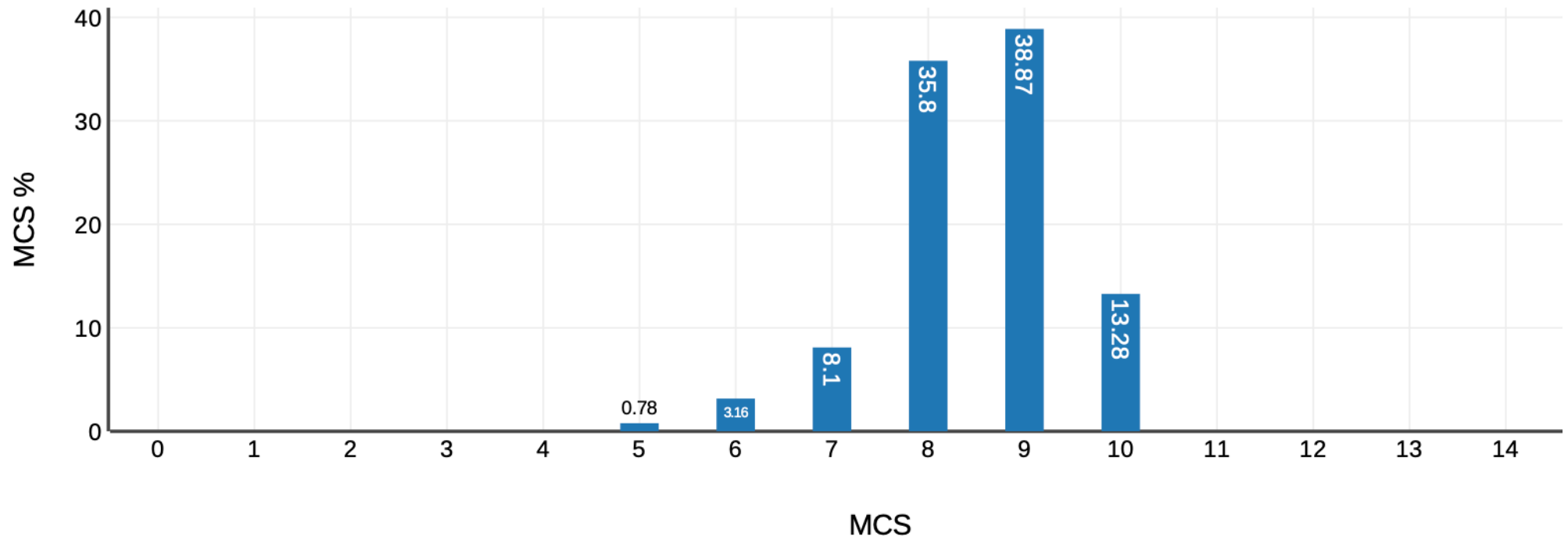
Filter

CPU	Load (%)	IRQ (%)	Disk (%)	
cpu0	95	95	0	
cpu1	98	98	0	
cpu2	71	68	0	
cpu3	45	43	0	

