Network Testing & Emulation Solutions

Testing As a service
Test plans and reports

sales@candelatech.com
1-360-380-1618

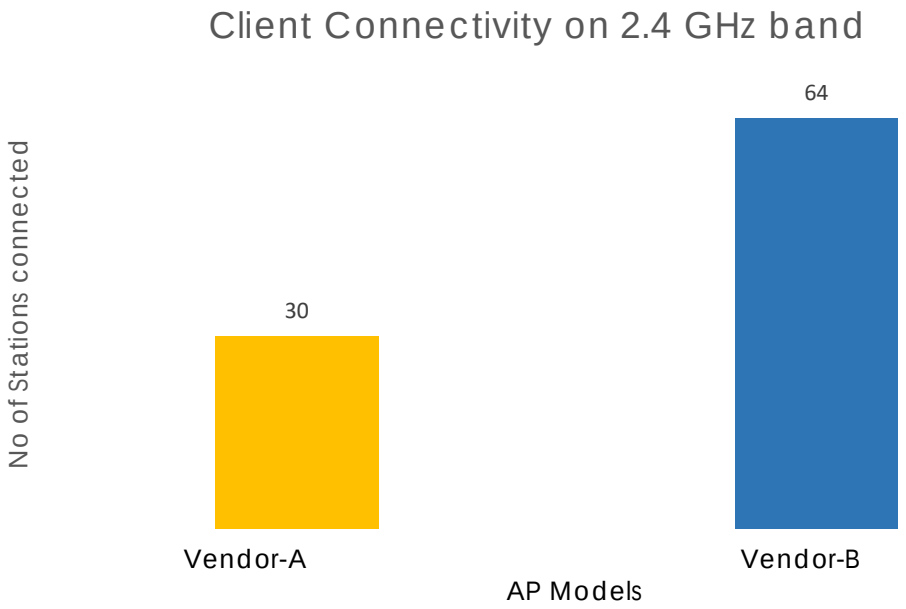
Test Suite Details

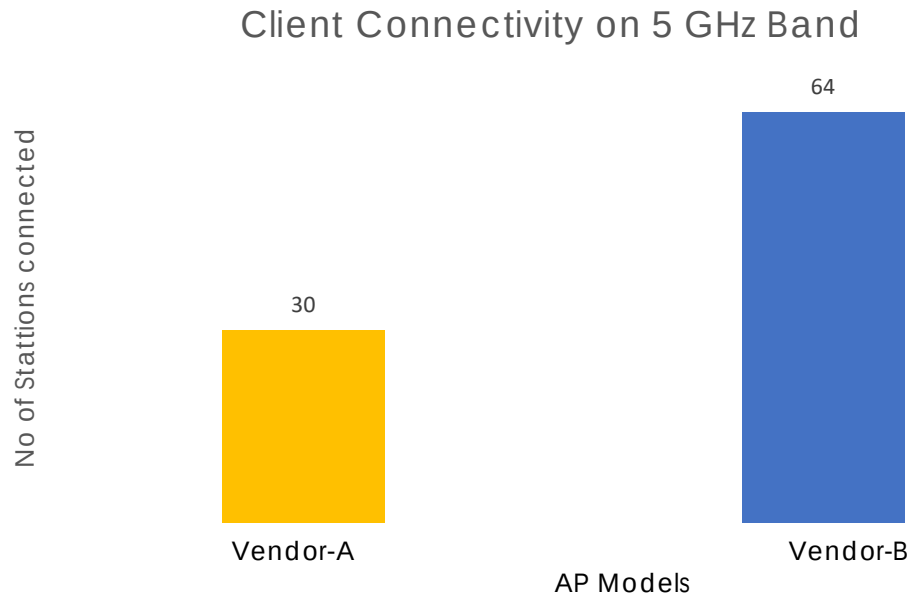
Sl No	Test Catageory	Test Case	No of Testcases
1	Basic Testing	Client Connectivity -2.4 & 5 GHz	17
2		Throughput with client capacity - 2.4 & 5 GHz	
3		Multi Band Throughput	
4		Data Plane - 2.4 & 5 GHz	
5		Port Reset	
6	Advanced Testing	Quality of Service	34
7		Dynamic Frequency Selection	
8		Performance Over Distance (RVR)	
9		Performance Over Orientation (RVO)	
10		File Transfer Protocol	
11		Interference (ACI/CCI)	
12		MU-MIMO	
13		OFDMA	
14		Airtime Fairness	
15		Roaming	
16		Long Term Stability	
17	TR-398 Testing	TR-398 issue-2	15
18	Coverage and Capacity test house	Coverage, roam and capacity with 40+ devices	5

Results Summary

Num	Tests	Vendor A	Vendor B
1	Basic Client connectivity – 2.4 GHz	Good	Excellent
2	Basic Client connectivity – 5 GHz	Good	Excellent
3	Client Capacity – 5 GHz TCP UL	Good	Excellent
4	Client Capacity – 5 GHz TCP DL	Good	Excellent
5	Client Capacity – 5 GHz UDP UL	Good	Excellent
6	Client Capacity – 5 GHz UDP DL	Poor	Excellent
7	Client Capacity – 2.4 GHz TCP UL	Good	Excellent
8	Client Capacity – 2.4 GHz TCP DL	Poor	Excellent
9	Client Capacity – 2.4 GHz UDP UL	Excellent	Good
10	Client Capacity – 2.4 GHz TCP DL	Poor	Excellent
11	Data Plane – 2.4 GHz	Excellent	N/A
12	Data Plane – 5 GHz	Excellent	N/A
13	Port Reset	Excellent	N/A
14	Quality of Service – 5 GHz	Good	N/A
15	Dual Band Testing – 5GHz TCP Upload	Good	Excellent
16	Dual Band Testing – 5GHz TCP Download	Poor	Excellent
17	Dual Band Testing – 5GHz UDP Upload	Poor	Excellent
18	Dual Band Testing – 5GHz UDP Download	Poor	Excellent
19	FTP – 2.4 GHz	Excellent	Excellent
20	FTP – 5 GHz	Poor	Excellent
21	DFS	Excellent	N/A
22	Rate vs Range	Good	Good
23	Rate vs Orientation	Poor	Good

Basic Client Connectivity





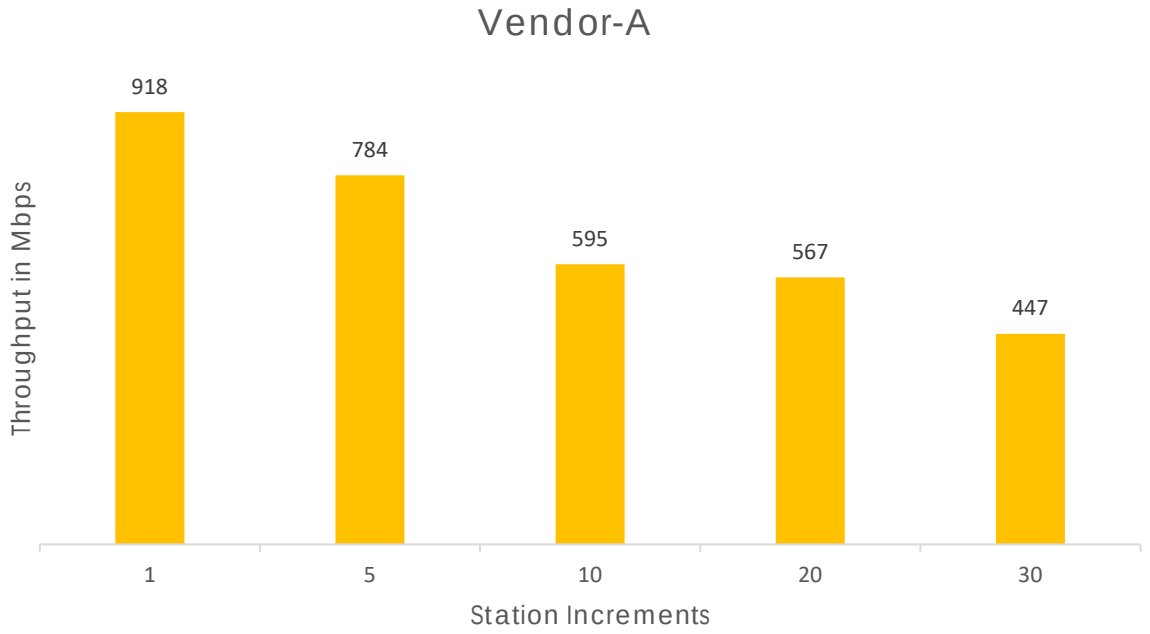
Test Description:

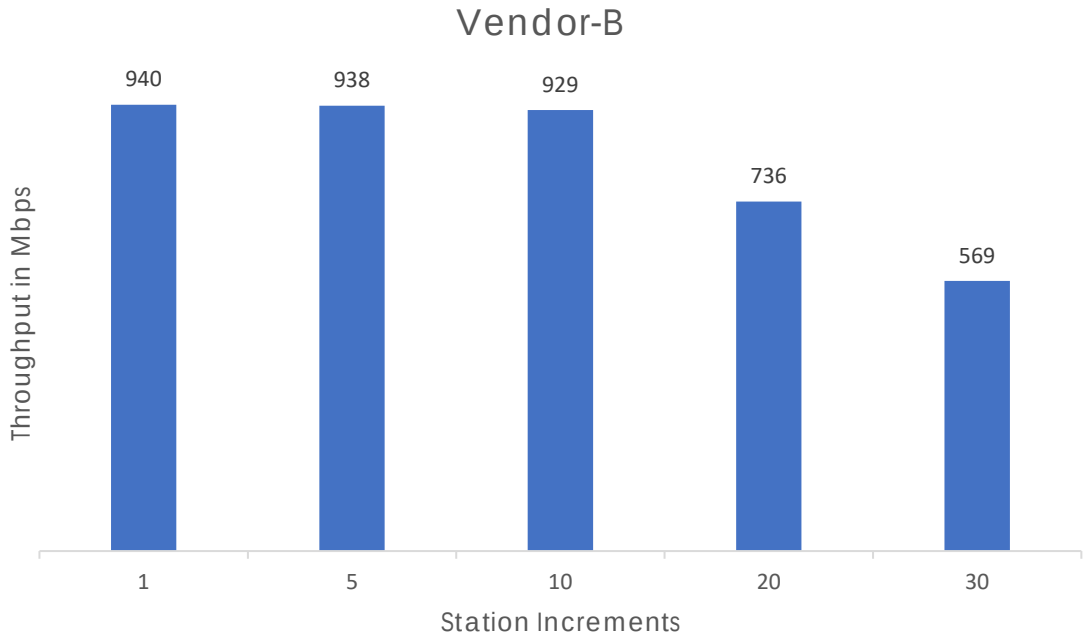
- DUT in ideal test conditions. No interfering APs and a good signal to the stations.
- All 2.4 GHz clients are connected in 3*3 with ax mode.
- All the 5 GHz clients are connected in 4*4 with ax mode.

Results Observations:

- In both bands, more clients are connecting to Vendor-B.

Client Capacity – 5 GHz TCP UL





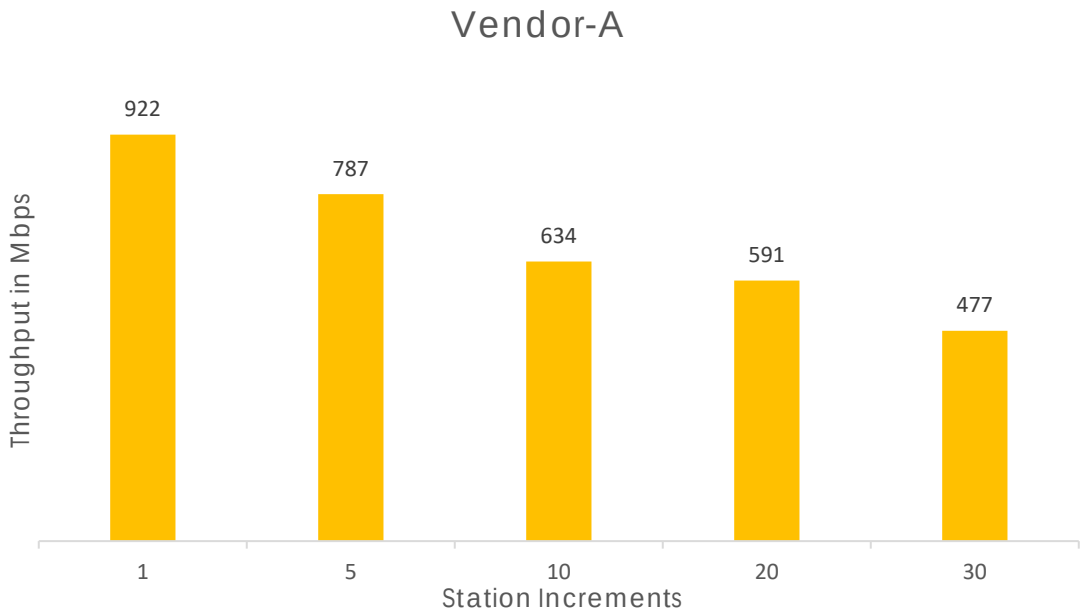
Test Description:

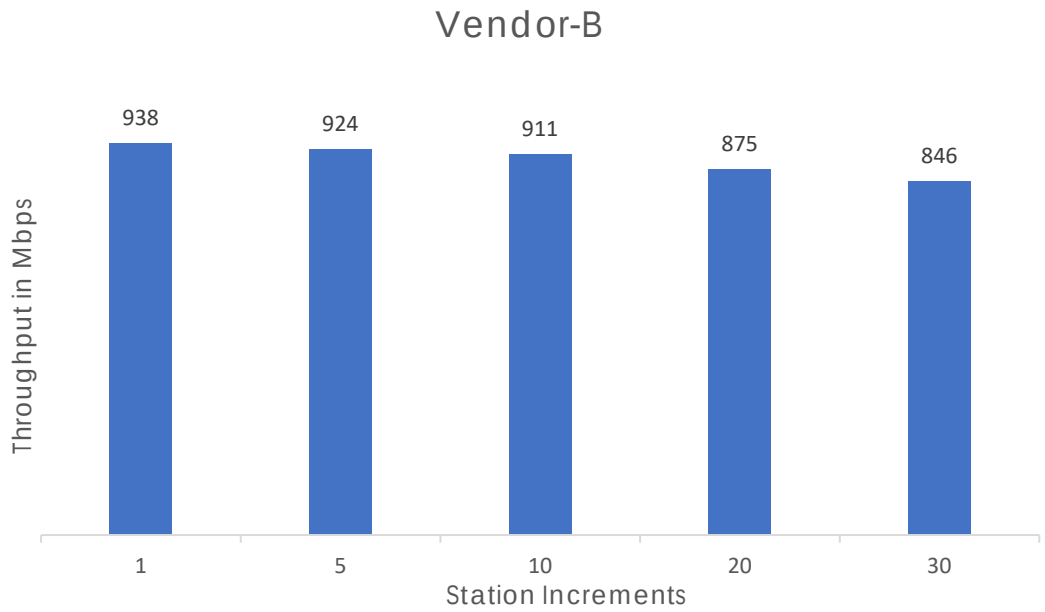
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with upstream, TCP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well

Client Capacity – 5 GHz TCP DL





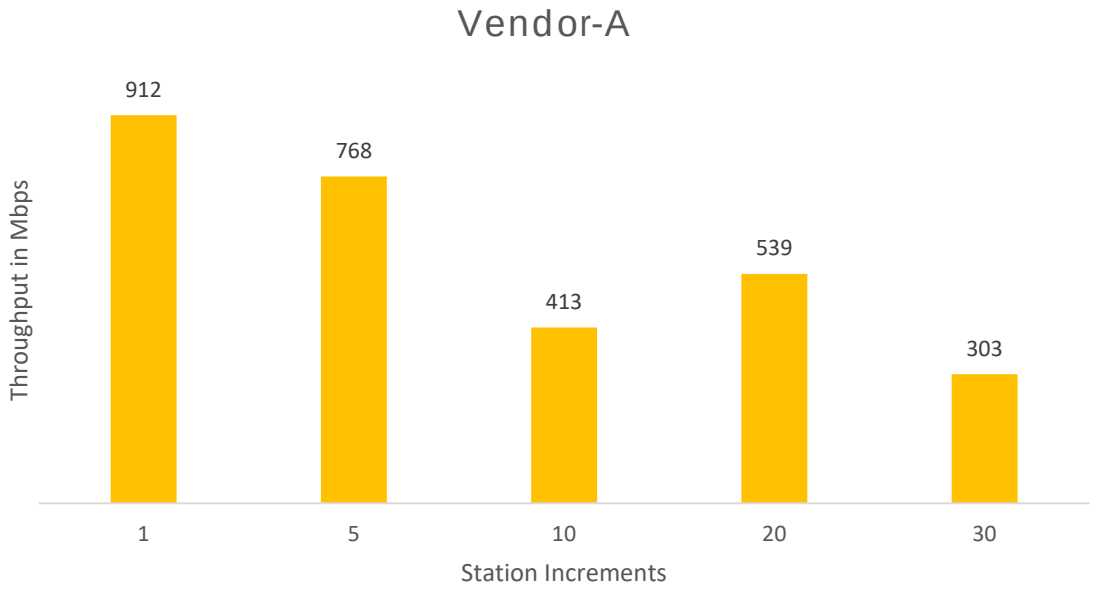
Test Description:

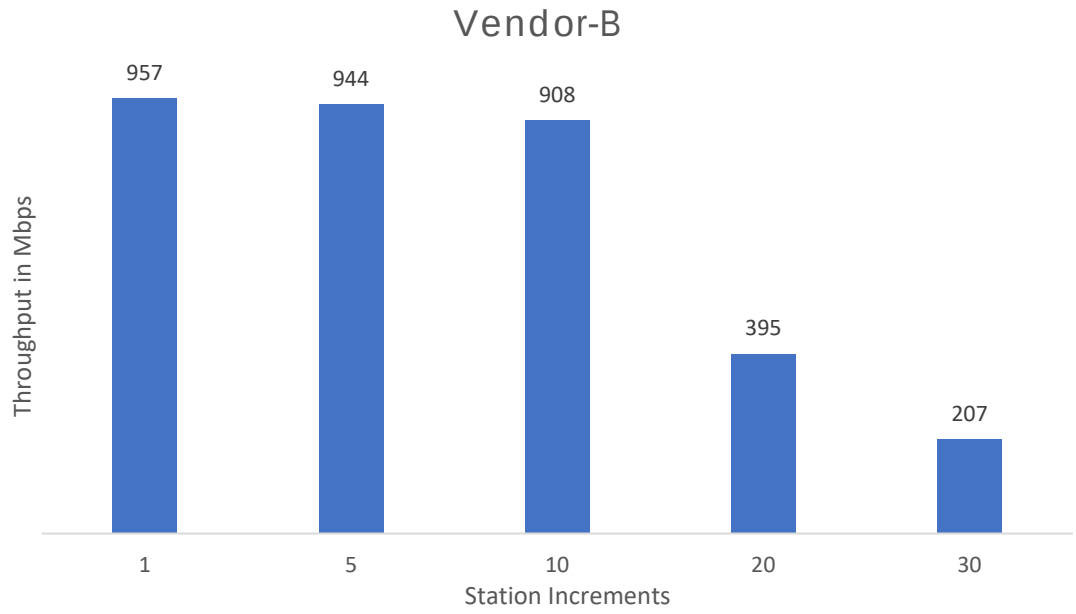
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, TCP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well

Client Capacity – 5 GHz UDP UL





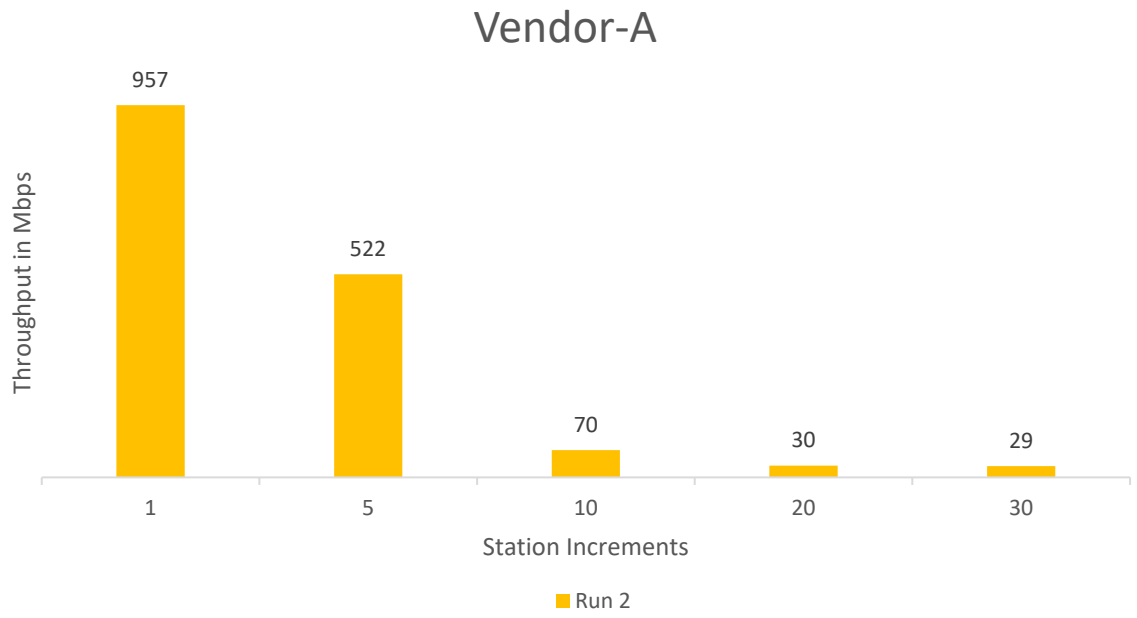
Test Description:

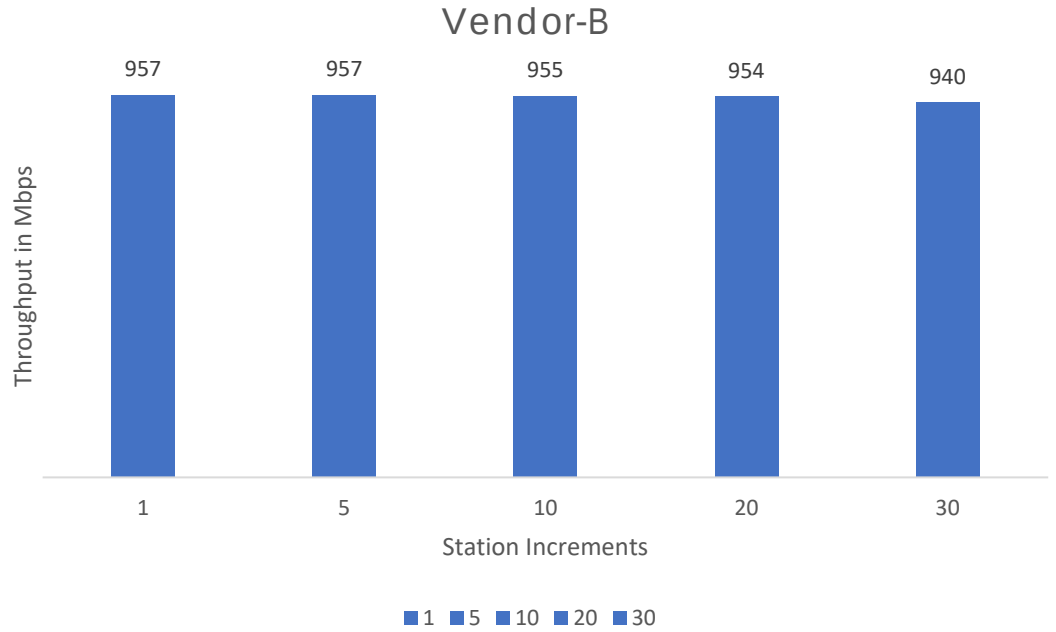
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with upstream, UDP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well.
- Conflict at the point of 30 clients.