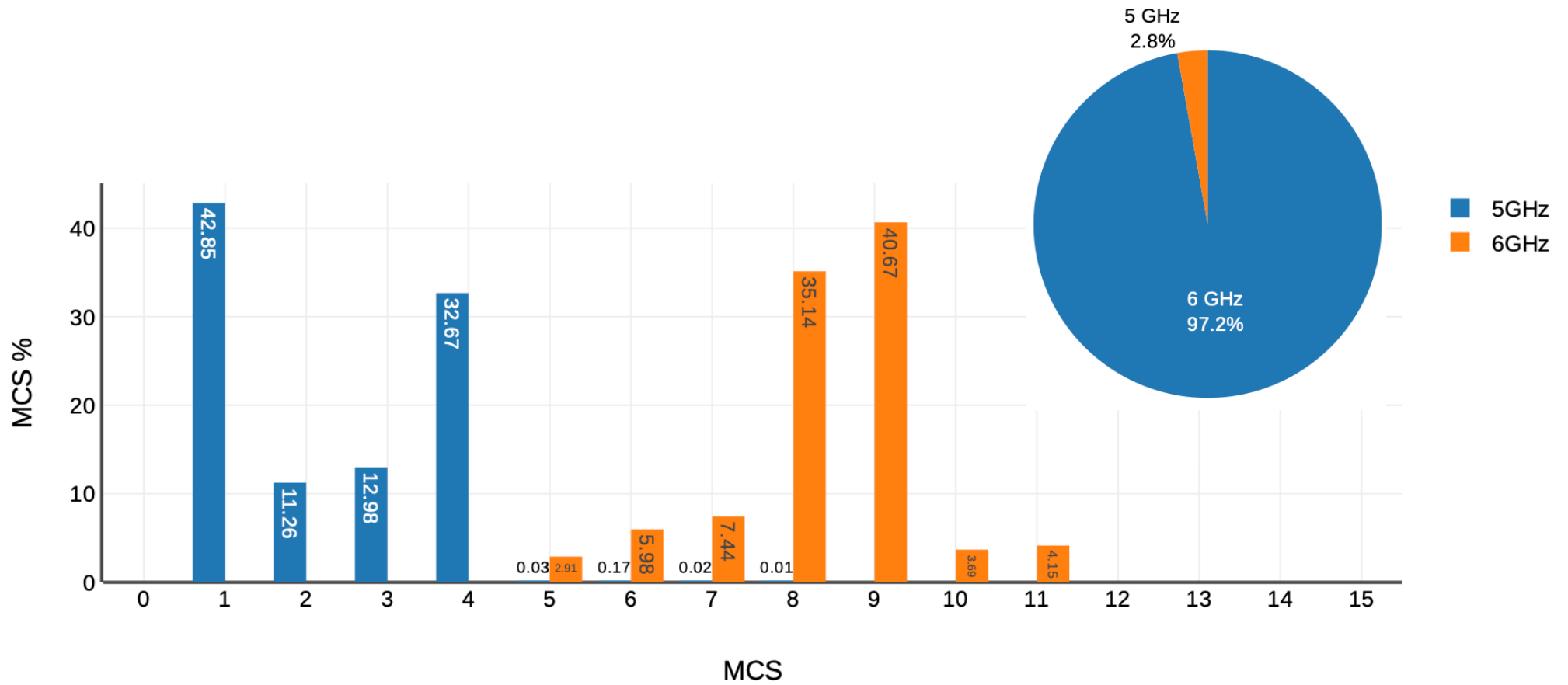
4

Live

25 clients UL



MLO 25 clients UL



Preamble Puncturing

Wi-Fi 7 Preamble Puncturing

Without Preamble Puncturing:



With Preamble Puncturing:

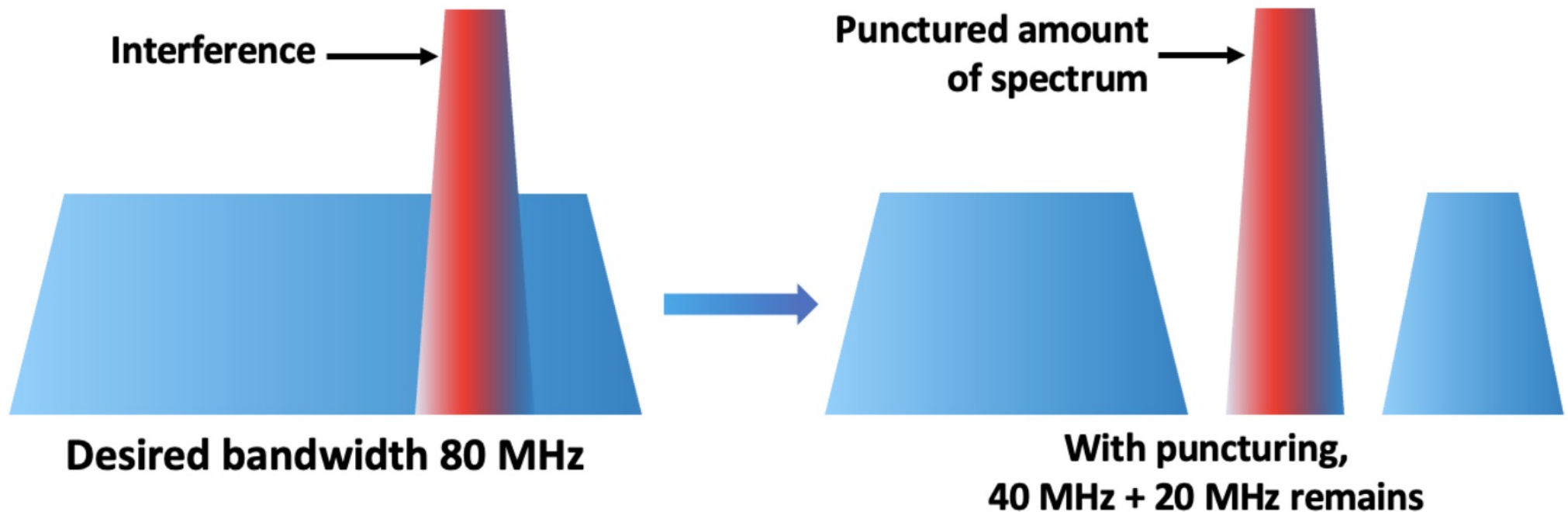


Puncturing allowed for
80 MHz channel width or wider

Channel Width	Allowed Puncturing
80 MHz	20 MHz
160 MHz	20 or 40 MHz
320 MHz	40 or 80 MHz (or) 40 + 80 MHz

Source :
Cisco

What is Preamble Puncturing?

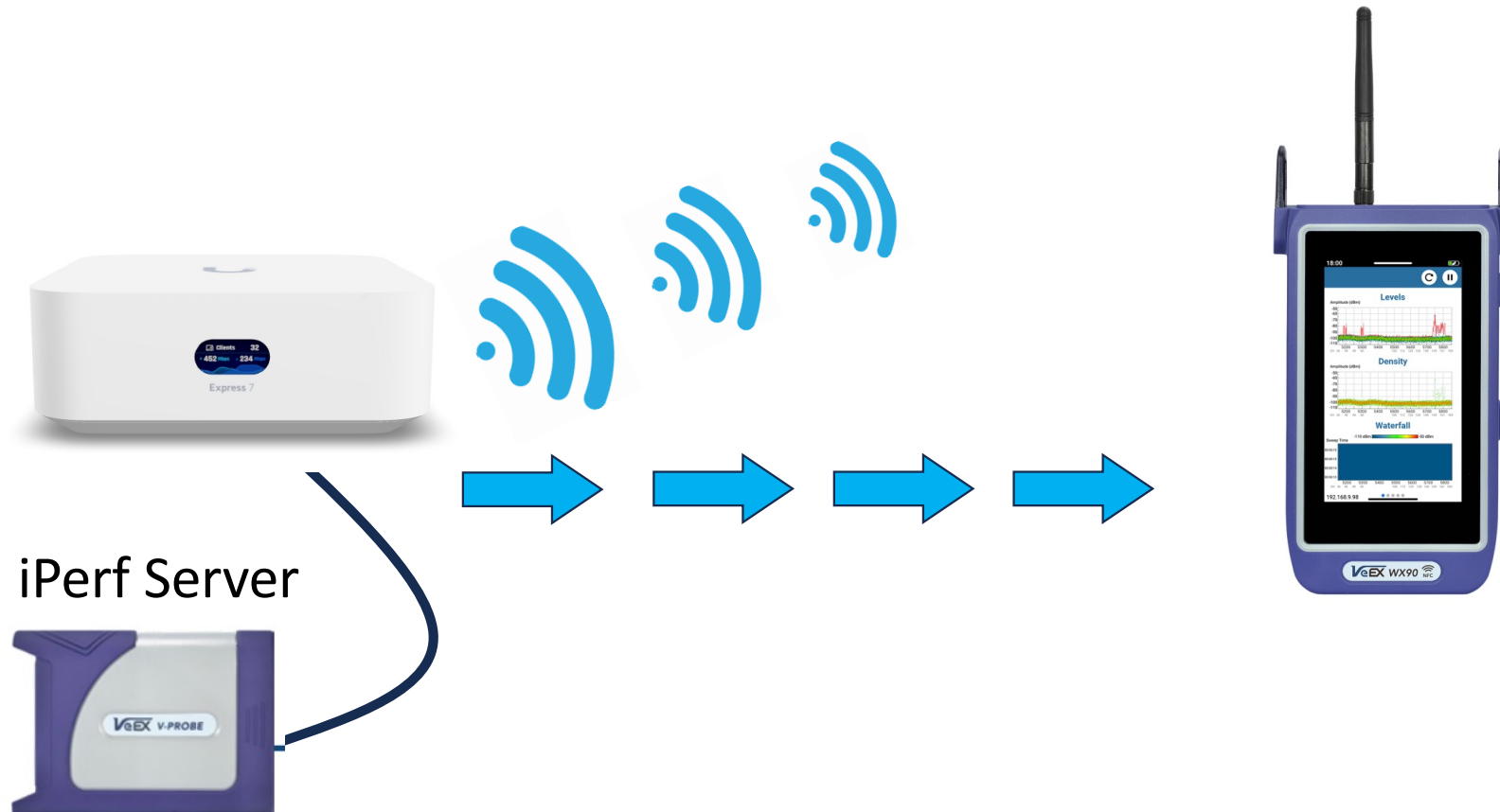


Source :
Ruckus

No Puncturing

- > Ext Tag: EHT Capabilities (802.11be D3.0)
- ✓ Ext Tag: EHT Operation (802.11be D3.0)
 - Ext Tag length: 8 (Tag len: 9)
 - Ext Tag Number: EHT Operation (802.11be D3.0) (106)
 - ✓ EHT Operation Parameters: 0x41, EHT Operation Information Present,
 -1 = EHT Operation Information Present: True
 -0. = Disabled Subchannel Bitmap Present: False
 -0.. = EHT Default PE Duration: False
 - 0... = Group Addressed BU Indication Limit: False
 - ..00 = Group Addressed BU Indication Exponent: 0
 - .1.. = MCS15 Disable: True
 - 0.... = Reserved: 0x0
 - Basic EHT-MCS And Nss Set: 0x00000011
- > Control: 0x04, Channel Width: 320 MHz EHT BSS bandwidth
 - CCFS0: 15
 - CCFS1: 31