Client Capacity – 5 GHz UDP DL





Test Description:

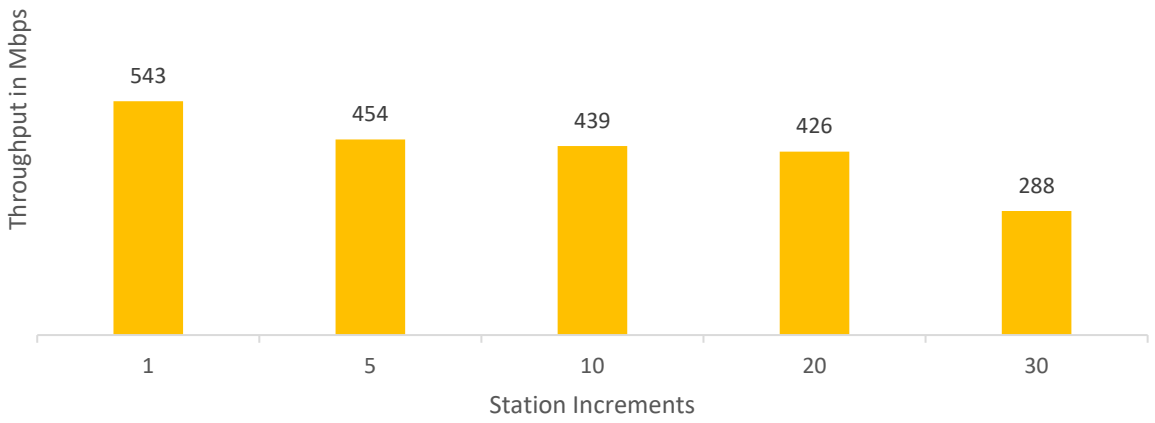
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, UDP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

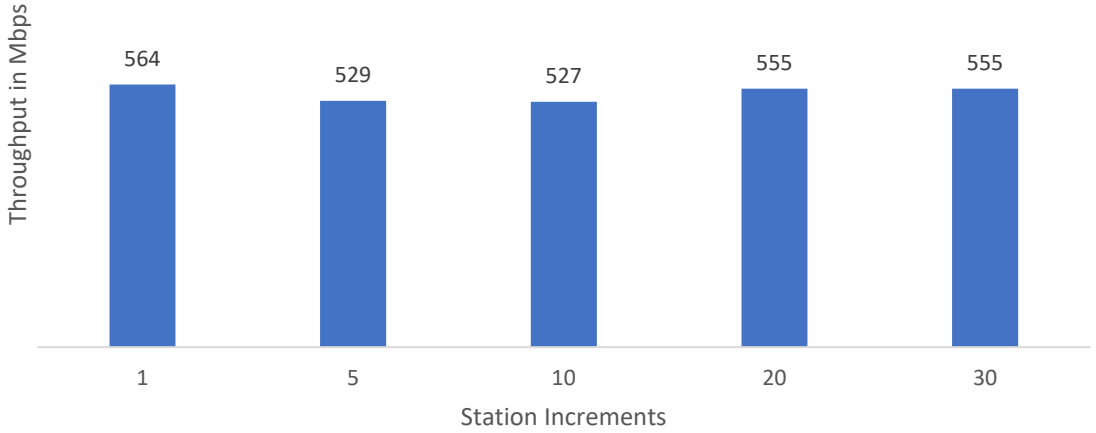
- Vendor B AP, good achieved throughput for single station and increments as well

Client capacity- 2.4GHz TCP-UP

Vendor-A



Vendor B



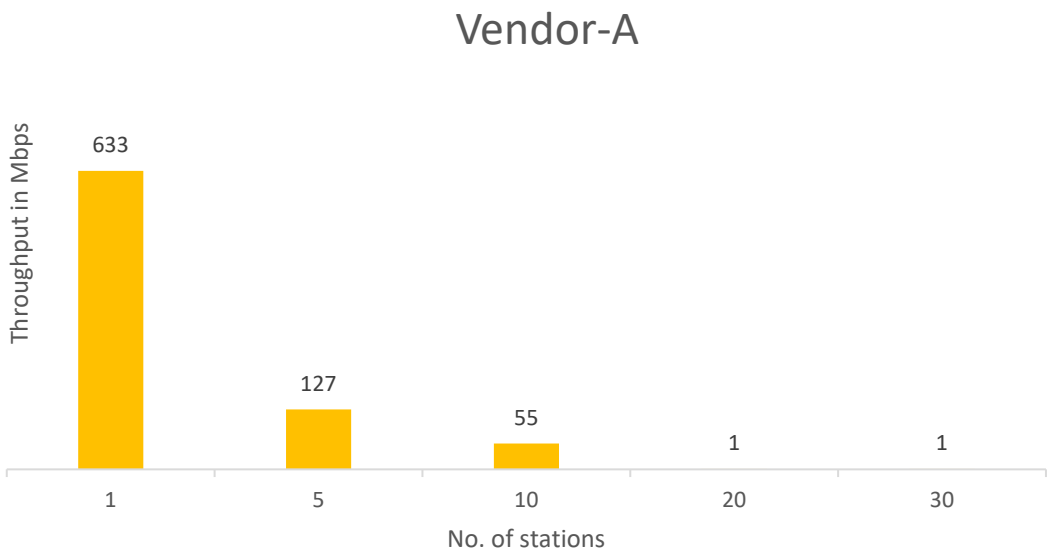
Test Description:

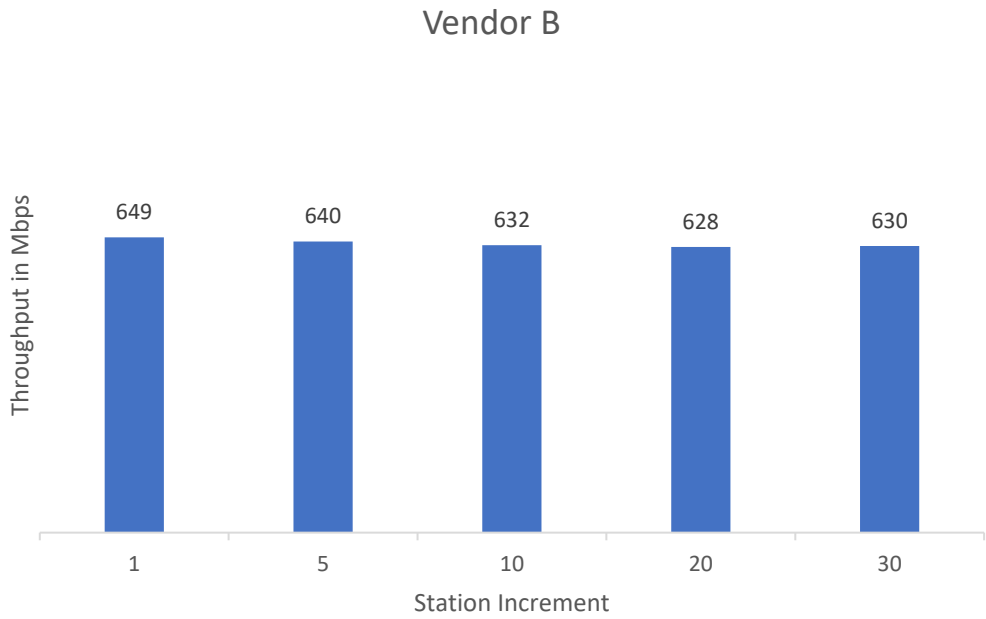
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 3NSS, 40Mhz BW
- Test run for 60 sec trials for different station increments with upstream, TCP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 2.4GHz on channel 1

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well

Client capacity- 2.4GHz TCP-DL





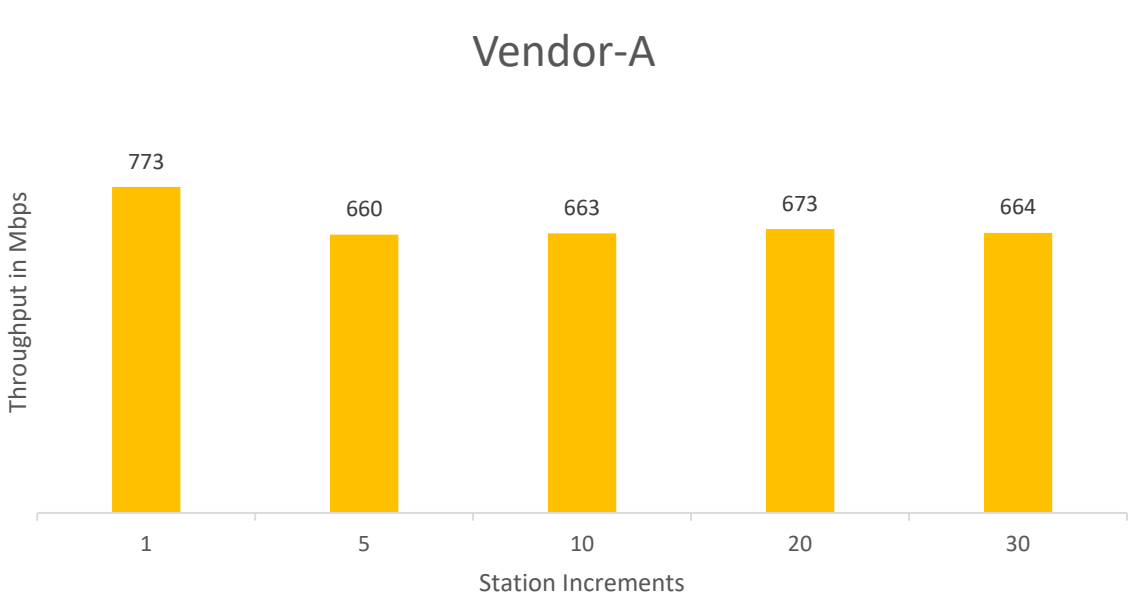
Test Description:

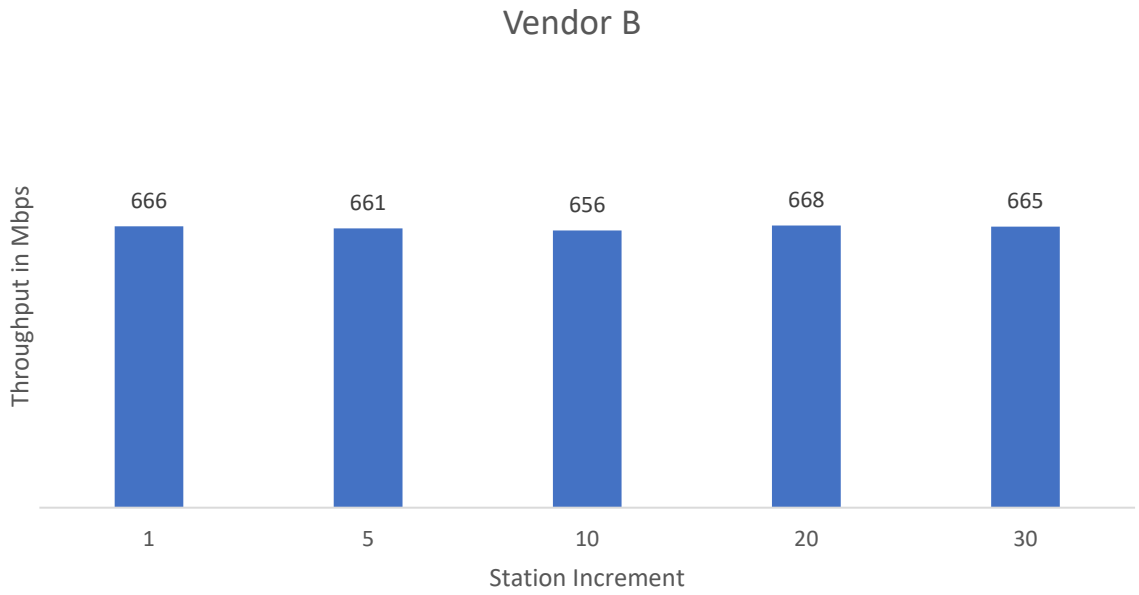
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 3NSS, 40Mhz BW
- Test run for 60 sec trials for different station increments with downstream, TCP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 2.4GHz on channel 1

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well

Client capacity- 2.4GHz UDP-UL





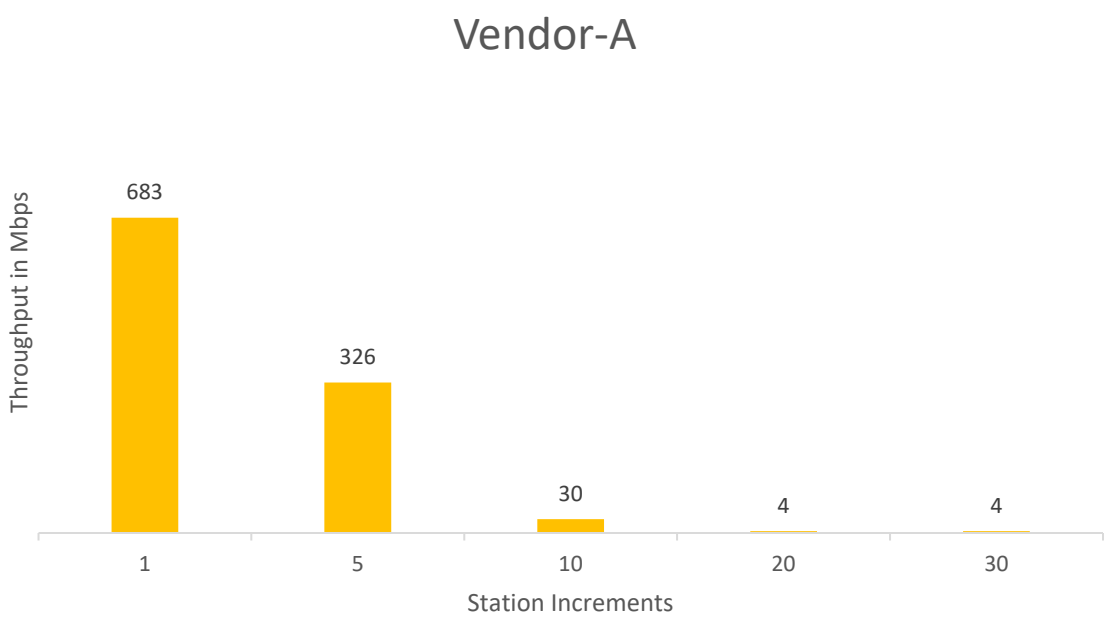
Test Description:

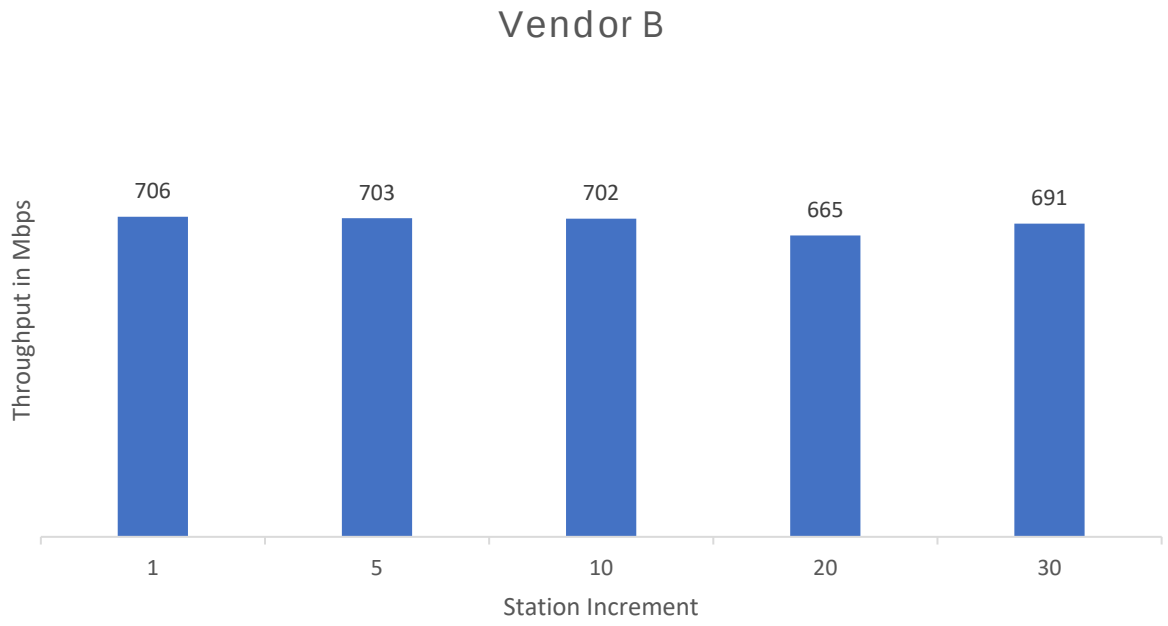
- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 3NSS, 40Mhz BW
- Test run for 60 sec trials for different station increments with upstream, UDP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 2.4GHz on channel 1

Results Observations:

- Vendor-A, good achieved throughput for single station and increments as well
- Conflict by means of increase in throughput as the stations increase.

Client capacity- 2.4GHz UDP-DL





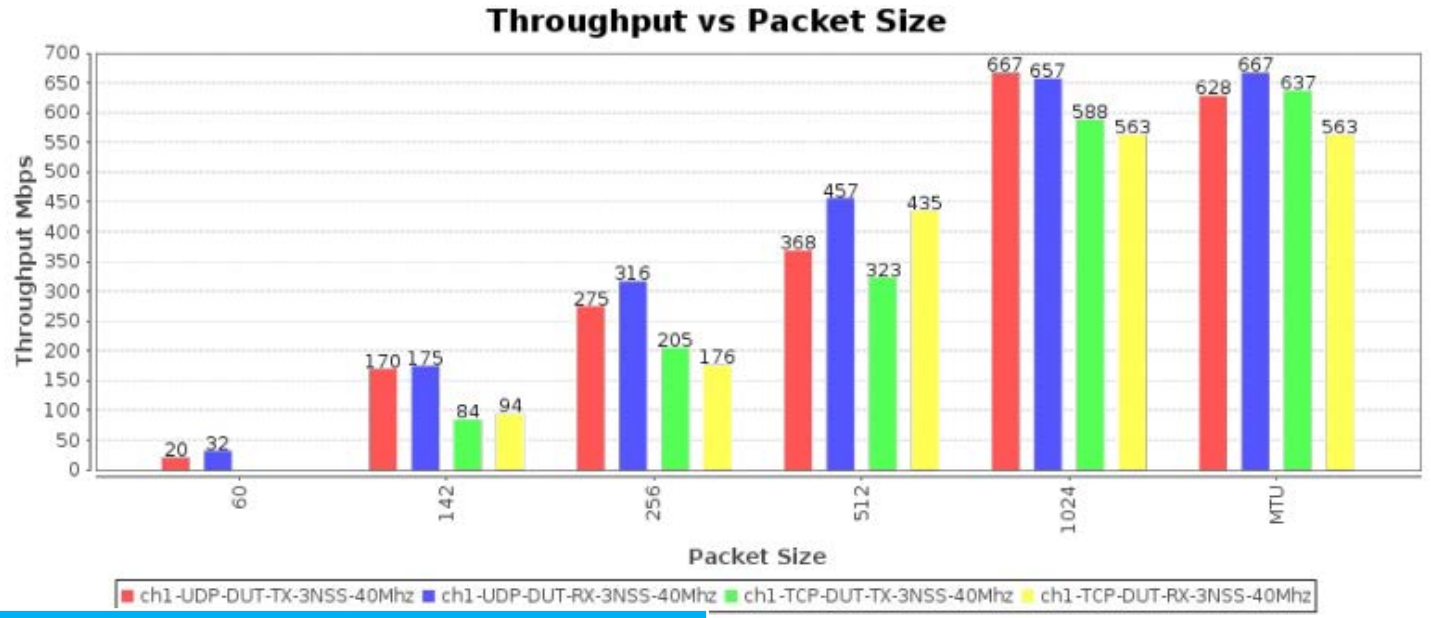
Test Description:

- DUT in ideal test conditions. No interfering APs and a good signal to the stations
- Intended load set to 1 Gbps rate for 3NSS, 40Mhz BW
- Test run for 60 sec trials for different station increments with downstream, TCP traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 2.4GHz on channel 1

Results Observations:

- Vendor B AP, good achieved throughput for single station and increments as well

Data-Plane test 2.4GHz



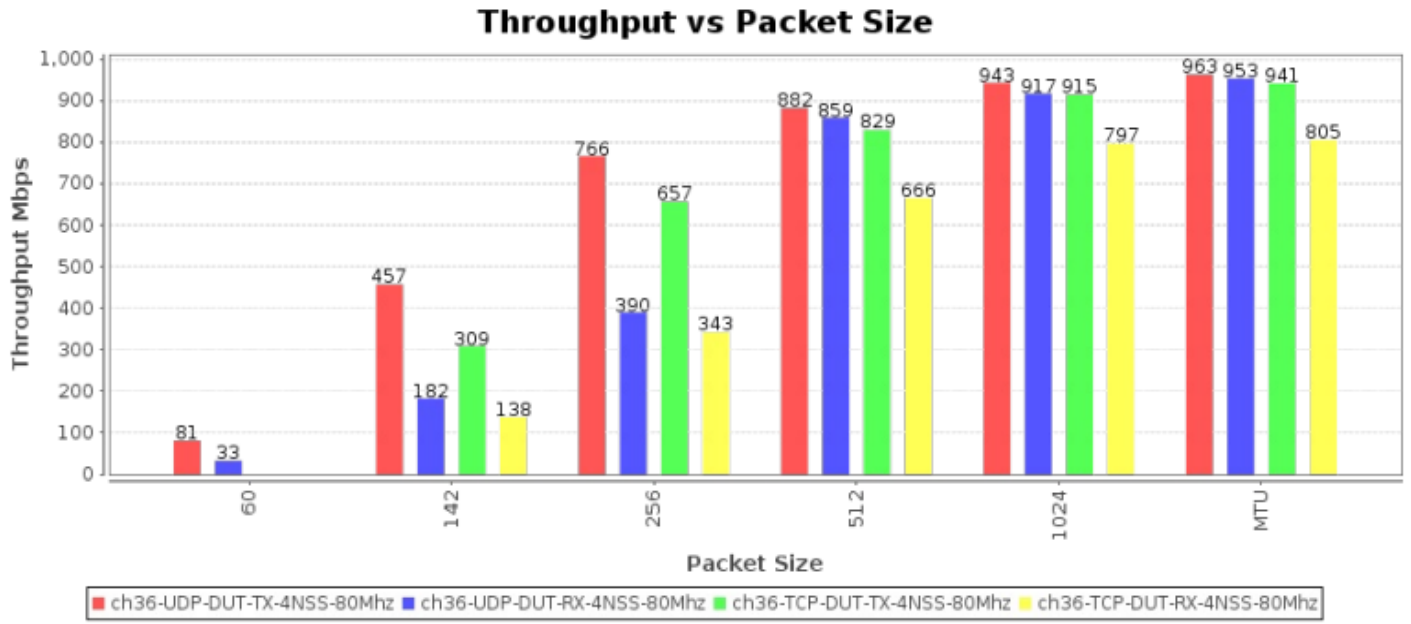
Test Description:

- In this scenario, the throughput is calculated by means of various kinds of packet sizes.
- Here we create a single client and check what is the maximum throughput at each point.
- Test run for 60 sec trials for different station increments with downstream and upstream traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 2.4GHz on channel 1, 3NSS.