Jamming



Jamming



Puncturing Turn On

- ✓ Ext Tag: EHT Operation (802.11be D3.0)
 - Ext Tag length: 10 (Tag len: 11)
 - Ext Tag Number: EHT Operation (802.11be D3.0) (106)
- ✓ EHT Operation Parameters: 0x43, EHT Operation Information Present,
 -1 = EHT Operation Information Present: True
 -1. = Disabled Subchannel Bitmap Present: True
 -0.. = EHT Default PE Duration: False
 - 0... = Group Addressed BU Indication Limit: False
 - ..00 = Group Addressed BU Indication Exponent: 0
 - .1.. = MCS15 Disable: True
 - 0.... = Reserved: 0x0
- Basic EHT-MCS And Nss Set: 0x00000011
- Control: 0x04, Channel Width: 320 MHz EHT BSS bandwidth
 - CCFS0: 15
 - CCFS1: 31
 - Disabled Subchannel Bitmap: 0x0300

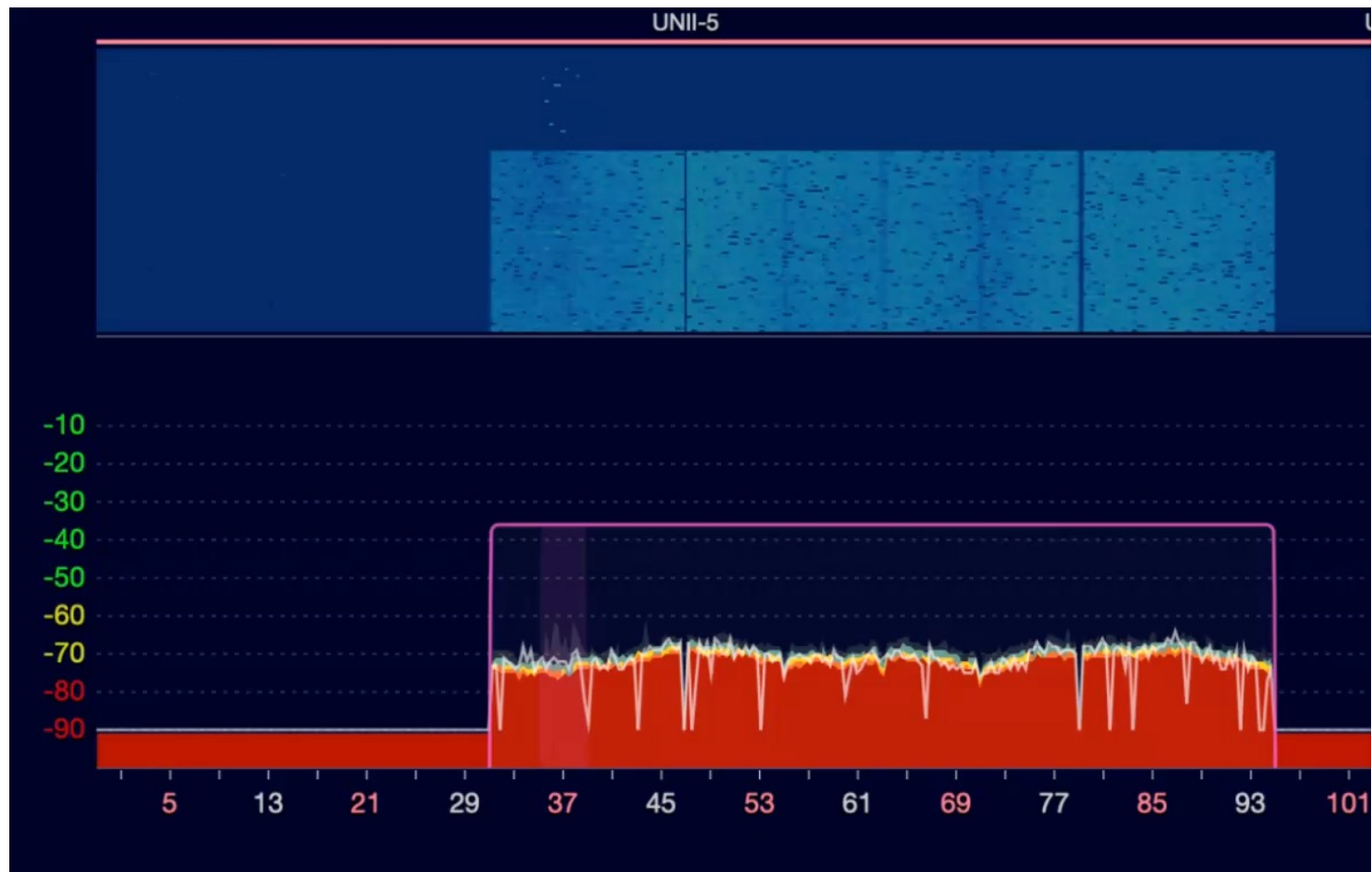
Puncturing Turn On

เมื่อค่าเปลี่ยนเป็น **CCFS0 = 15** และ **CCFS1 = 31** ควบคู่กับ **Disabled Subchannel Bitmap = 0x0300** บนความกว้าง 320 MHz สรุปการคำนวณตำแหน่ง Preamble Puncturing ได้ดังนี้ครับ

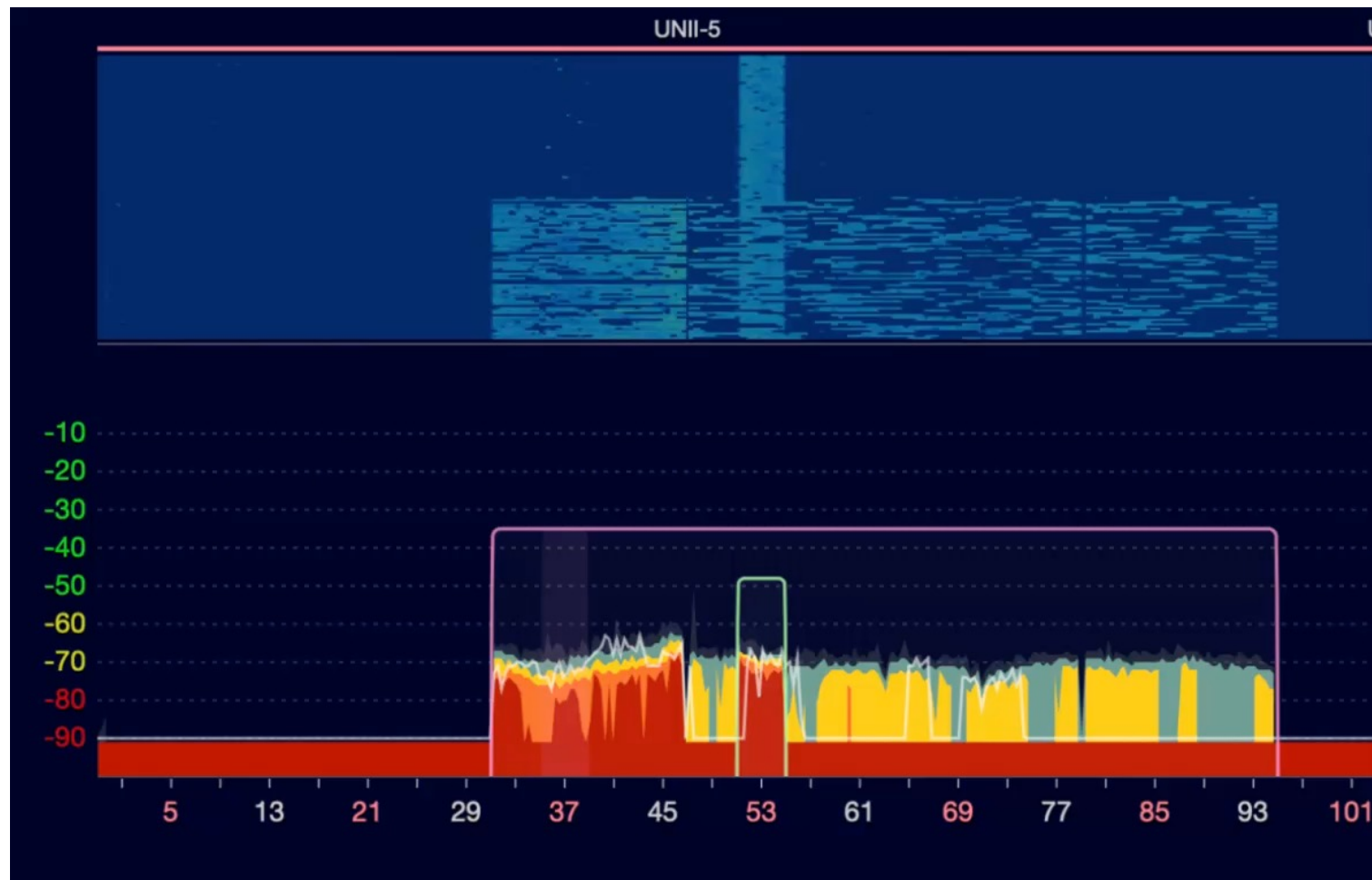
สรุปช่วงความถี่และช่องที่โดน Punctured

- ช่องที่ถูกเจาะออก (Punctured Channels): **Channel 17** และ **Channel 21**
- ช่วงความถี่ที่ถูกบล็อก (Freq Range): 6,035 MHz – 6,075 MHz (ขนาดรวม 40 MHz)