Results Observations:

- Vendor-A, is performing good at the data-plane test but is relatively not as per MCS index.

Data-Plane test 5GHz



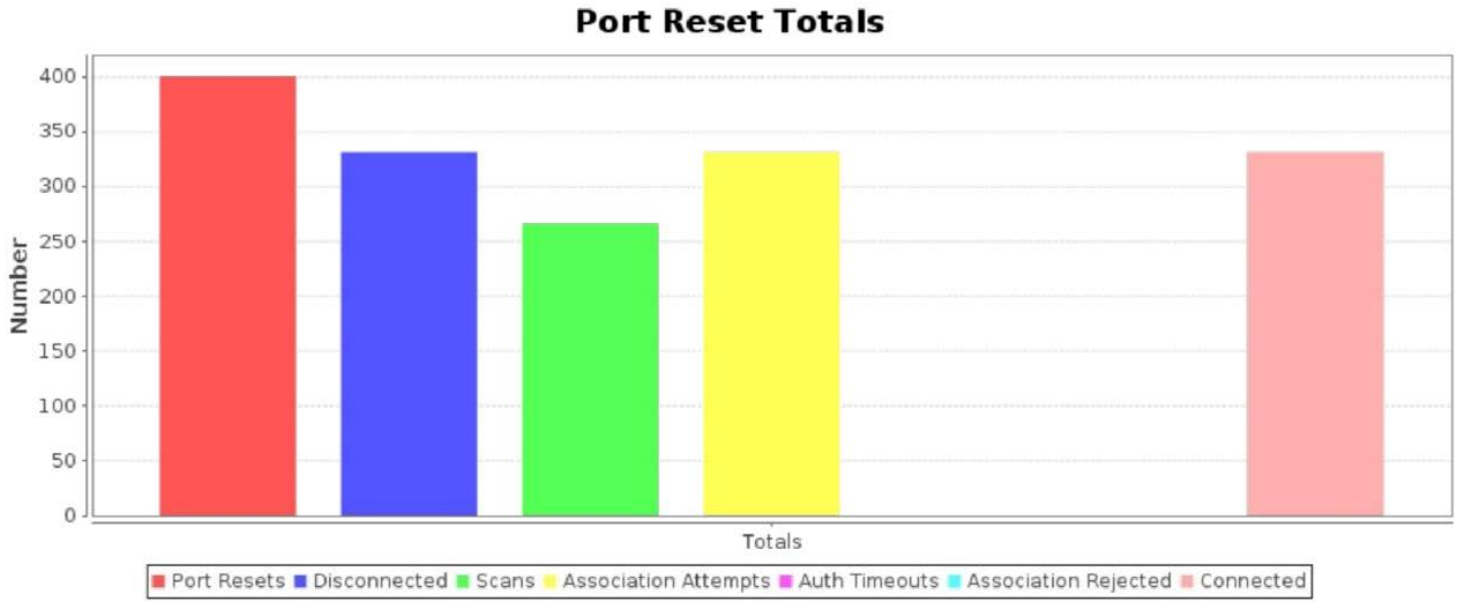
Test Description:

- In this scenario, the throughput is calculated by means of various kinds of packet sizes.
- Here we create a single client and check what is the maximum throughput at each point.
- Test run for 60 sec trials for different station increments with downstream and upstream traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36, 4NSS.

Results Observations:

- Vendor-A, is performing good at the data-plane test but is relatively not as per MCS index.

Port Reset-2.4GHz



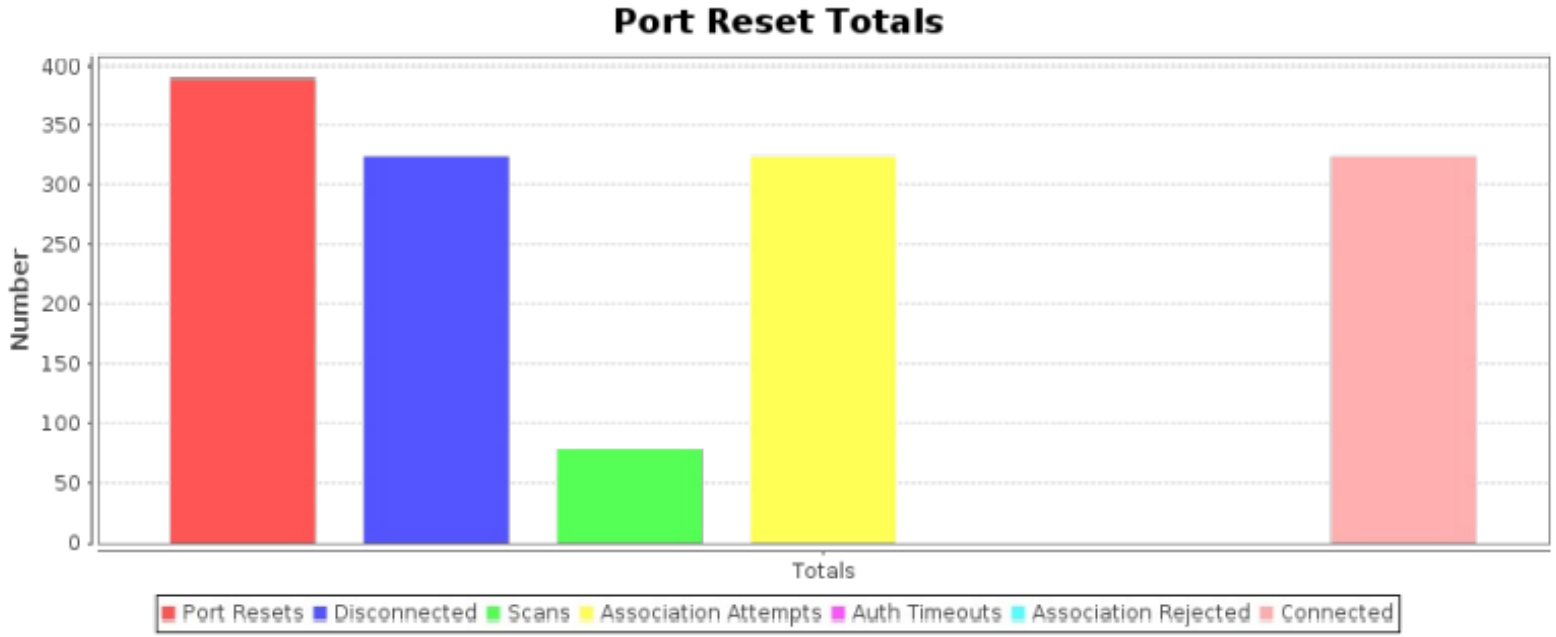
Test Description:

- In this scenario, the port reset time and association time is calculated
- Here we create 30-clients and check what is the maximum rate of port reset at each point.
- Test run for 60 sec(min) and 120(max) trials for different port intervals.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Port reset test run in 2.4GHz on channel 1, 3NSS.

Results Observations:

- Vendor-A, is following good port reset count for 30-clients in the span of 1 hour.

Port Reset 5GHz



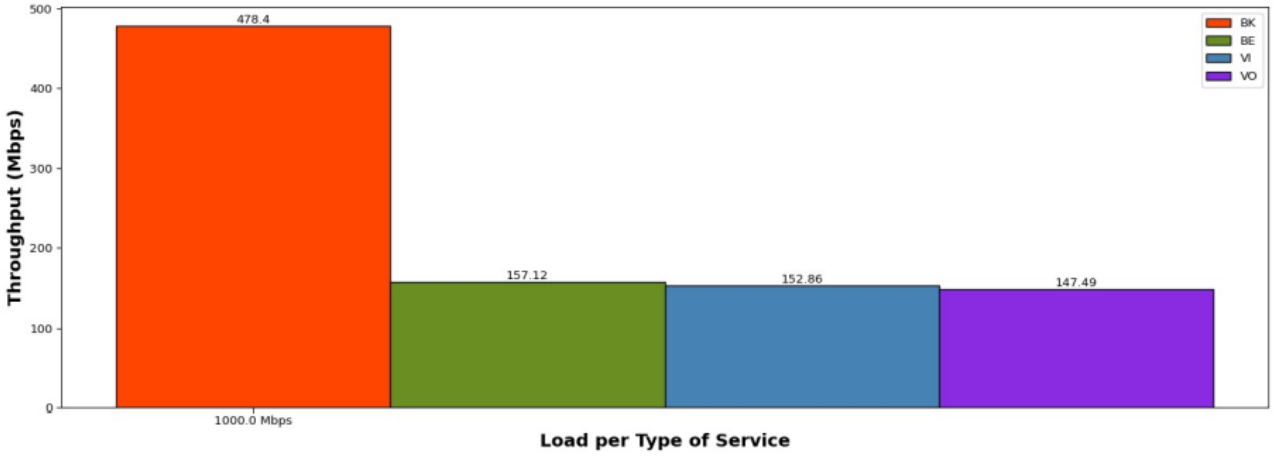
Test Description:

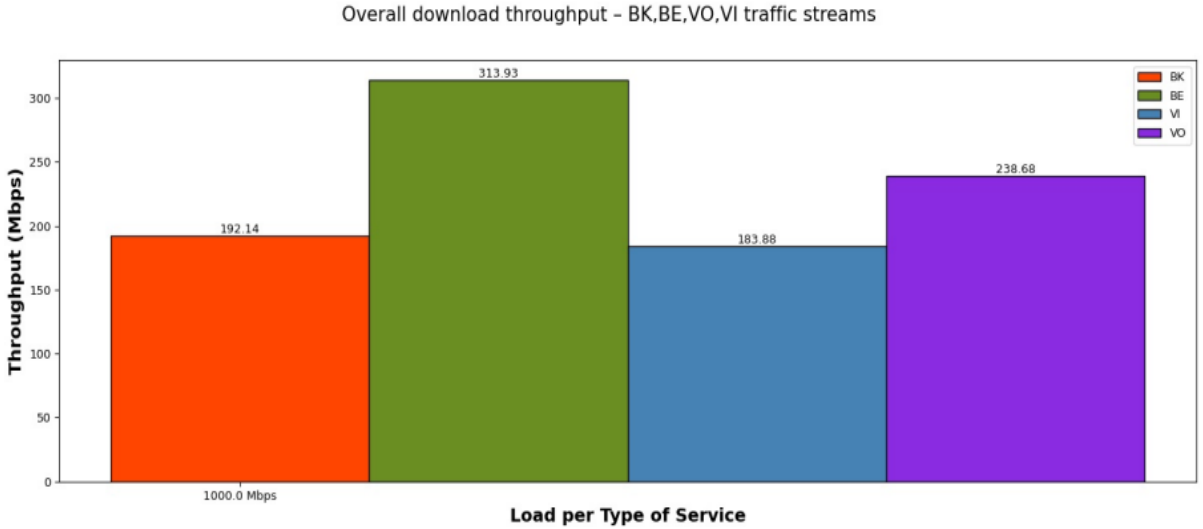
- In this scenario, the port reset time and association time is calculated
- Here we create 30-clients and check what is the maximum rate of port reset at each point.
- Test run for 60 sec(min) and 120(max) trials for different port intervals.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Port reset test run in 5GHz on channel 36, 4NSS.

Results Observations:

- Vendor-A, is following good port reset count for 30-clients in the span of 1 hour.

Quality of Service for 5GHz 1-Client and 2-clients





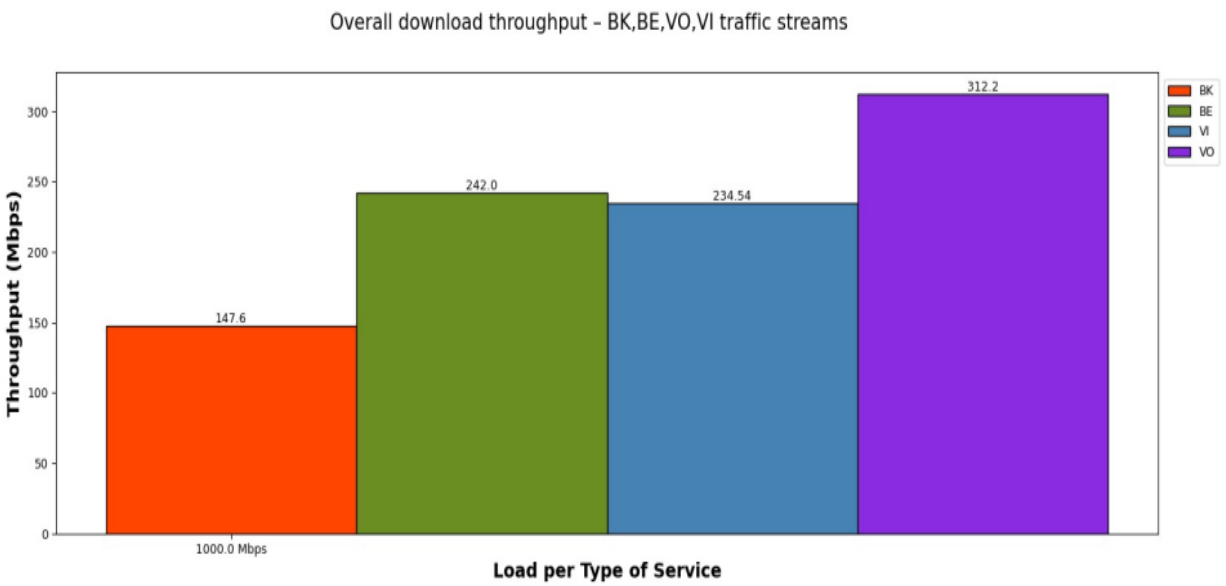
Test Description:

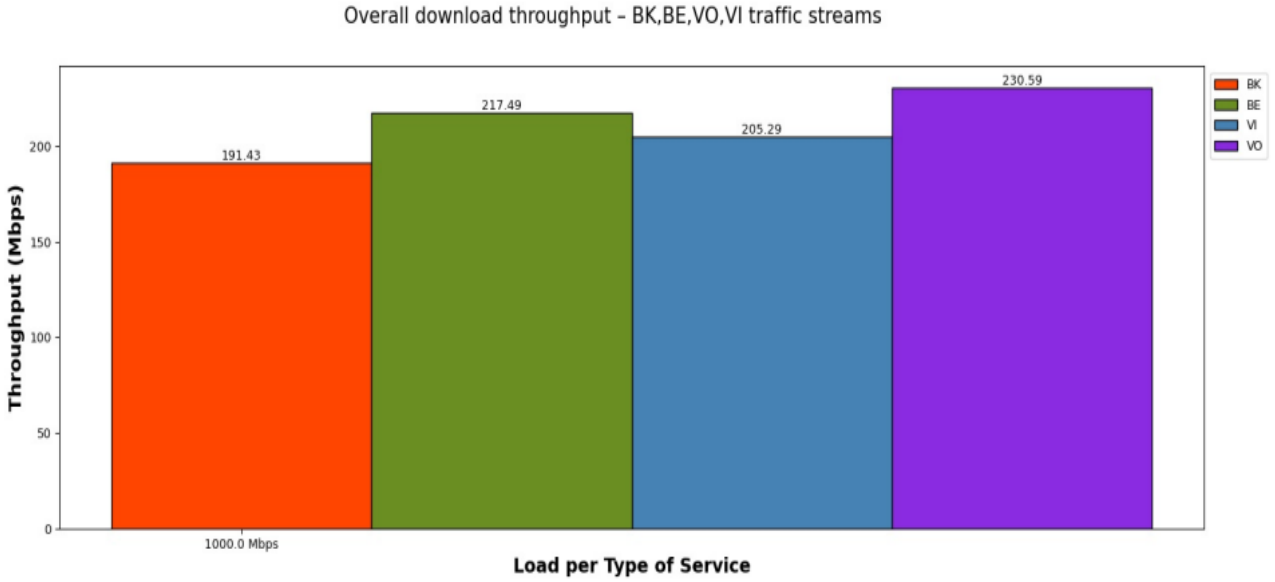
- In this scenario, the Quality of Service is observed by means of running various kinds of traffic:- VOICE,VIDEO,BACKEND,BEST EFFORT.
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, QoS traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor-A, is not following the precedence of QoS for both 1-client and 2-clients.

Quality of Service for 5GHz 5-Clients and 7-clients





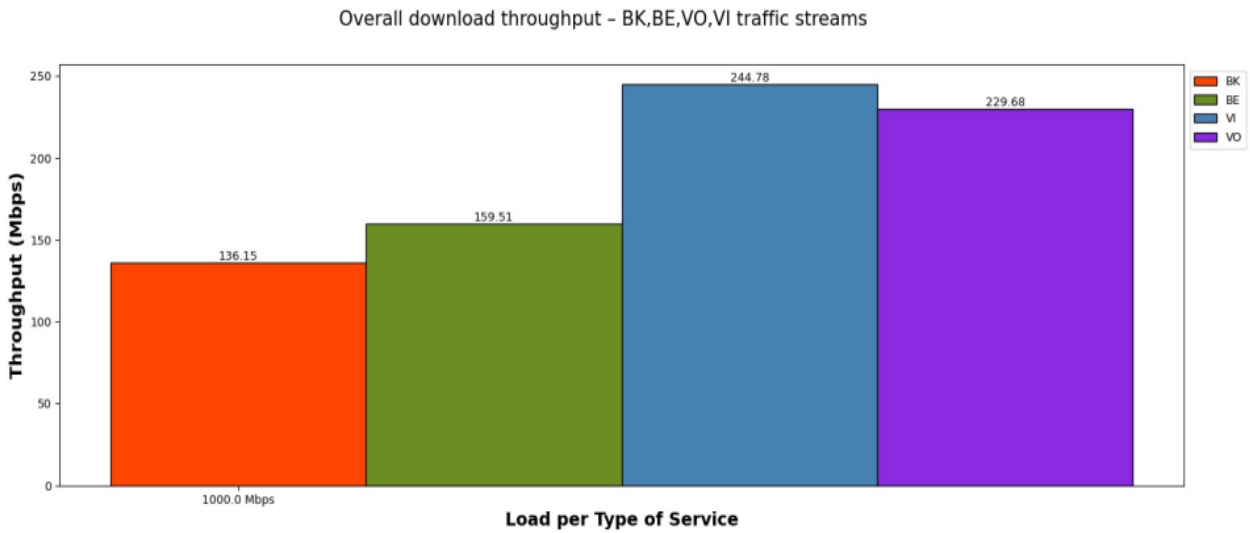
Test Description:

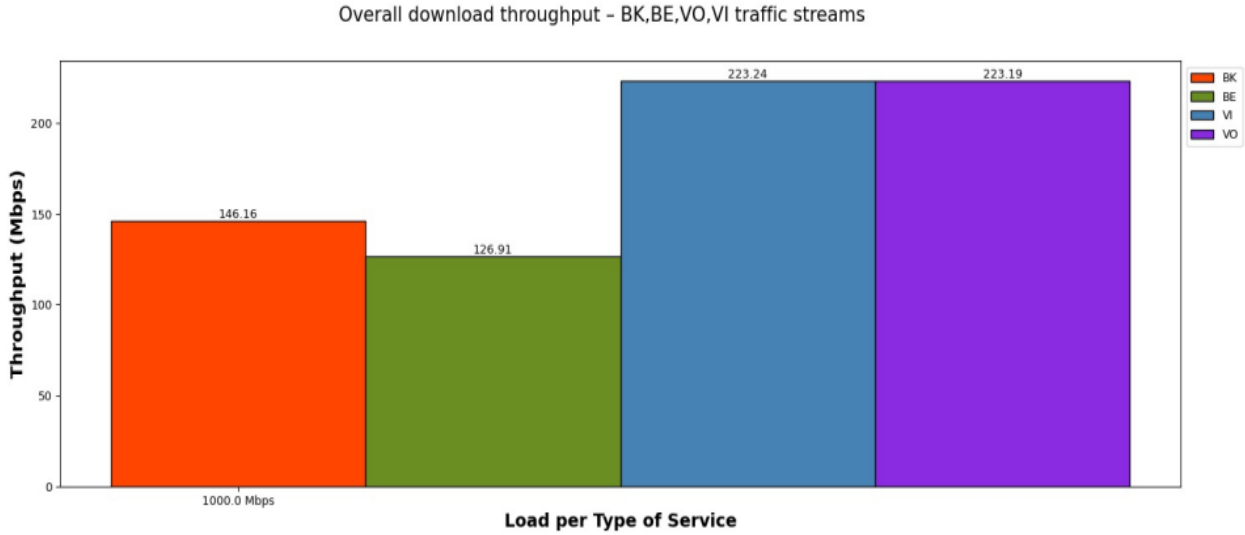
- In this scenario, the Quality of Service is observed by means of running various kinds of traffic:- VOICE,VIDEO,BACKEND,BEST EFFORT.
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, QoS traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor-A, is not following the precedence of QoS for both 5-client and 7-clients.