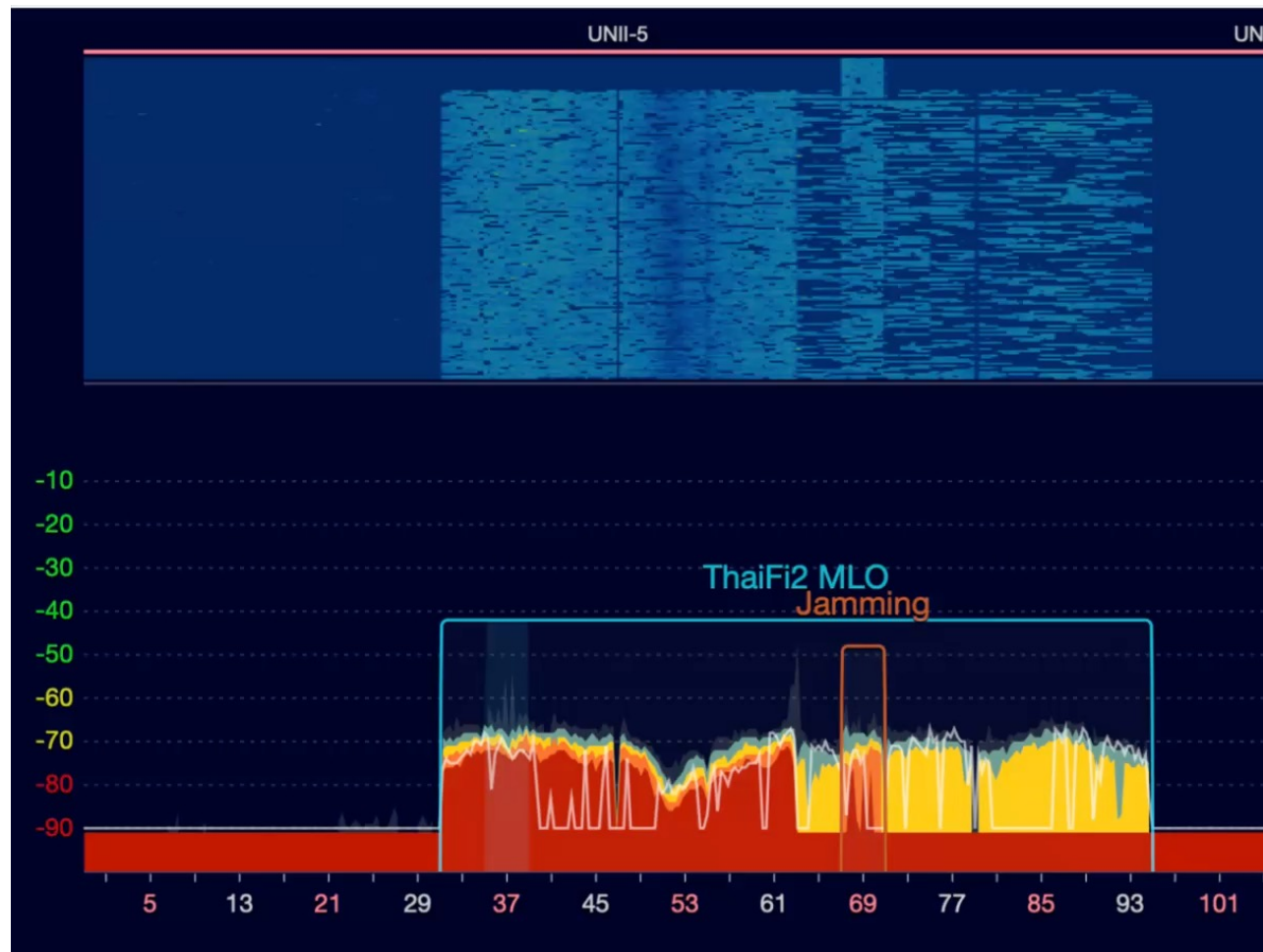
No Jam



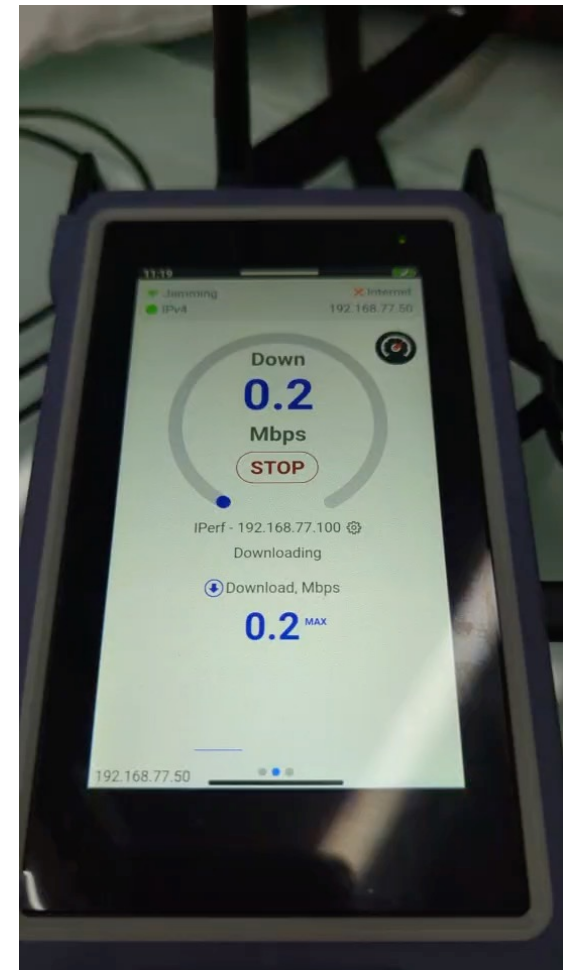
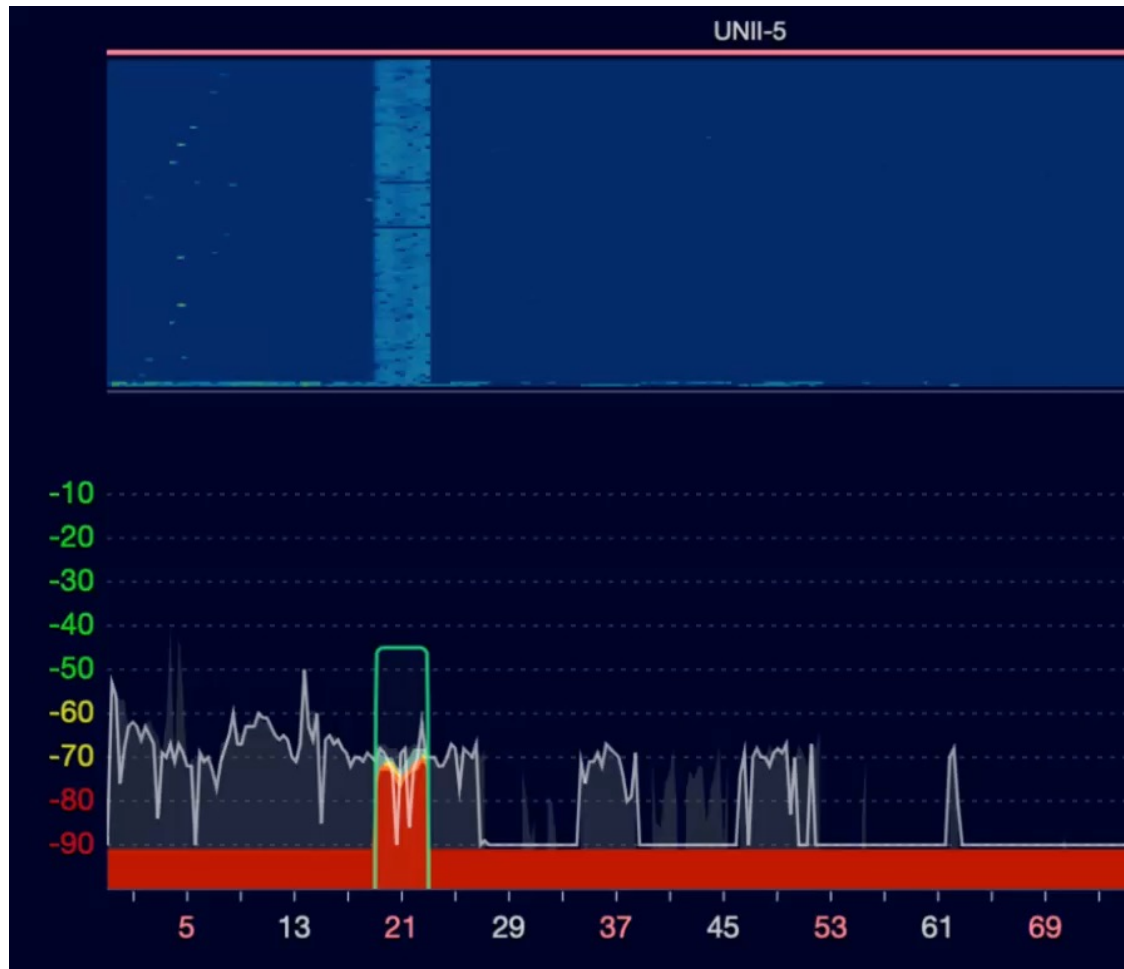
No Puncturing (1)