Quality of Service for 5GHz 10-Clients and 15-clients





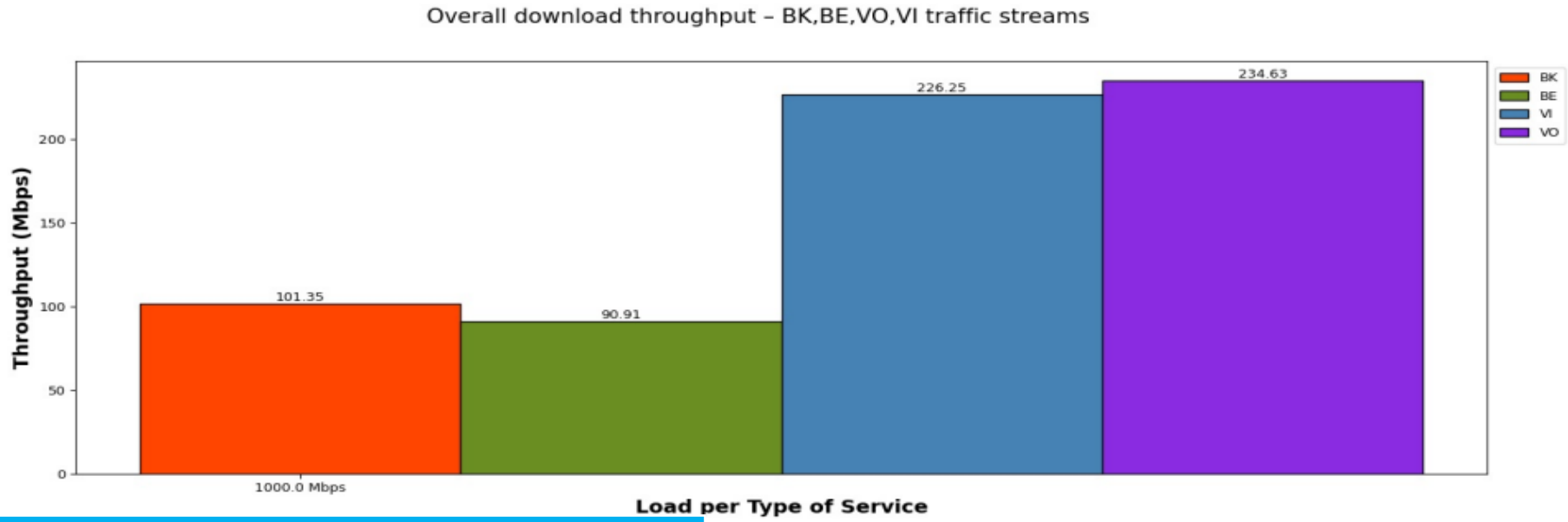
Test Description:

- In this scenario, the Quality of Service is observed by means of running various kinds of traffic:- VOICE,VIDEO,BACKEND,BEST EFFORT.
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, QoS traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor-A, is not following the precedence of QoS for 10-clients and is following for 15-clients.

Quality of Service for 5GHz 19-clients



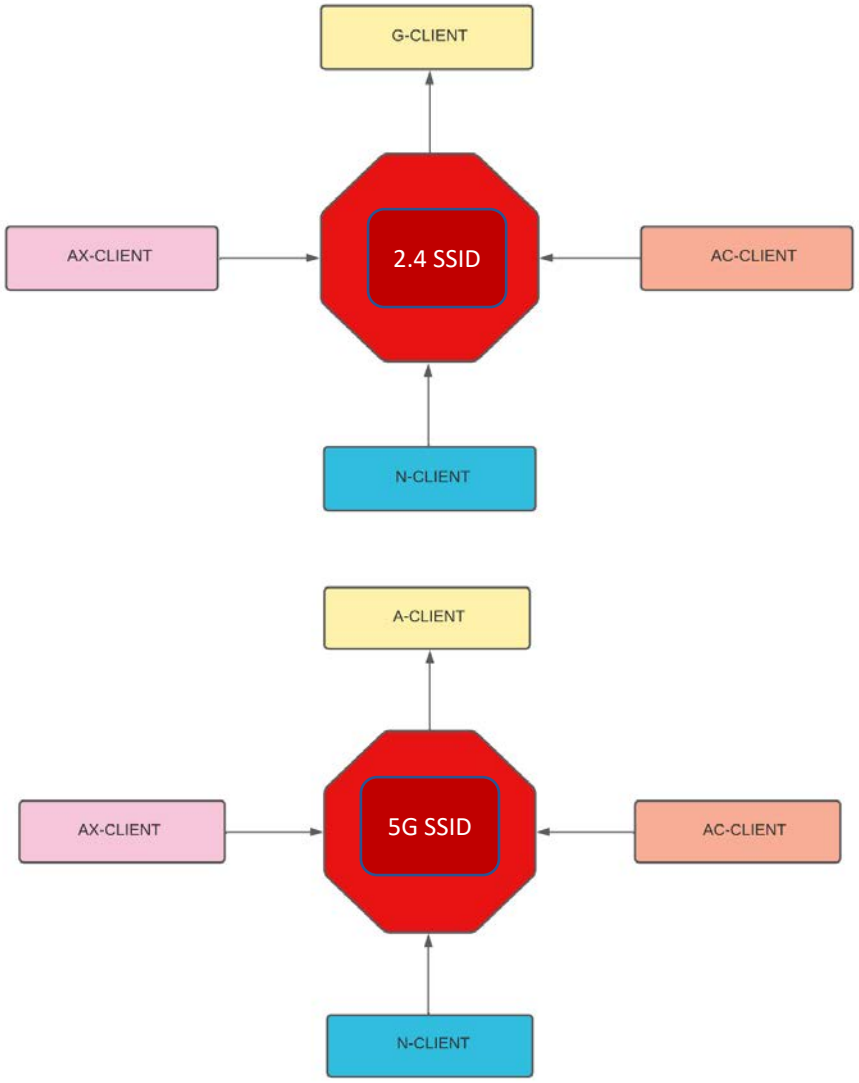
Test Description:

- In this scenario, the Quality of Service is observed by means of running various kinds of traffic:- VOICE,VIDEO,BACKEND,BEST EFFORT.
- Intended load set to 1 Gbps rate for 4NSS, 80Mhz BW
- Test run for 60 sec trials for different station increments with downstream, QoS traffic.
- DUT-TX is from AP to Client and DUT-Rx is from Client to AP.
- Throughput test run in 5GHz on channel 36

Results Observations:

- Vendor-A, is following the precedence of QoS for 19-clients.

Airtime Fairness testing:

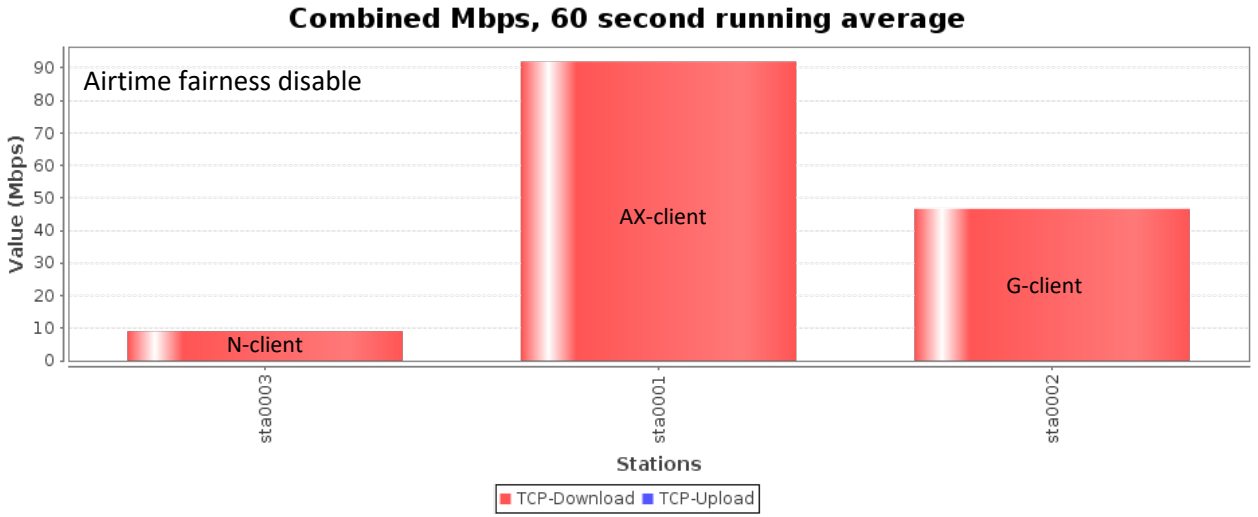


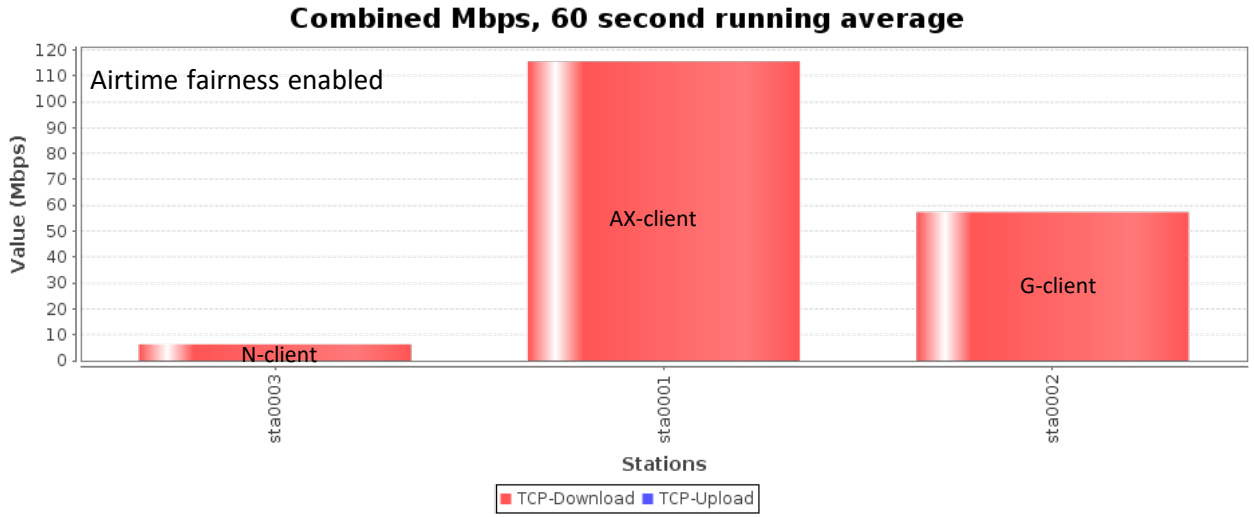
Test procedure for Airtime fairness test:

- In this testcase we create 4 different kind of clients, and connect them to the Vendor-A at the same time.
- We set the maximum traffic as 1Gbps, and run the traffic together for all the 4 clients.
- We also consider the network time as a constraint and monitor the throughput difference when Airtime Fairness is enabled.
- Airtime fairness can be observed only in the downlink traffic.

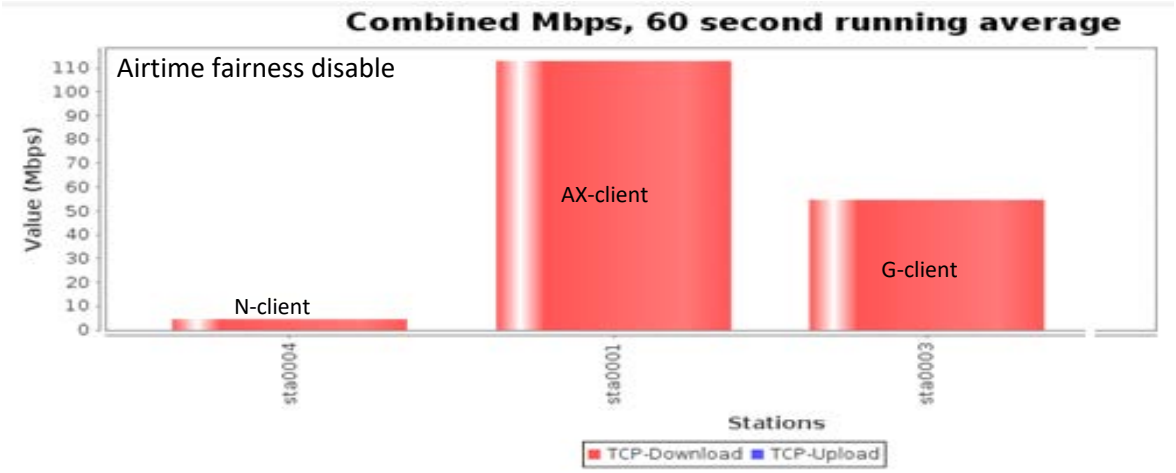
Airtime Fairness : TCP-DL[2.4GHz]

Vendor-A

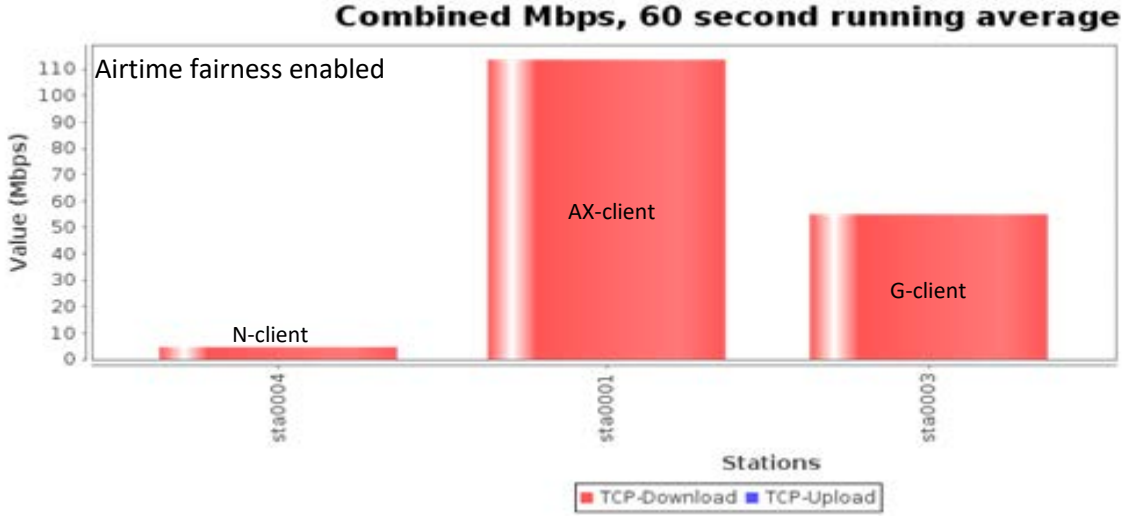




Vendor-B

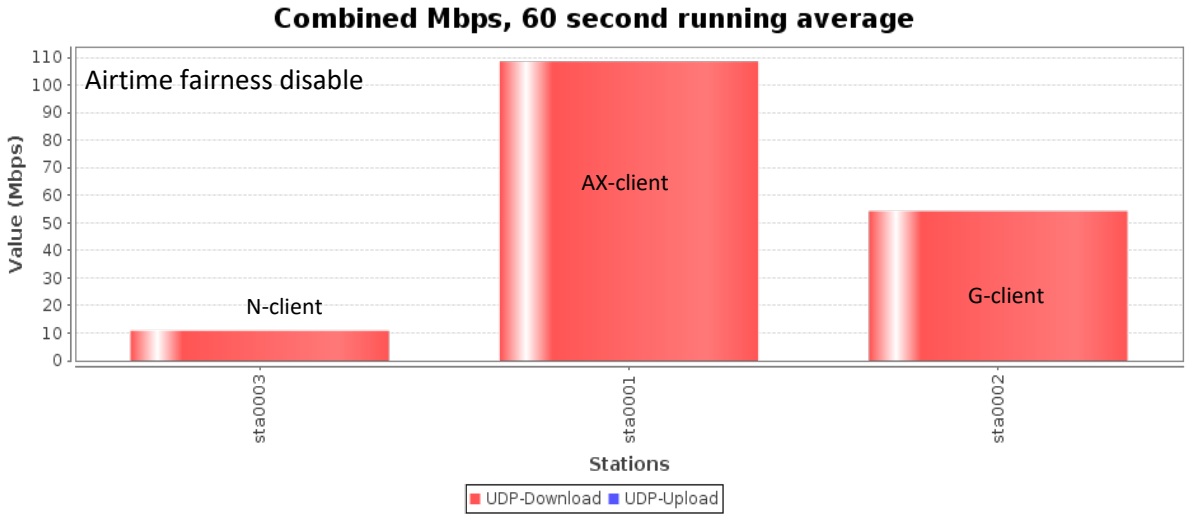


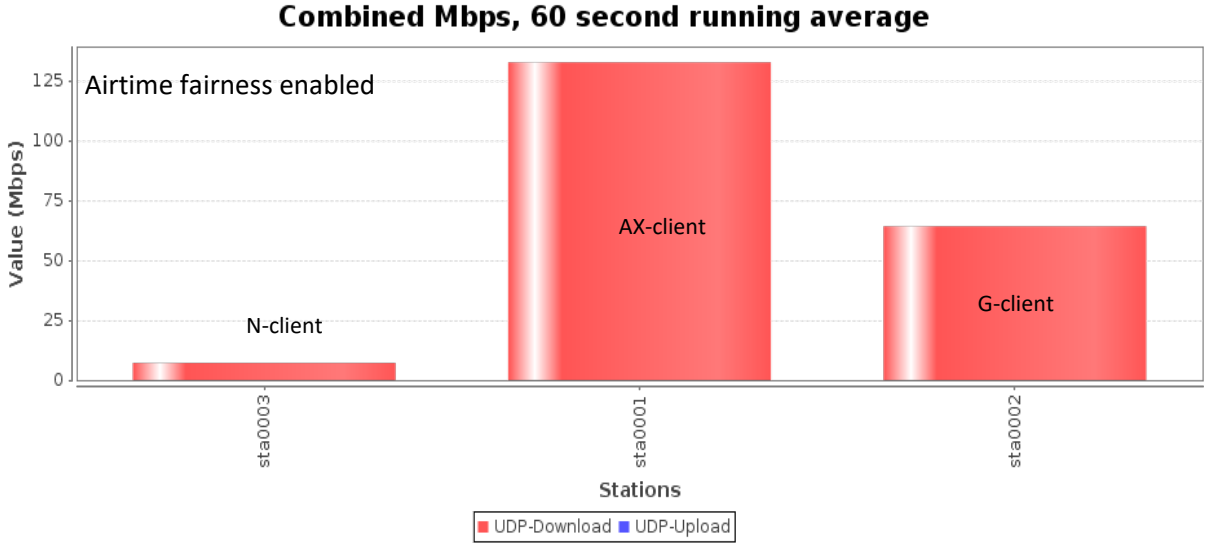
AC-client



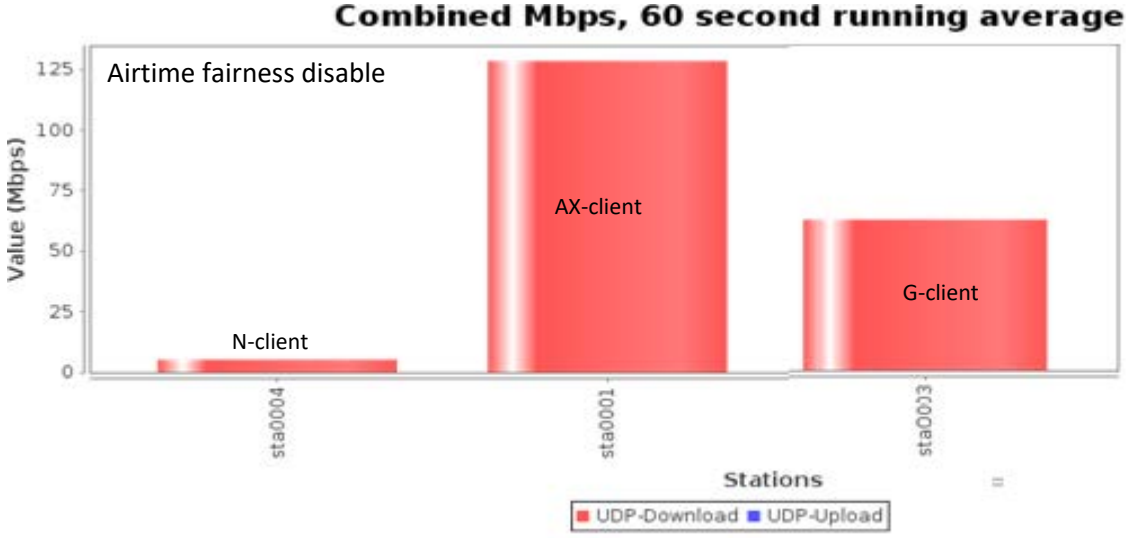
Airtime Fairness : UDP-DL[2.4GHz]