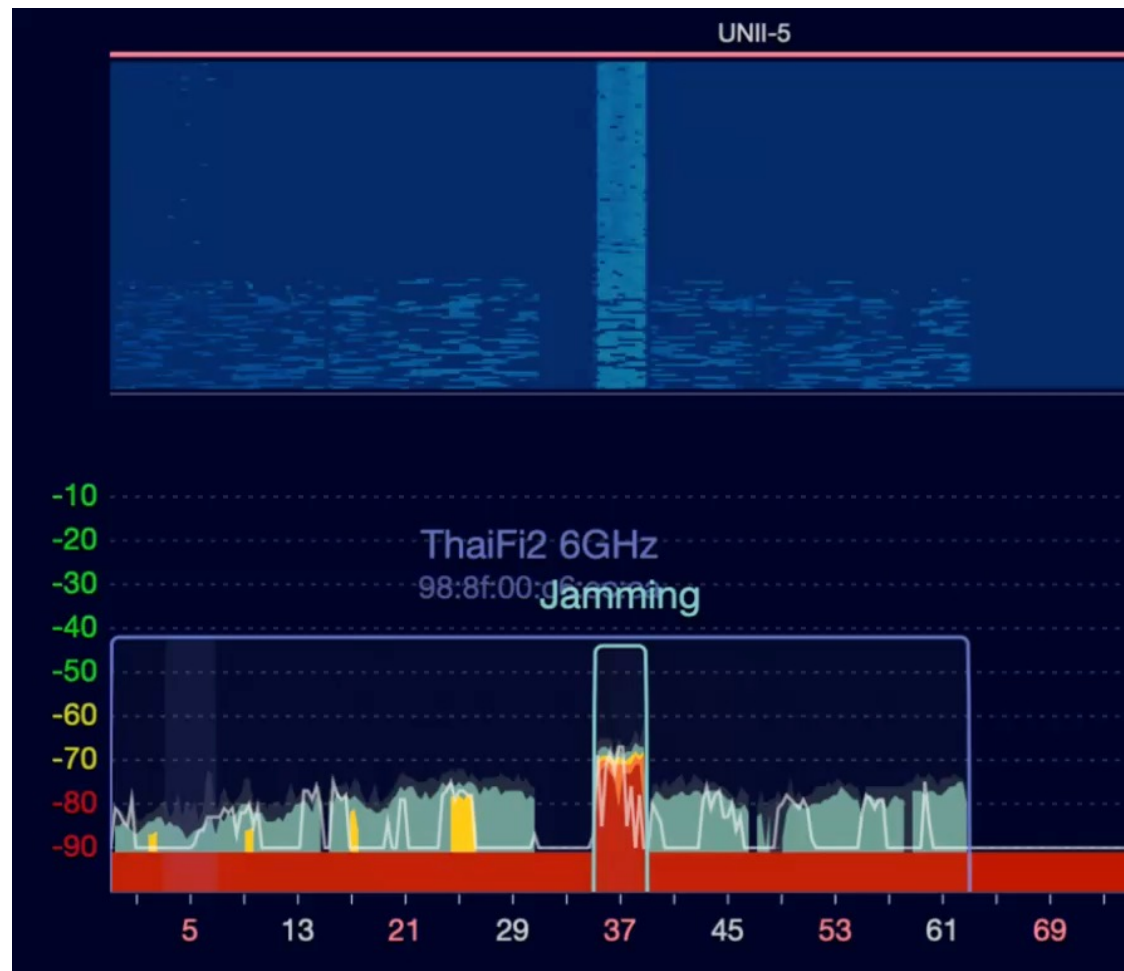
No Puncturing (2)



Survivor



Puncturing



Only One model



AP-735

Special Thanks