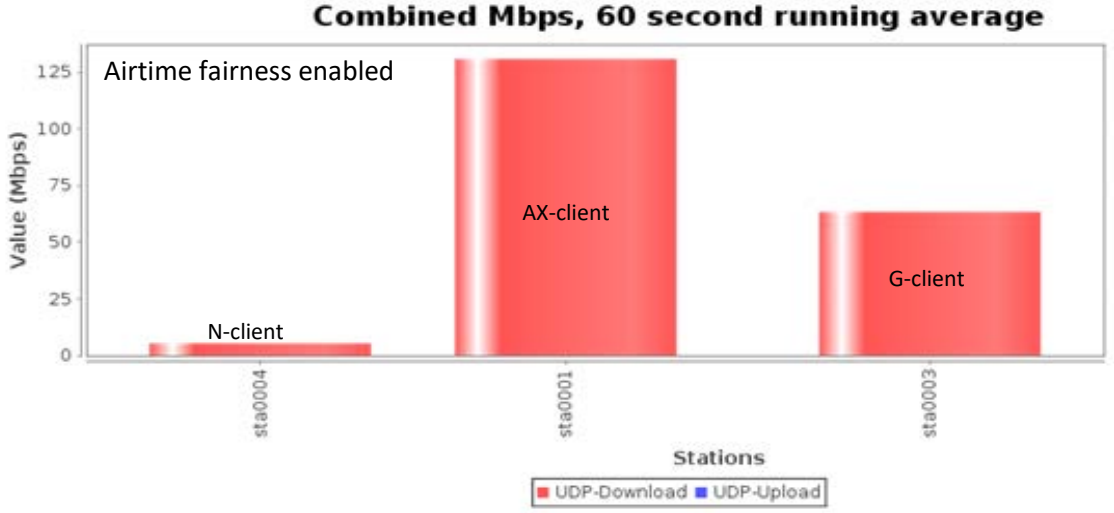
Vendor-A



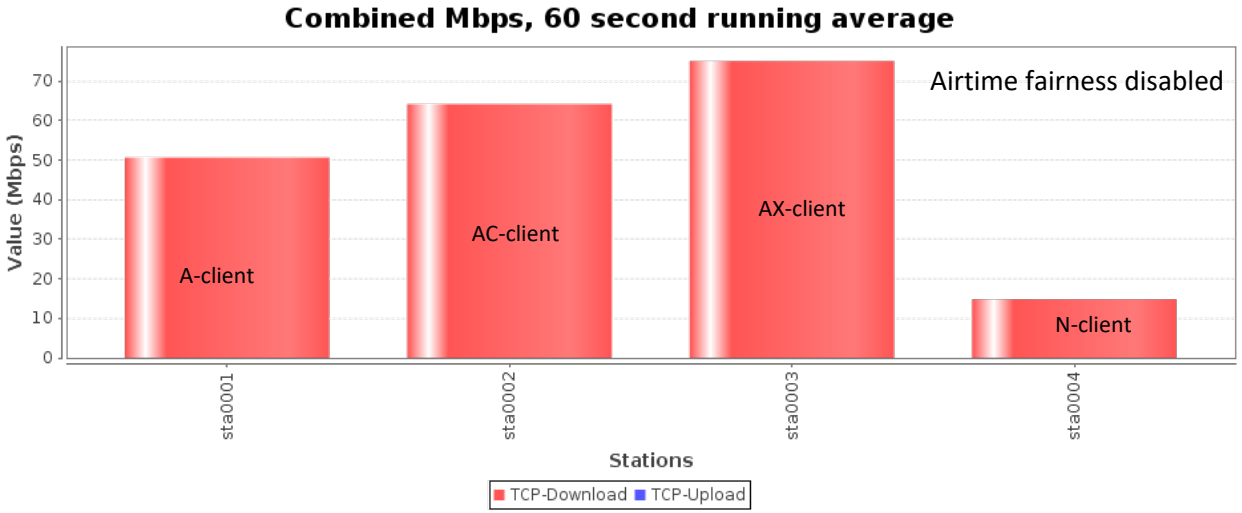


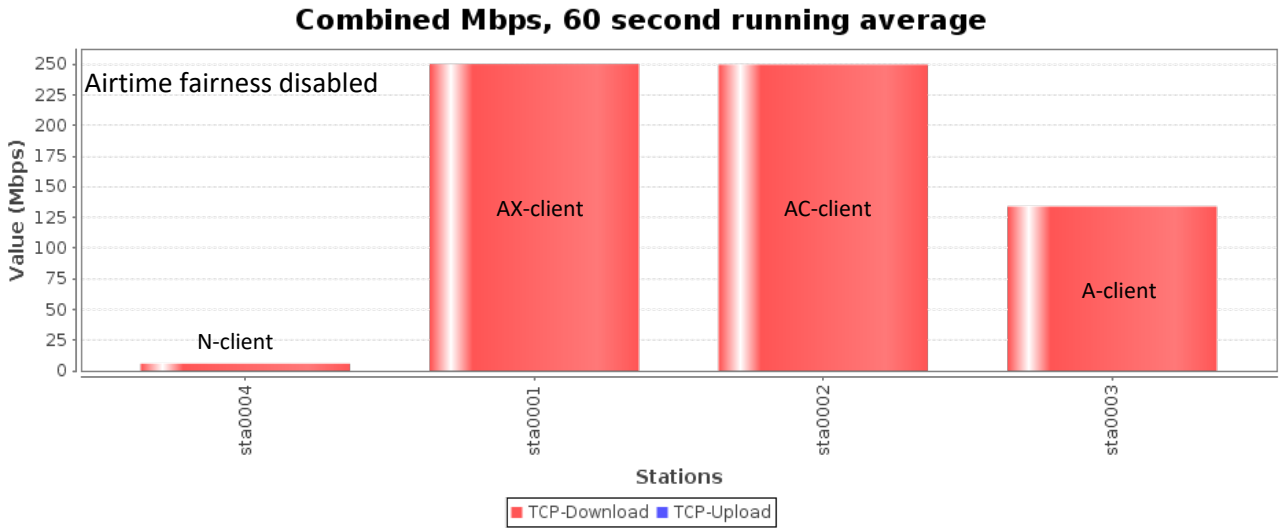
Vendor-B

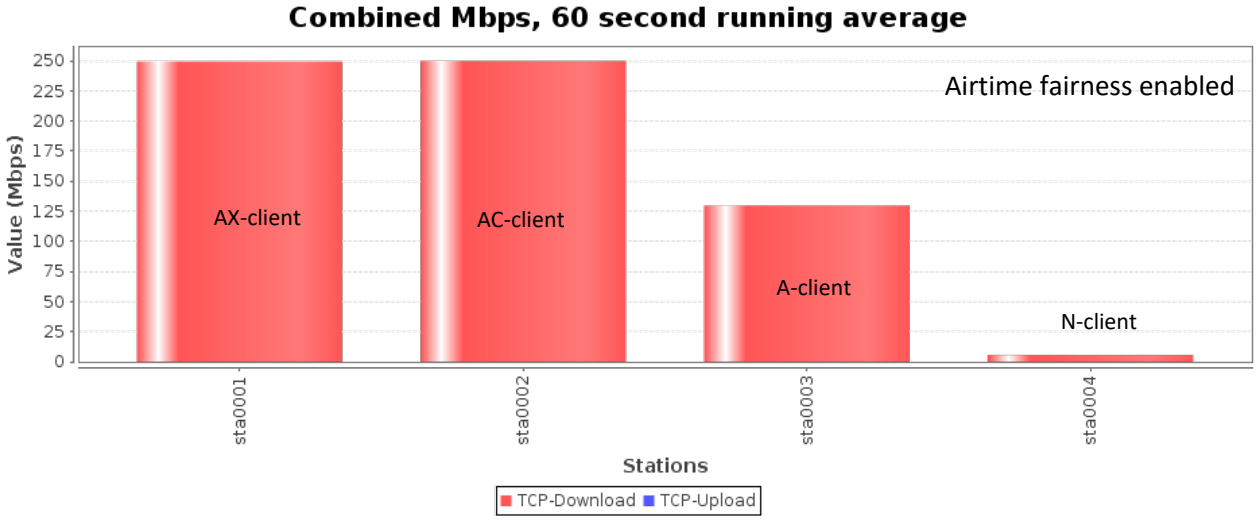


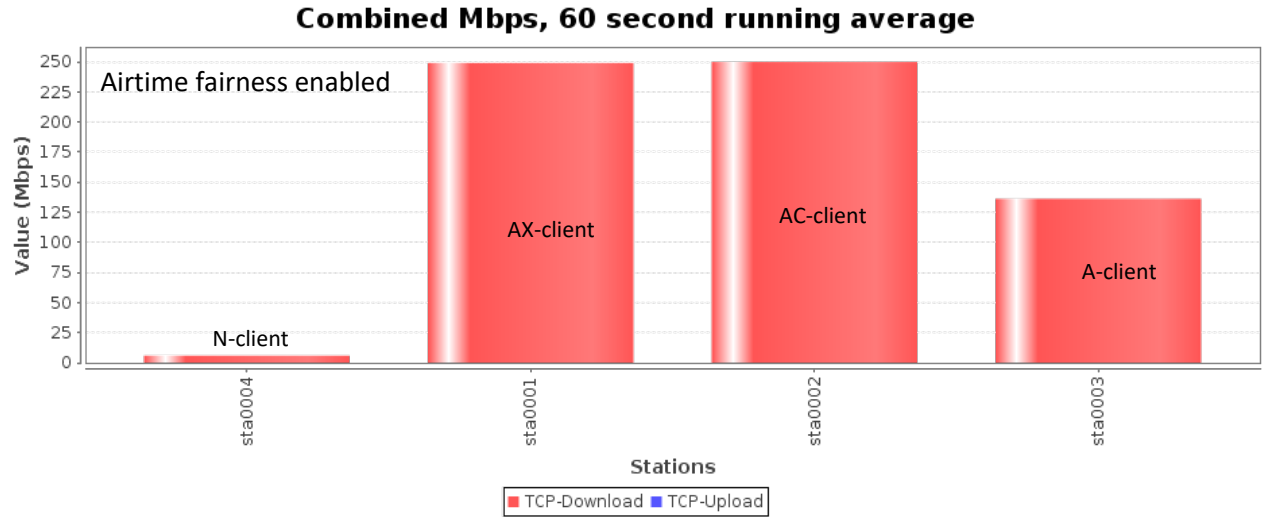


Airtime Fairness : TCP-DL[5GHz]

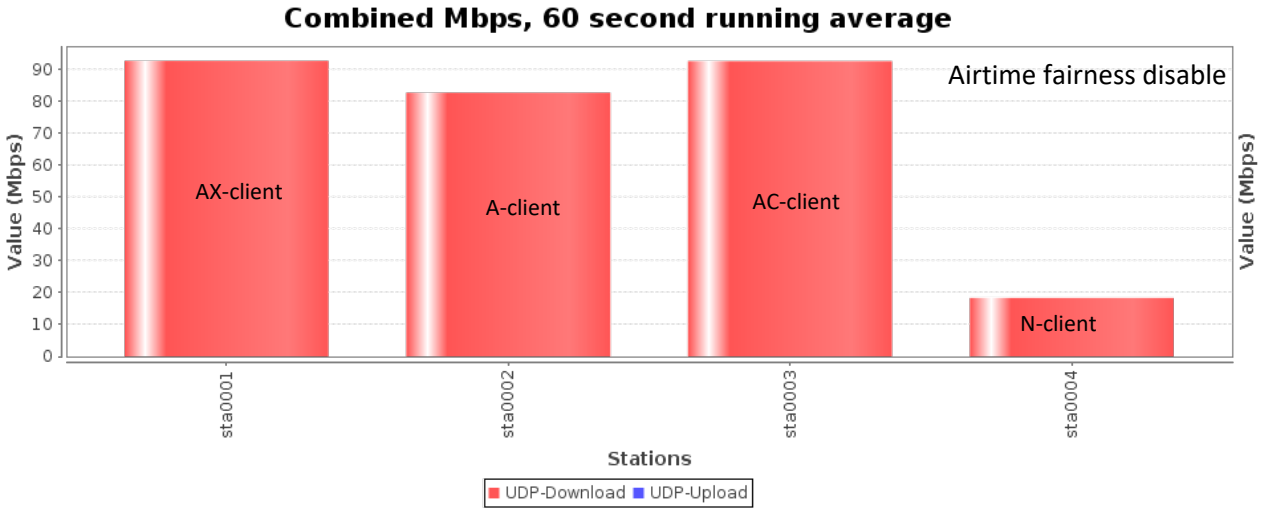


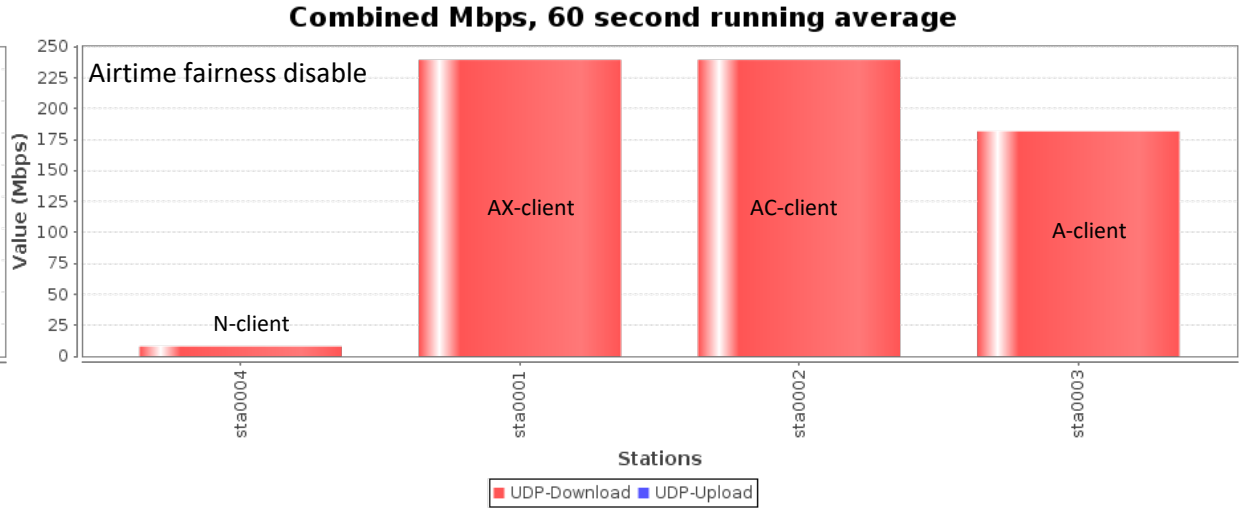


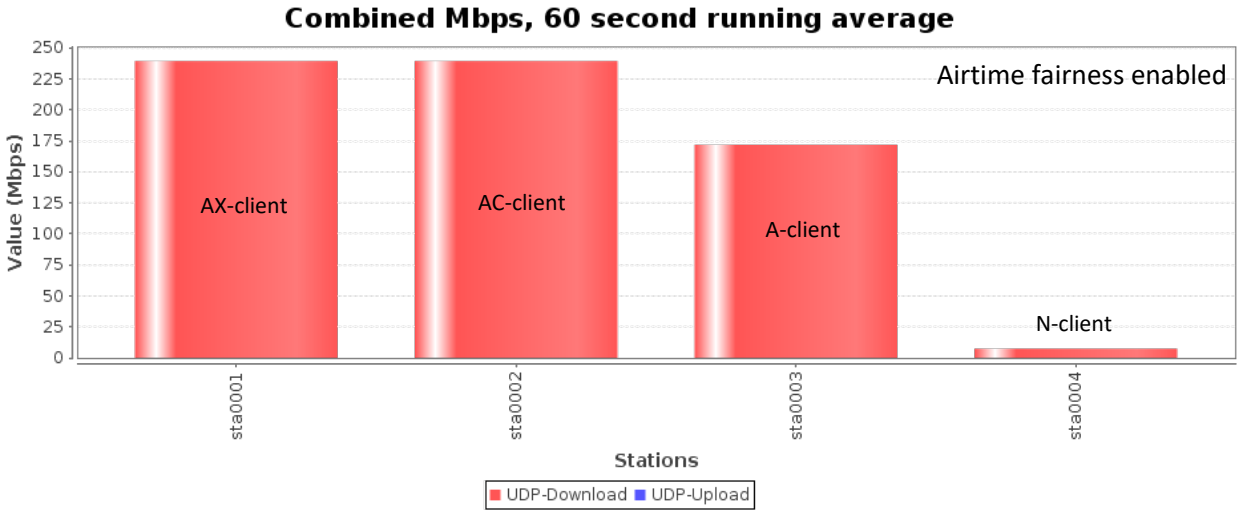


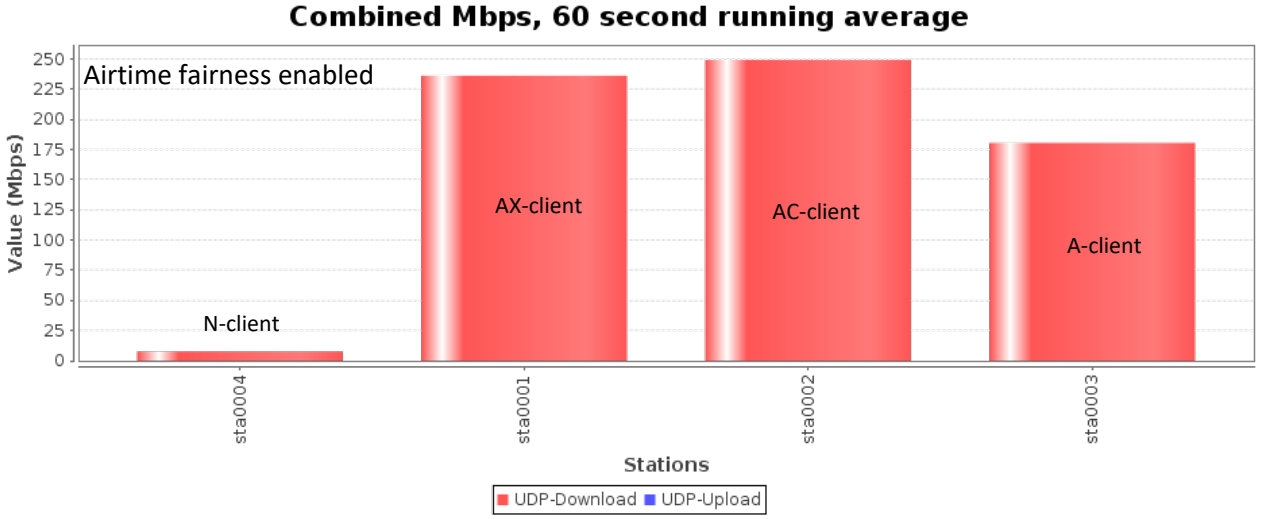


Airtime Fairness : UDP-DL[5GHz]

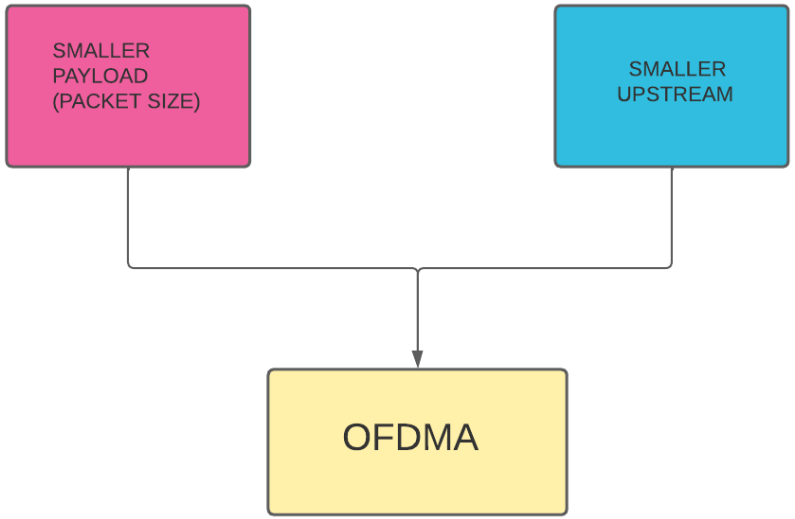








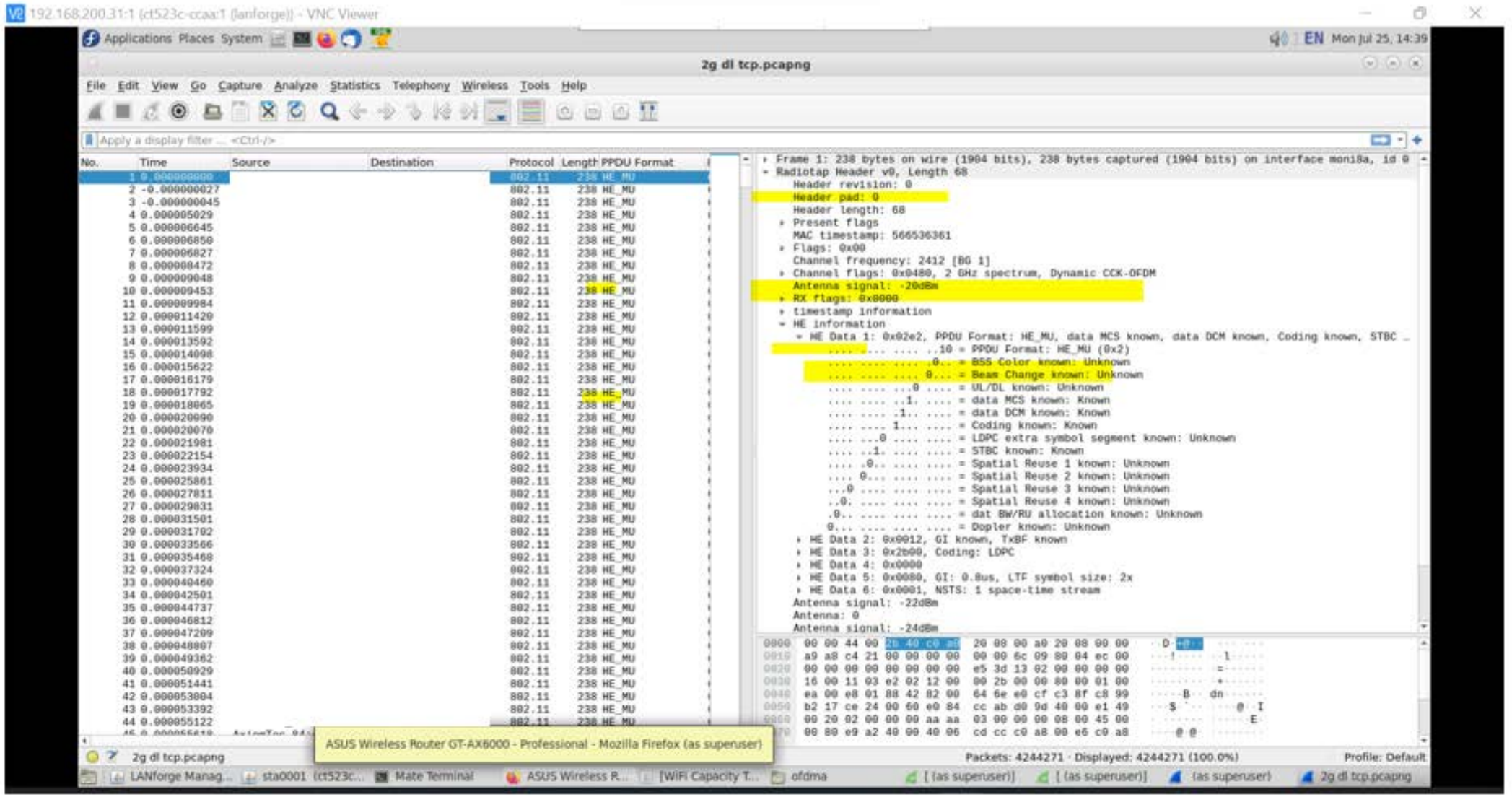
OFDMA testing:



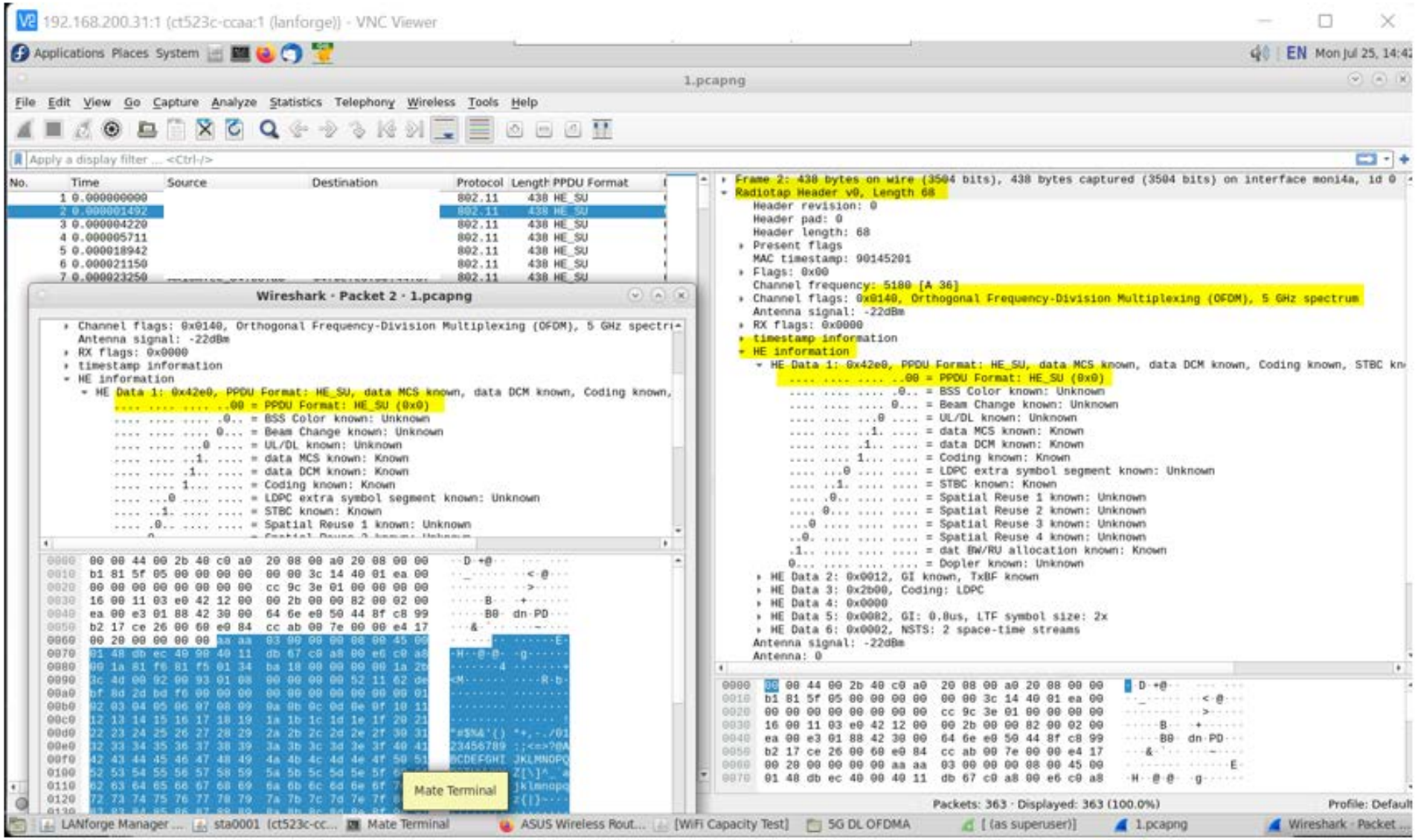
TEST PROCEDURE for OFDMA(Orthogonal Frequency Division Multiple Access):

- It works only for 802.11ax clients.
- We have fixed the packet size to 64 bytes, and the upstream traffic to 100mbps, such that we can create the perfect scenario and observe the wire-shark captures.
- The objective of the testcase is to check the captures and ensure we are getting HE_MU packets in data frames while we enable OFDMA, and HE_SU packets in data frames while we disable OFDMA, and observe the throughput variations.

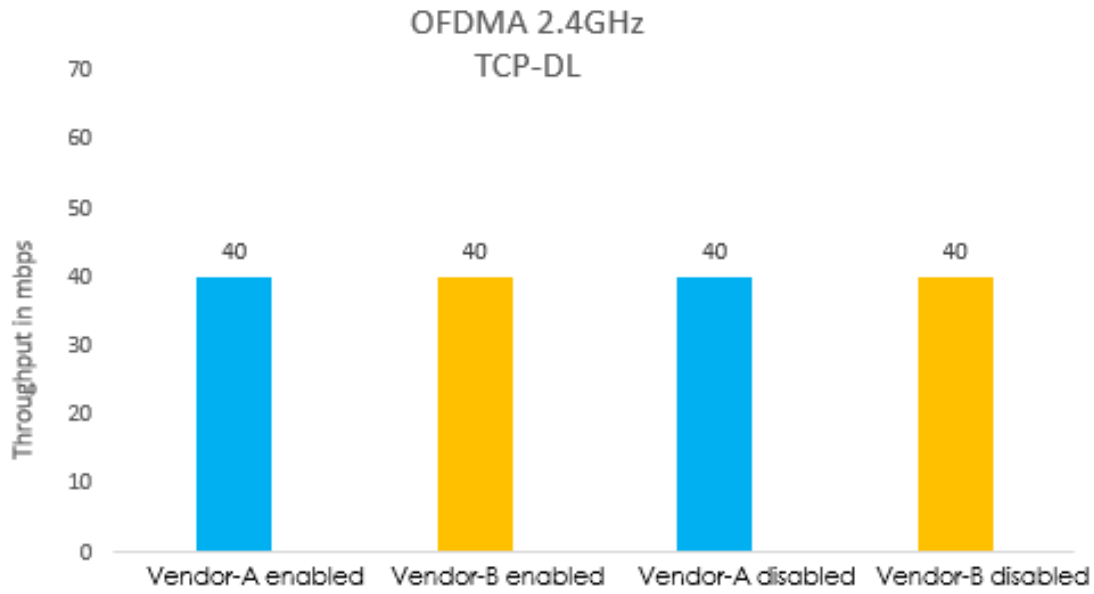
Wire-shark captures-OFDMA[Enabled].



Wire-shark captures-OFDMA[Disabled].



OFDMA: TCP-UL[2.4GHz]



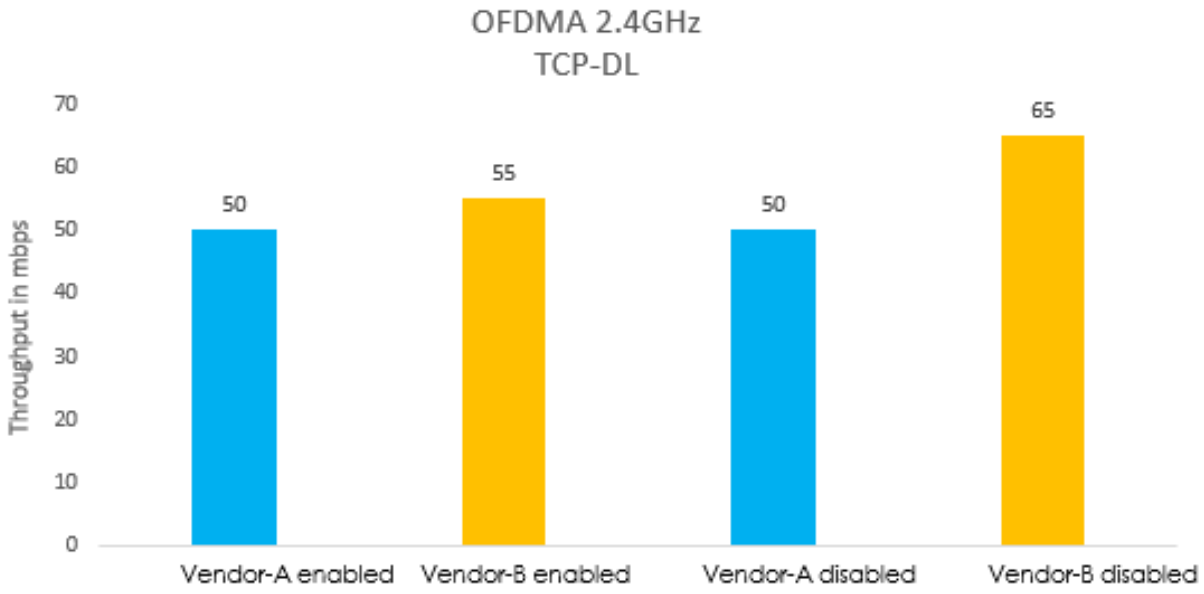
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The Vendor-B is also having no variation in the throughput at both the scenarios.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Both are showing similar outputs.

OFDMA: TCP-DL[2.4GHz]



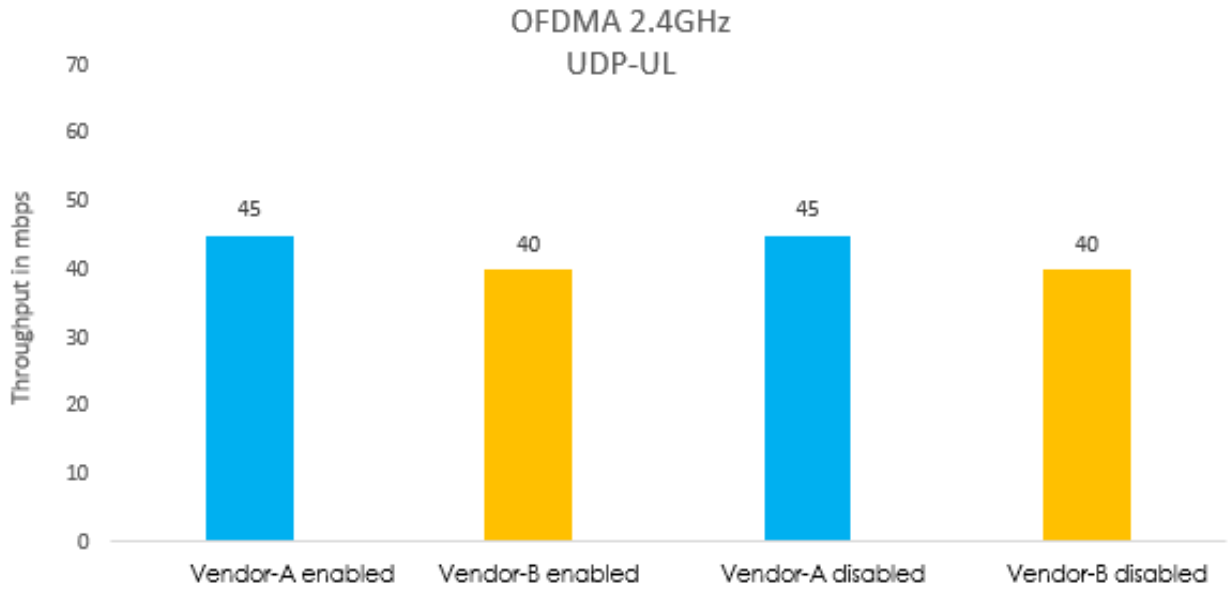
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The Vendor-B AP has OFDMA option and the throughput varies by enabling and disabling OFDMA

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- But Vendor-B is showing higher throughput.

OFDMA: UDP-UL[2.4GHz]



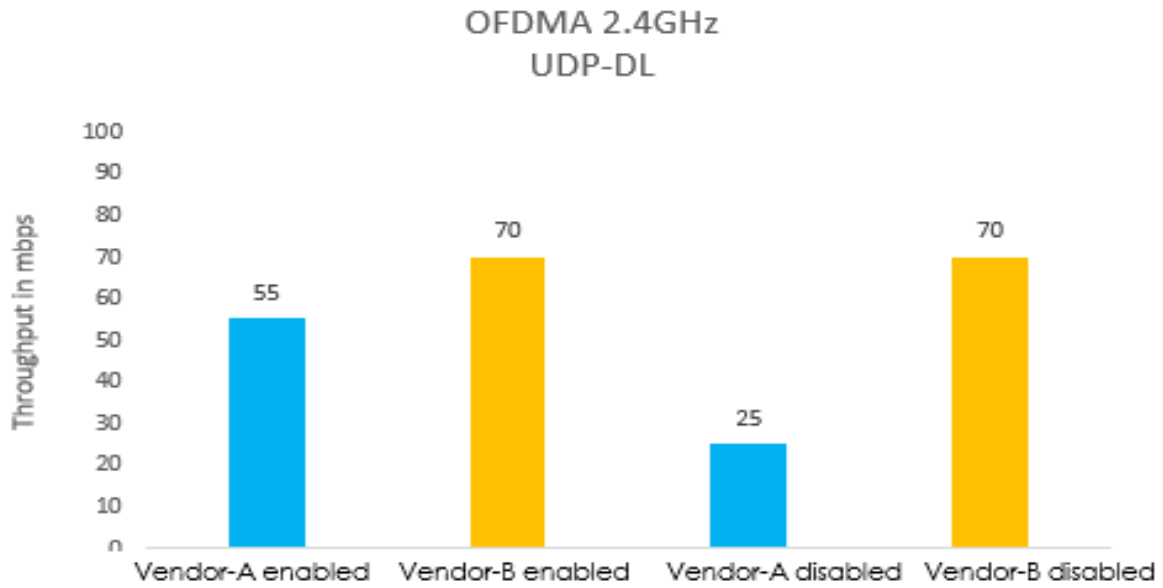
Test description:

- The OFDMA is by default enabled for Vendor-A, and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The Vendor-B has OFDMA option and the throughput varies by enabling and disabling OFDMA.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Vendor-A is working better in this scenario.

OFDMA: UDP-DL[2.4GHz]



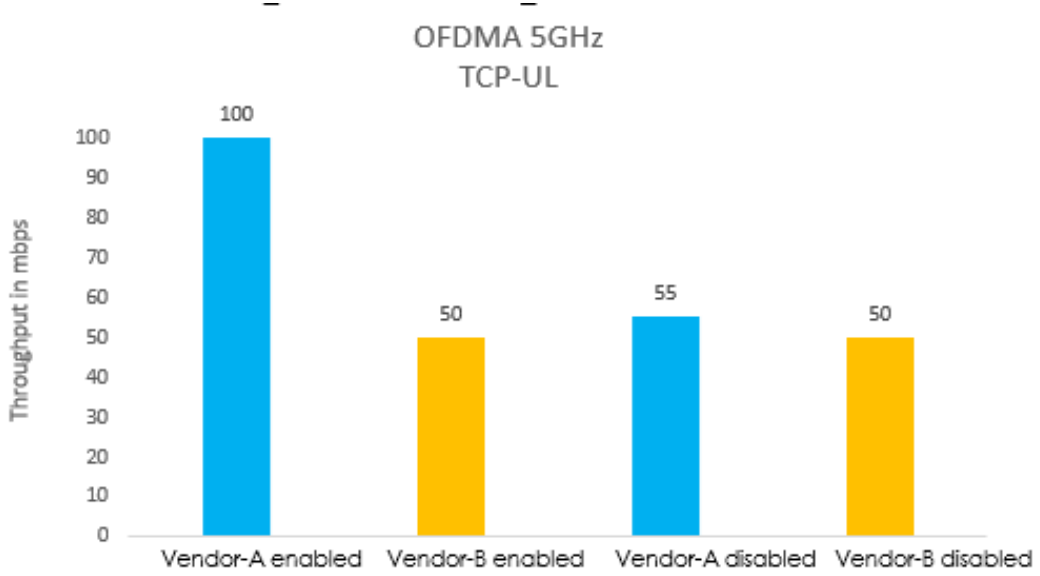
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The Vendor-B has OFDMA option and the throughput varies by enabling and disabling OFDMA.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- But Vendor-B is showing higher throughput.

OFDMA: TCP-UL[5GHz]



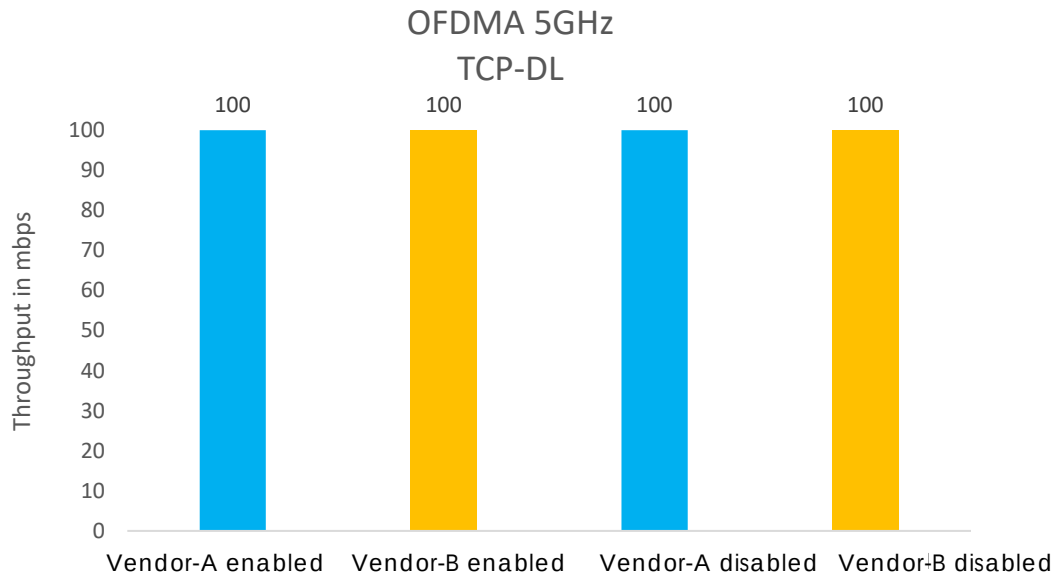
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The maximum throughput is around 70mbps as we have set the upstream traffic is 100mbps.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Vendor-A is showing higher throughput.

OFDMA: TCP-DL[5GHz]



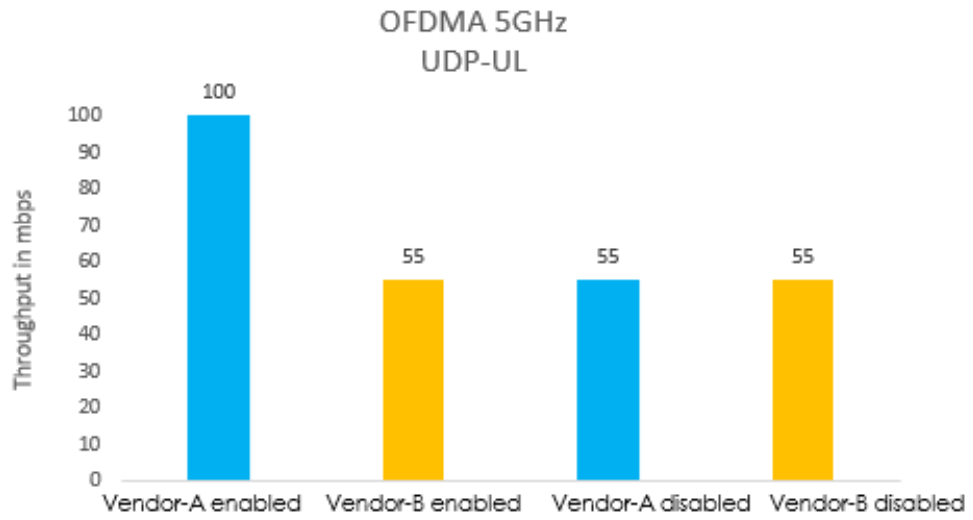
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The maximum throughput is around 70mbps as we have set the upstream traffic is 100mbps.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Both are showing similar higher throughput.

OFDMA: UDP-UL[5GHz]



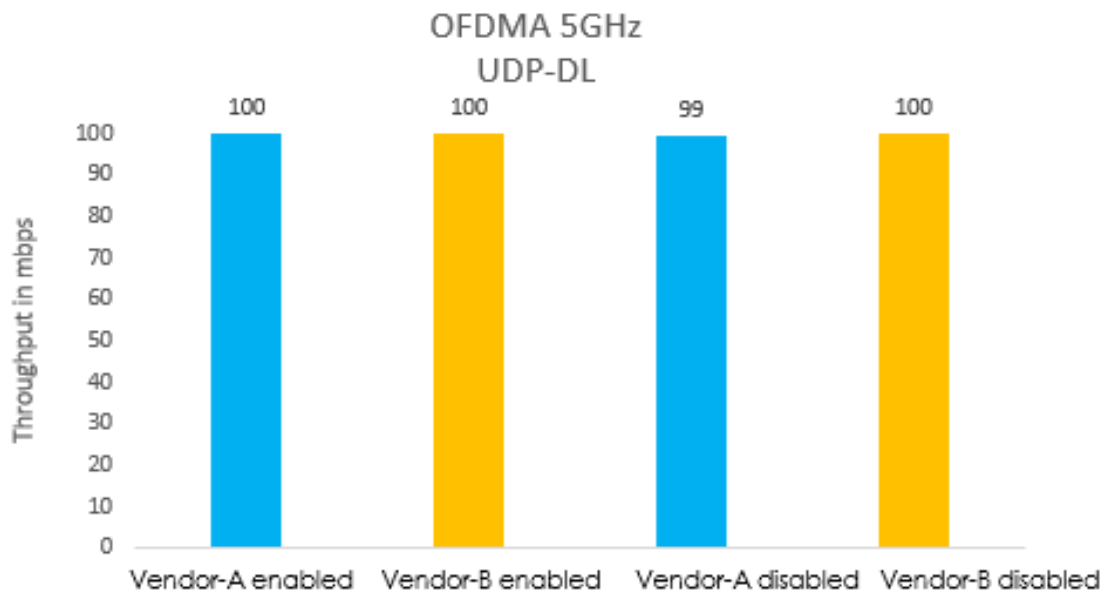
Test description:

- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The maximum throughput is around 70mbps as we have set the upstream traffic is 100mbps.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Vendor-A is showing higher throughput.

OFDMA: UDP-DL[5GHz]



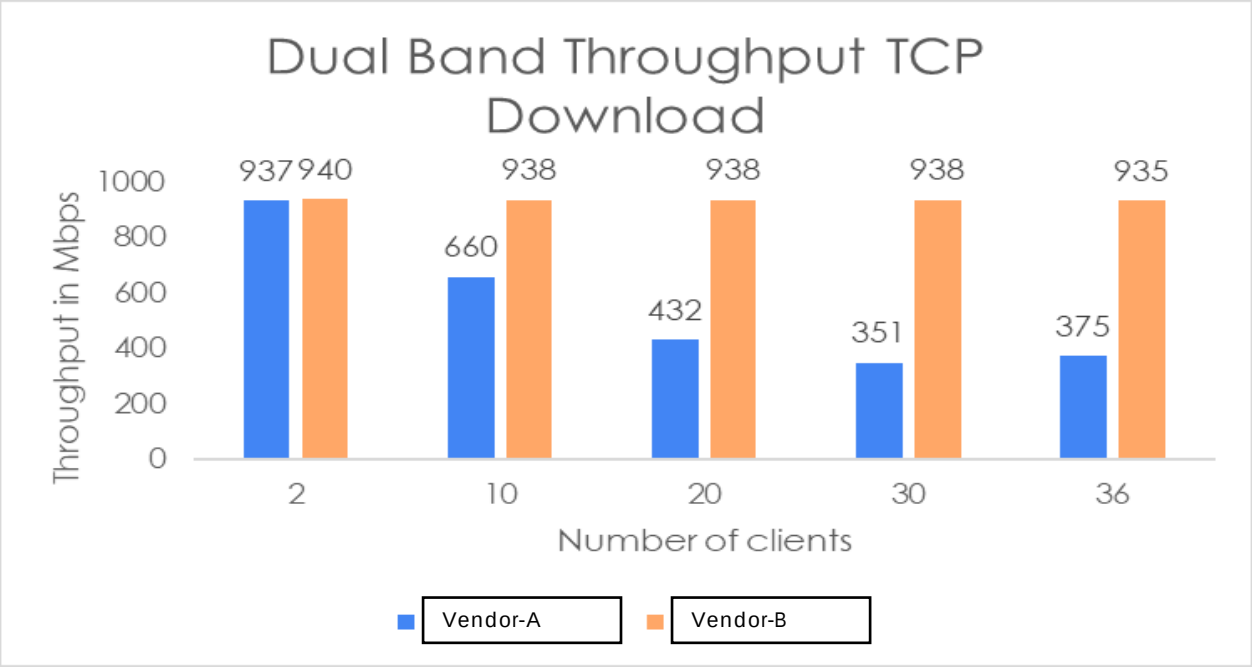
Test description:

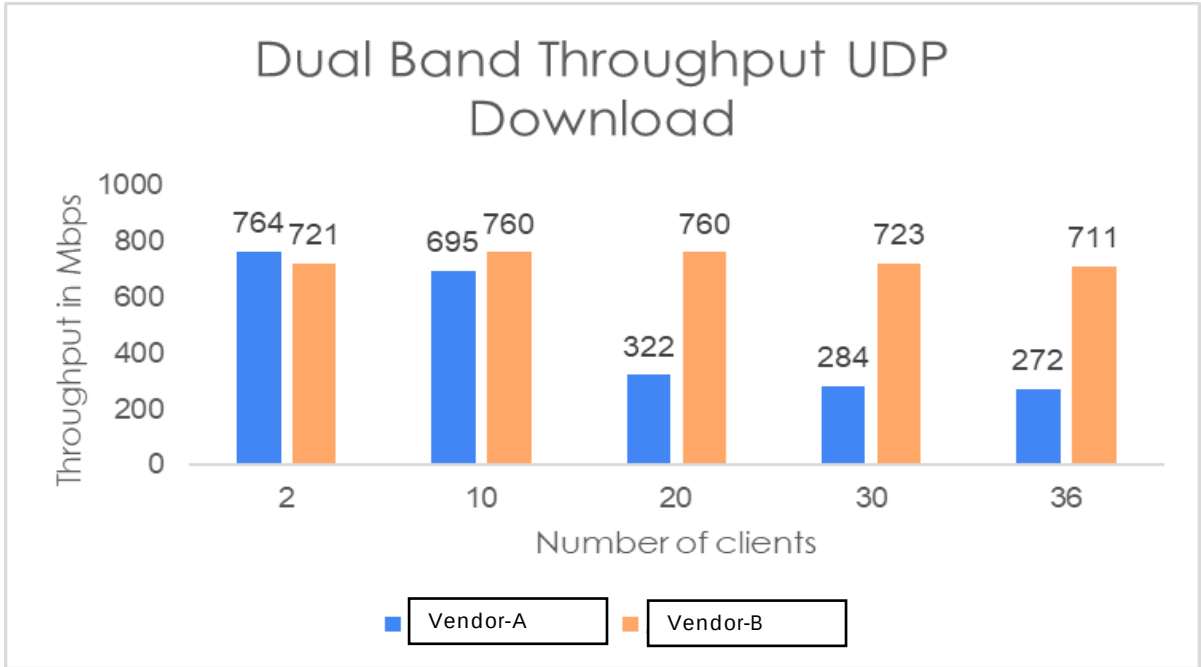
- The OFDMA is by default enabled for Vendor-A , and we use the CLI commands to disable the OFDMA.
- The throughput has no variation in both the cases.
- The maximum throughput is around 70mbps as we have set the upstream traffic is 100mbps.

Result observations:

- Both the CPE's are showing HE_MU packets when OFDMA is enabled .
- Both are showing similar throughput.

Dual Band Performance Test





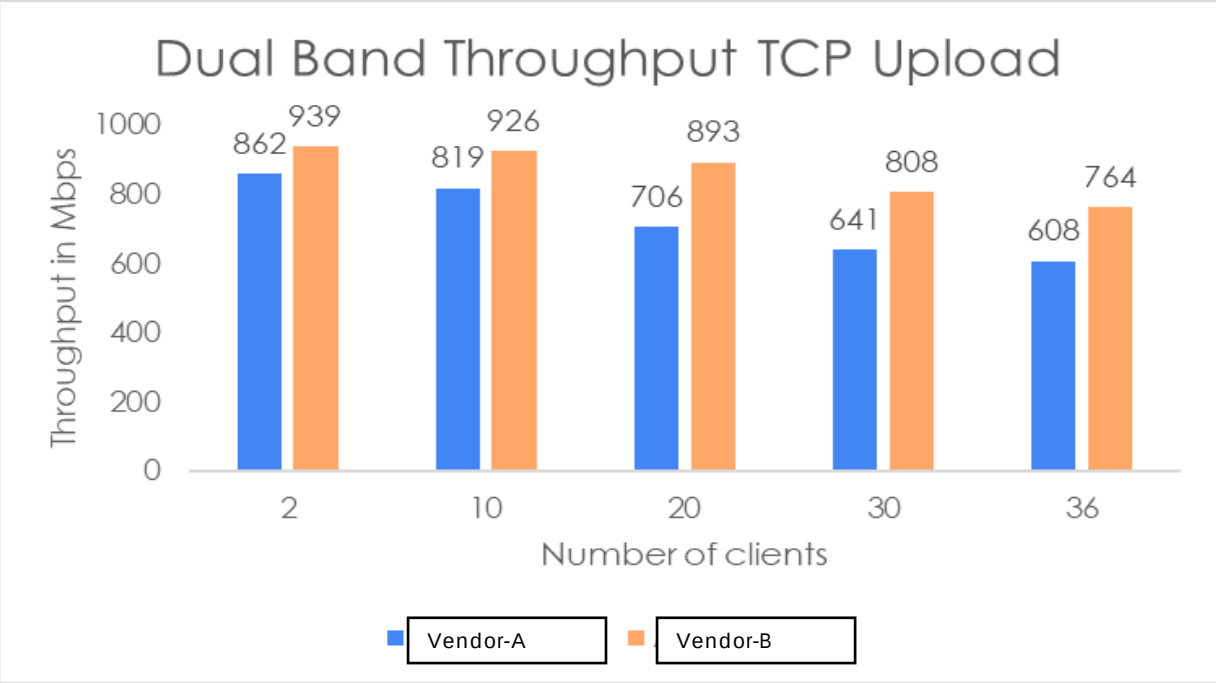
Test Description:

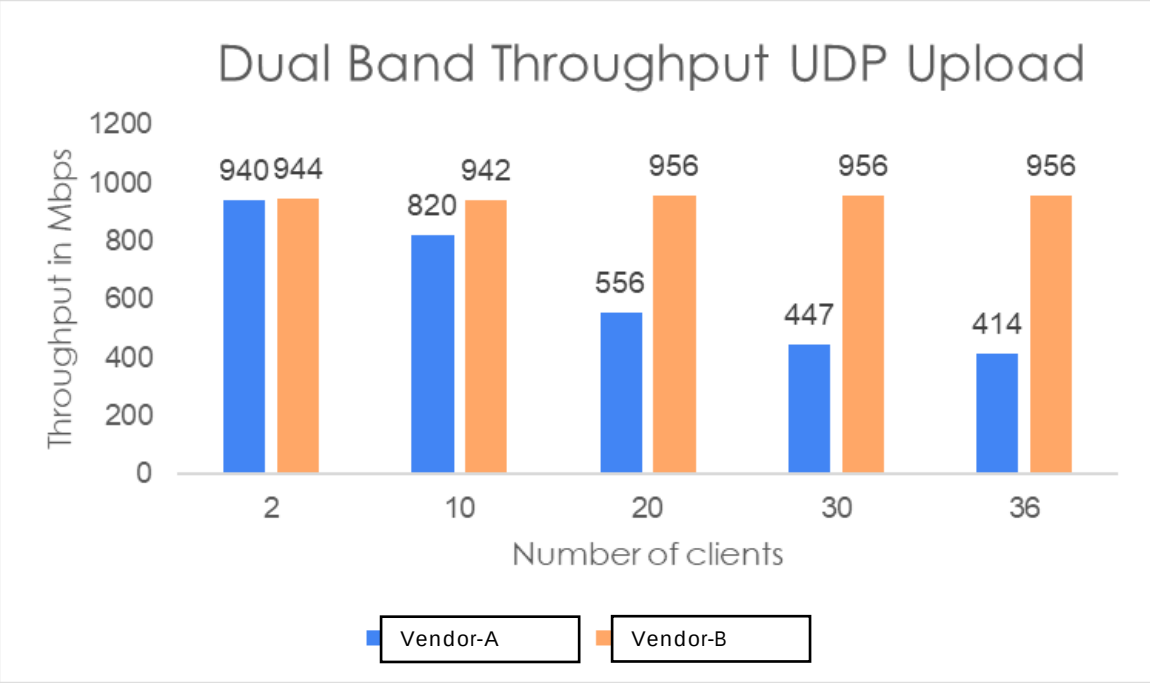
- All 2.4 GHz clients are connected in 3*3 with ax mode. All the 5 GHz clients are connected in 4*4 with ax mode.
- Traffic is running parallelly on both bands.

Results Observations:

- With Vendor-B is giving better throughput.

Dual Band Performance Test





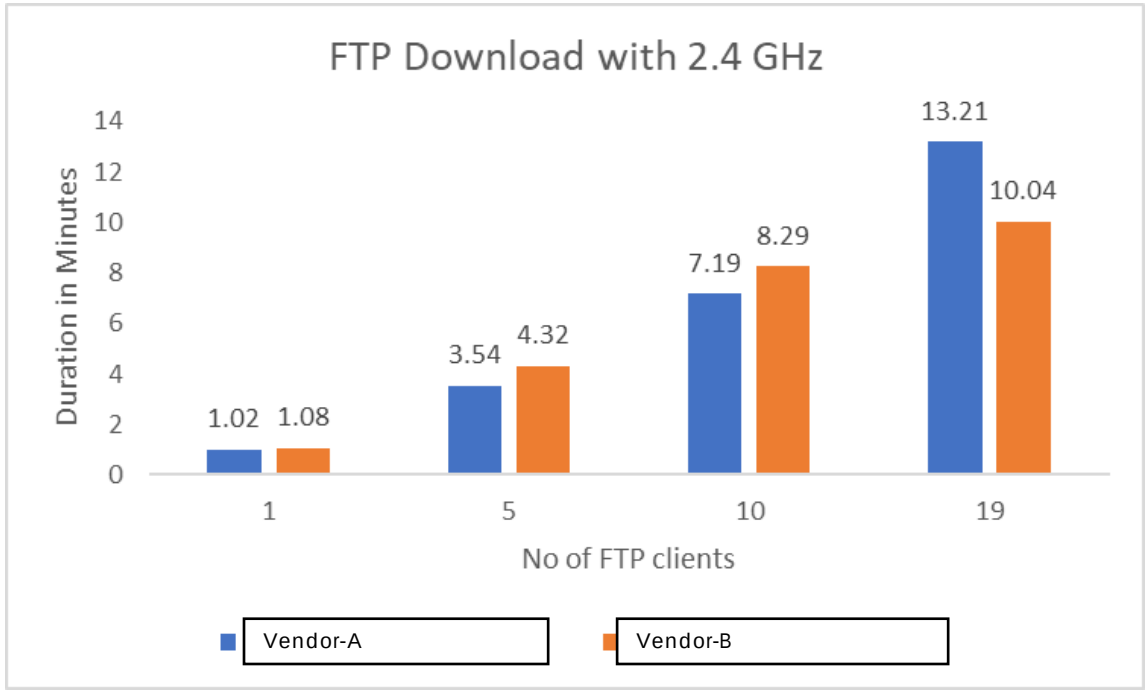
Test Description:

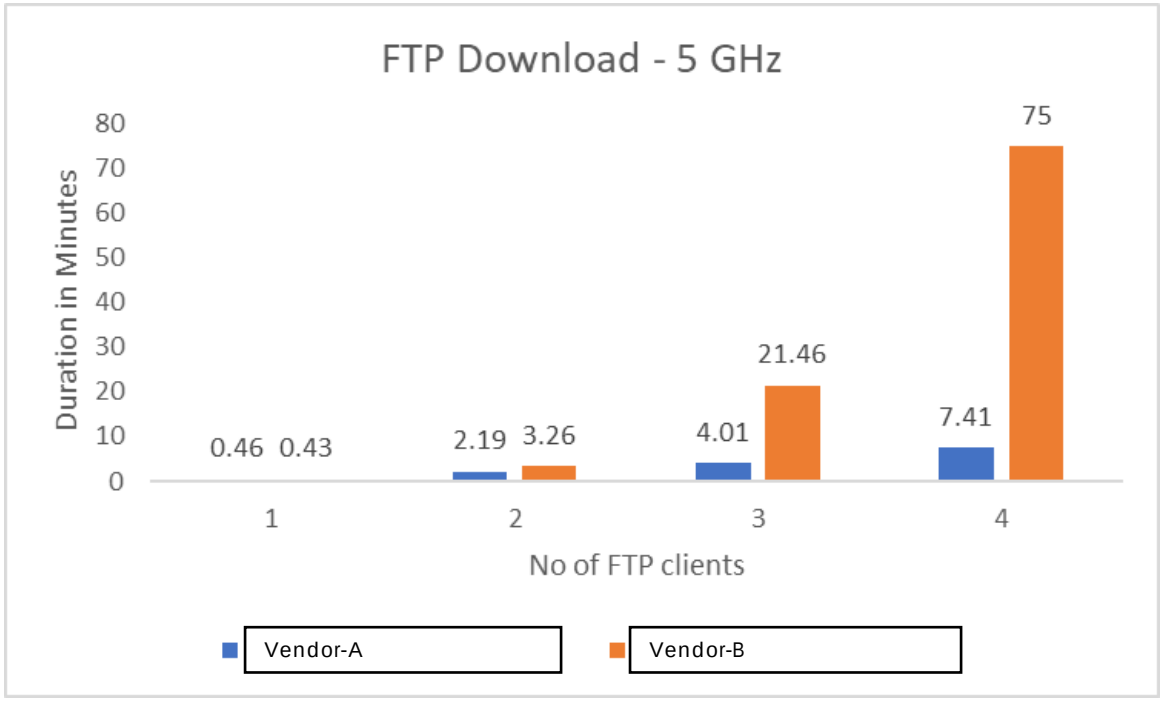
- All 2.4 GHz clients are connected in 3*3 with ax mode. All the 5 GHz clients are connected in 4*4 with ax mode.
- Traffic is running parallelly on both bands.

Results Observations:

- With Vendor-B is giving better throughput.

File Transfer Protocol Testing





Test Description:

- All 2.4 GHz clients are connected in 3*3 with ax mode. All the 5 GHz clients are connected in 4*4 with ax mode.
- FTP file (1GB) is transferred from server to wireless client

Results Observations:

- With Vendor-B is performing better with respect of transferring files in 5 GHz mode

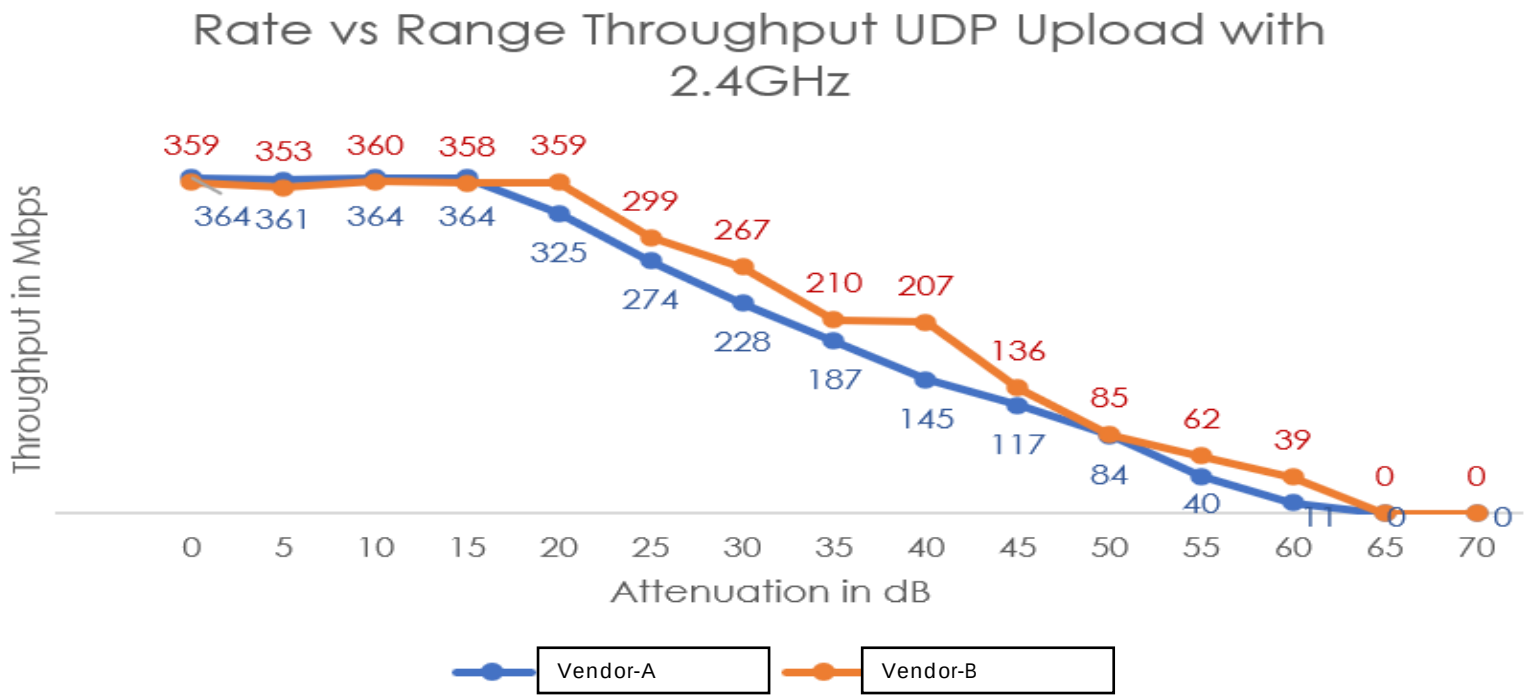
Dynamic Frequency Selection

DFS Channels	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140
Radar Detected	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Channel Shifted	48	40	157	157	157	140	140	144	56	48	36	36	144	144	44

Test Description:

- Clients connected in 5 GHz with 20 MHz band with radar type used here is FCC0

Rate Vs Range – 2.4GHz UDP Upload



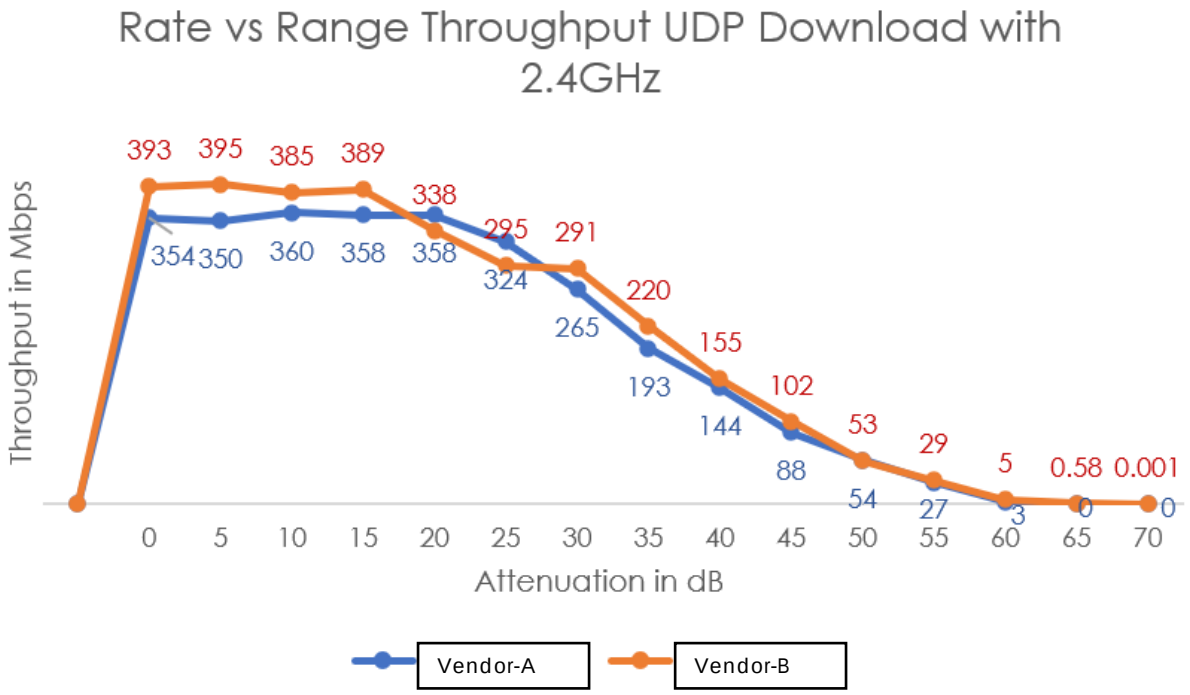
Test Description:

- In this scenario, Station associated and start running traffic when attenuation is 0 dB and gradually increase attenuation 5 dB steps.
- Intended load is set to 1 Gbps with UDP upload traffic with client3NSS, 20Mhz BW in AX mode.
- Traffic from Client to AP and throughput test run in 2.4GHz on channel 1.

Results Observations:

- Vendor-B has more RSSI at zero attenuation compared to Vendor-A.
- Vendor-B is getting more throughput with the increase in attenuation than Vendor-A.
- Vendor-A, Vendor-B have disconnected after 60dB.

Rate vs Range – 2.4GHz UDP Download



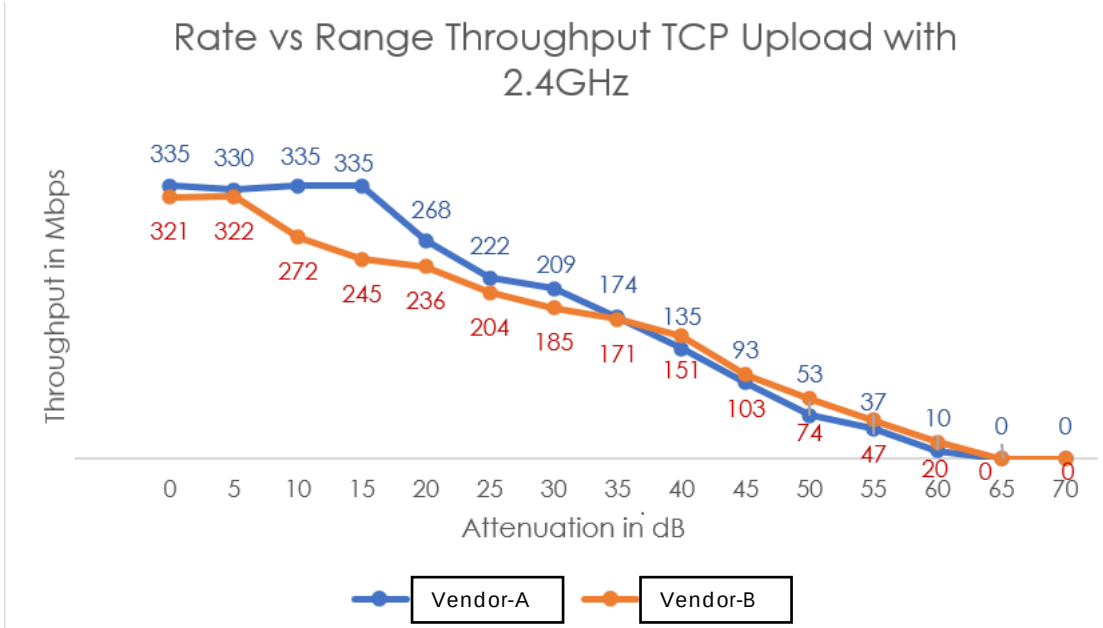
Test Description:

- In this scenario, Station associated and start running traffic when attenuation is 0 dB and gradually increase attenuation 5 dB steps.
- Intended load is set to 1 Gbps with UDP download traffic with client3NSS, 20Mhz BW in AX mode.
- Traffic from AP to client and throughput test run in 2.4GHz on channel 1.

Results Observations:

- Vendor-B has good RSSI at zero attenuation compared to Vendor-A
  Vendor-B is getting more throughput with zero attenuation than Vendor-A.
- Vendor-A, Vendor-B have disconnected after 60dB.

Rate vs Range – 2.4GHz TCP Upload



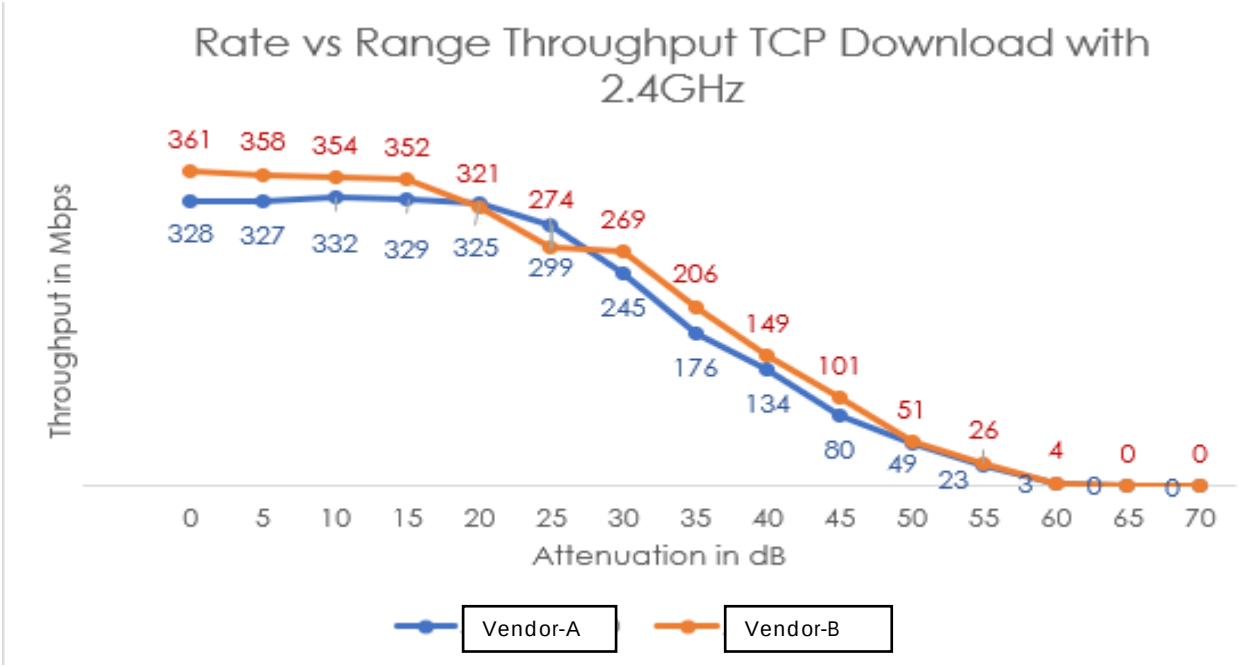
Test Description:

- In this scenario, Station associated and start running traffic when attenuation is 0 dB and gradually increase attenuation 5 dB steps.
- Intended load is set to 1 Gbps with TCP upload traffic with client3NSS, 20Mhz BW in AX mode.
- Traffic from client to AP and throughput test run in 2.4GHz on channel 1.

Results Observations:

- Vendor-B has more RSSI at zero attenuation compared to Vendor-A.
- Vendor-A is getting more throughput with zero attenuation than Vendor-B.
- Vendor-A, Vendor-B have disconnected after 60dB.

Rate vs Range – 2.4GHz TCP Download



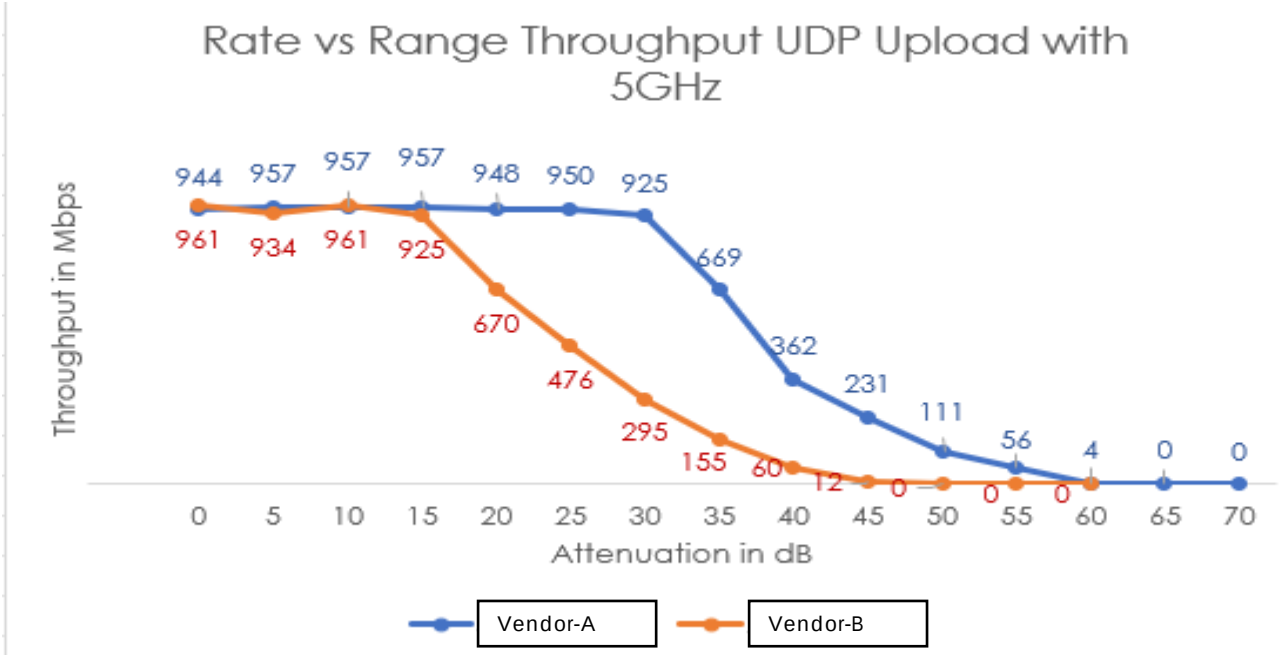
Test Description:

- In this scenario, Station associated and start running traffic when attenuation is 0 dB and gradually increase attenuation 5 dB steps.
- Intended load is set to 1 Gbps with TCP download traffic with client3NSS, 20Mhz BW in AX mode.
- Traffic from AP to client and throughput test run in 2.4GHz on channel 1.

Results Observations:

- Vendor-B is getting more throughput with increase in attenuation than Vendor-A.
- Vendor-A, Vendor-B have disconnected after 60dB.

Rate vs Range – 5GHz UDP Upload



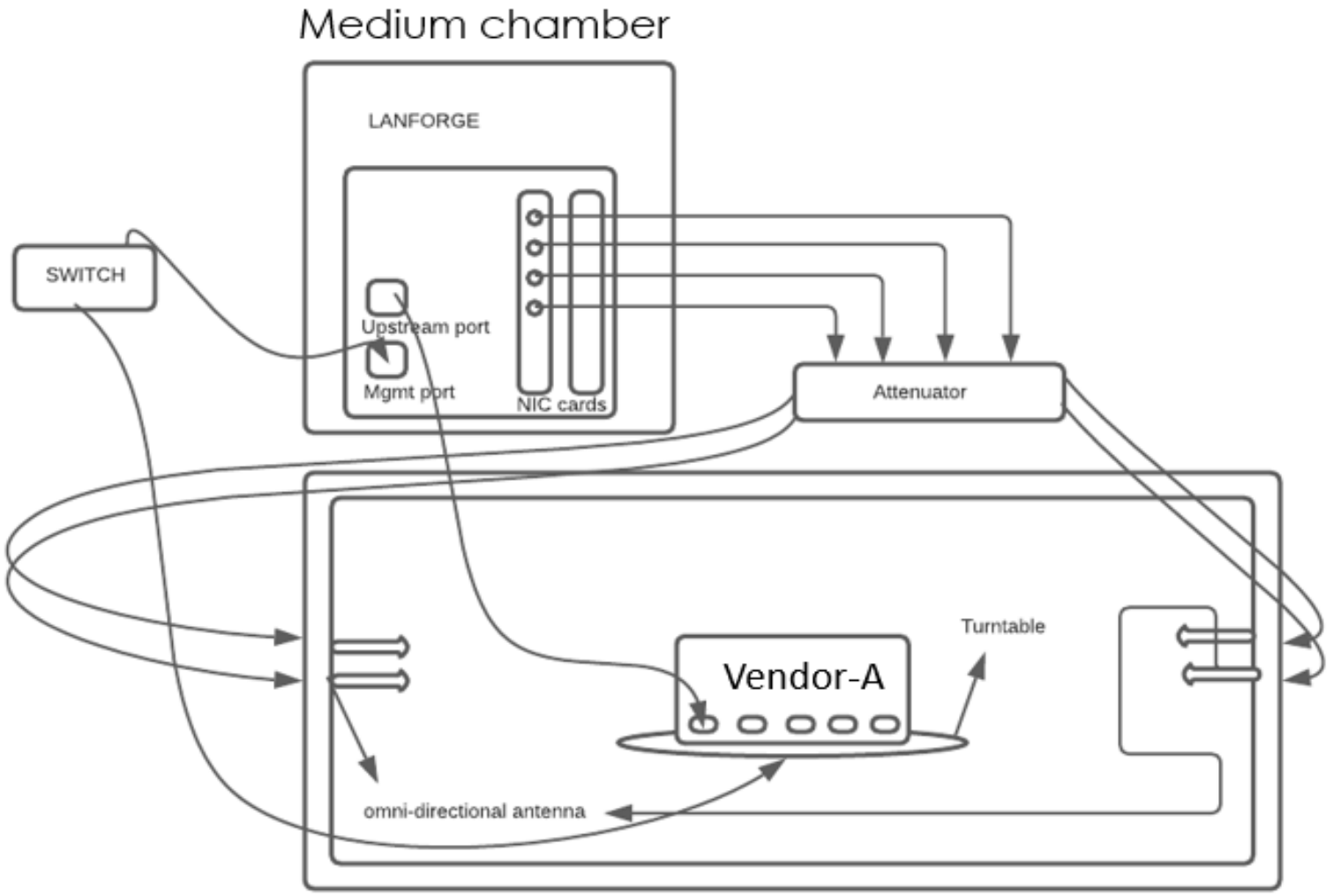
Test Description:

- In this scenario, Station associated and start running traffic when attenuation is 0 dB and gradually increase attenuation 5 dB steps.
- Intended load is set to 1 Gbps with UDP Upload traffic with client 4NSS, 80Mhz BW in AX mode.
- Traffic from client to AP and throughput test run in 5GHz on channel .

Results Observations:

- Vendor-B is getting more throughput with increase in attenuation than Vendor-A.
- Vendor-A, Vendor-B have disconnected after 60dB.

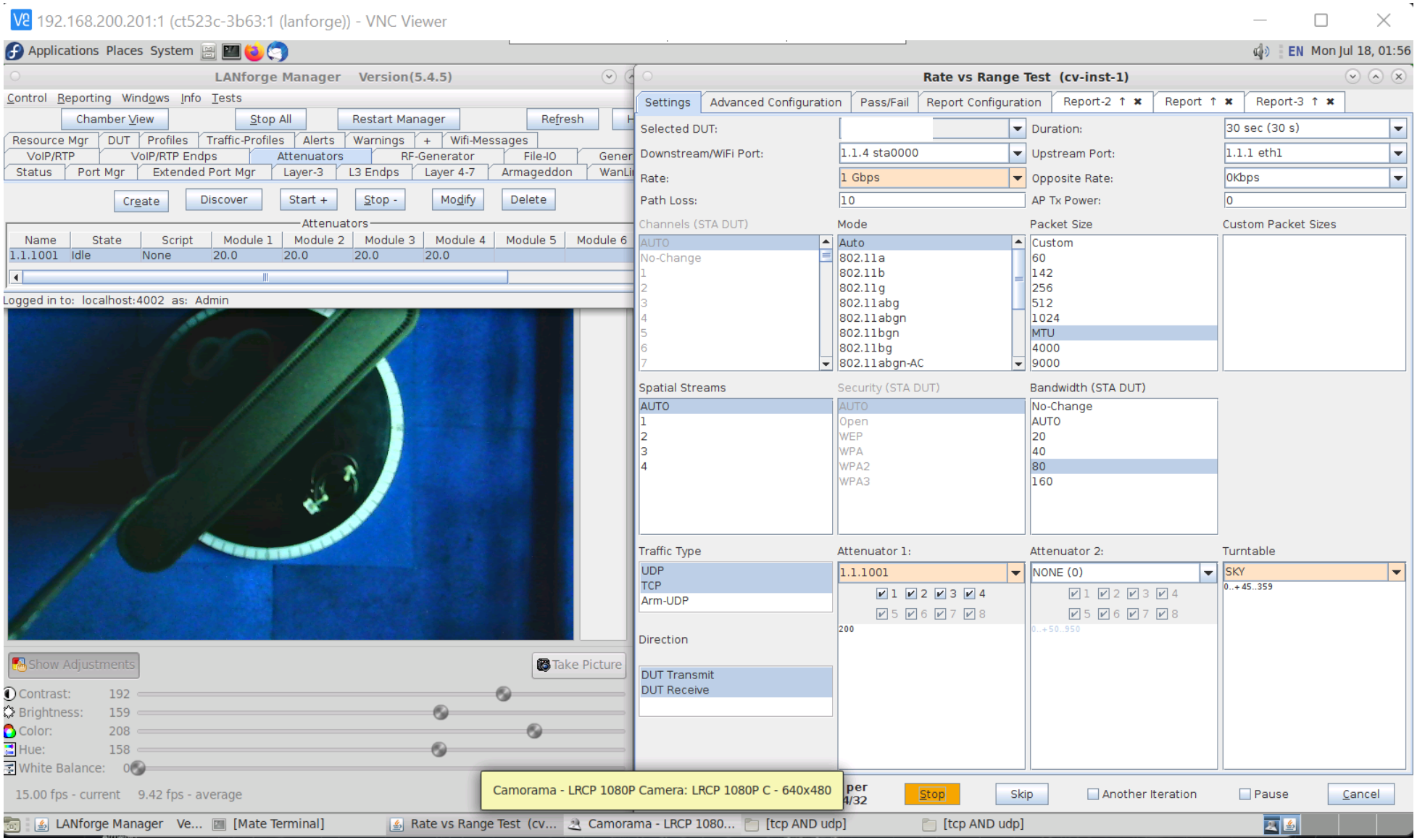
Testbed Setup for Rate vs Orientation:



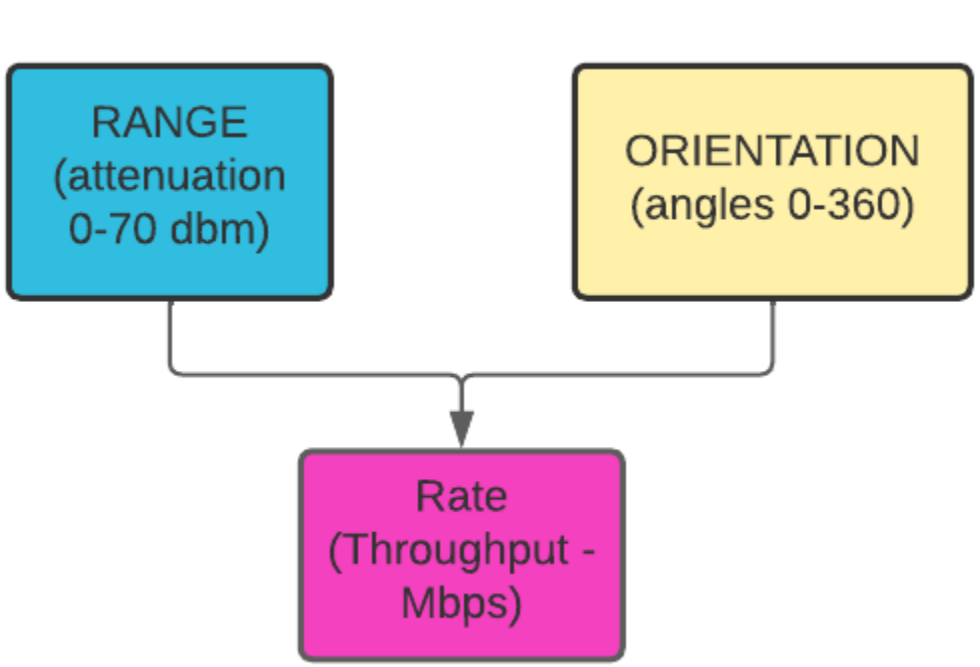
Large chamber with turntable

- We used MTK 4*4 Radios for this test.
- The attenuator which is used can provide maximum 95dbm.
- The turntable provides 0-359 degrees rotation.

Testing images:



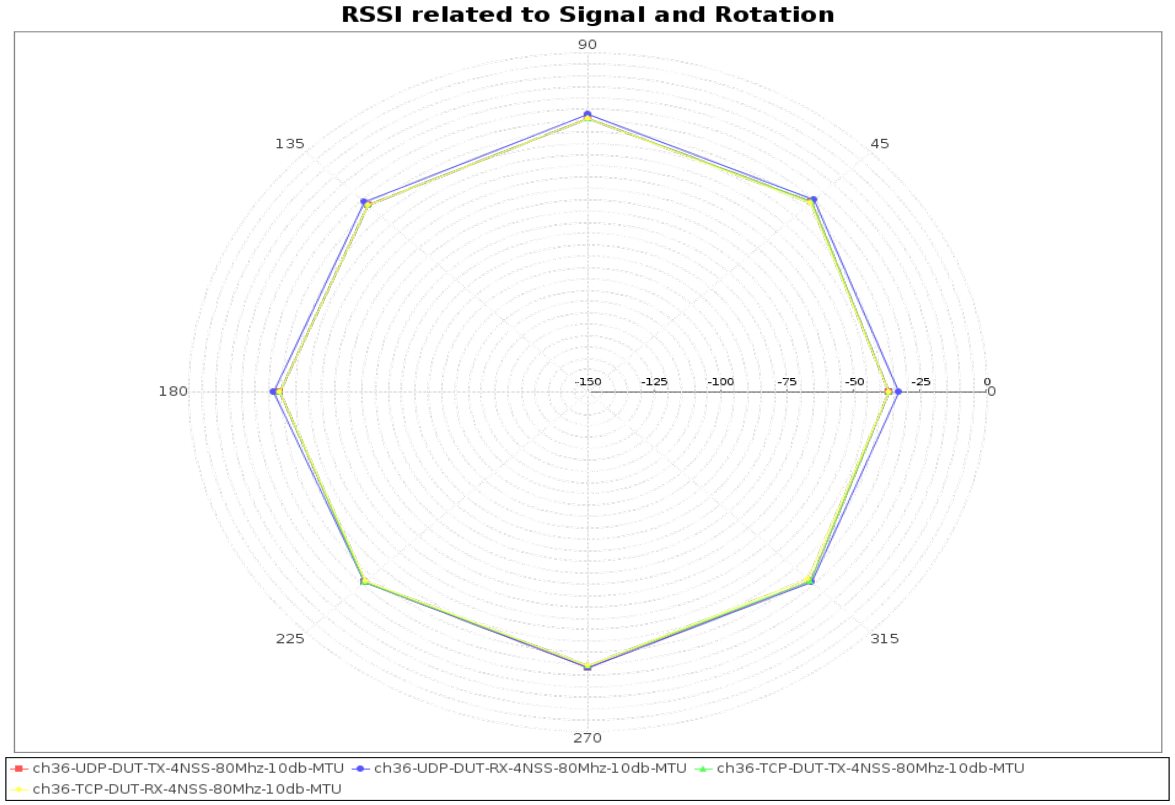
Rate vs Orientation test:



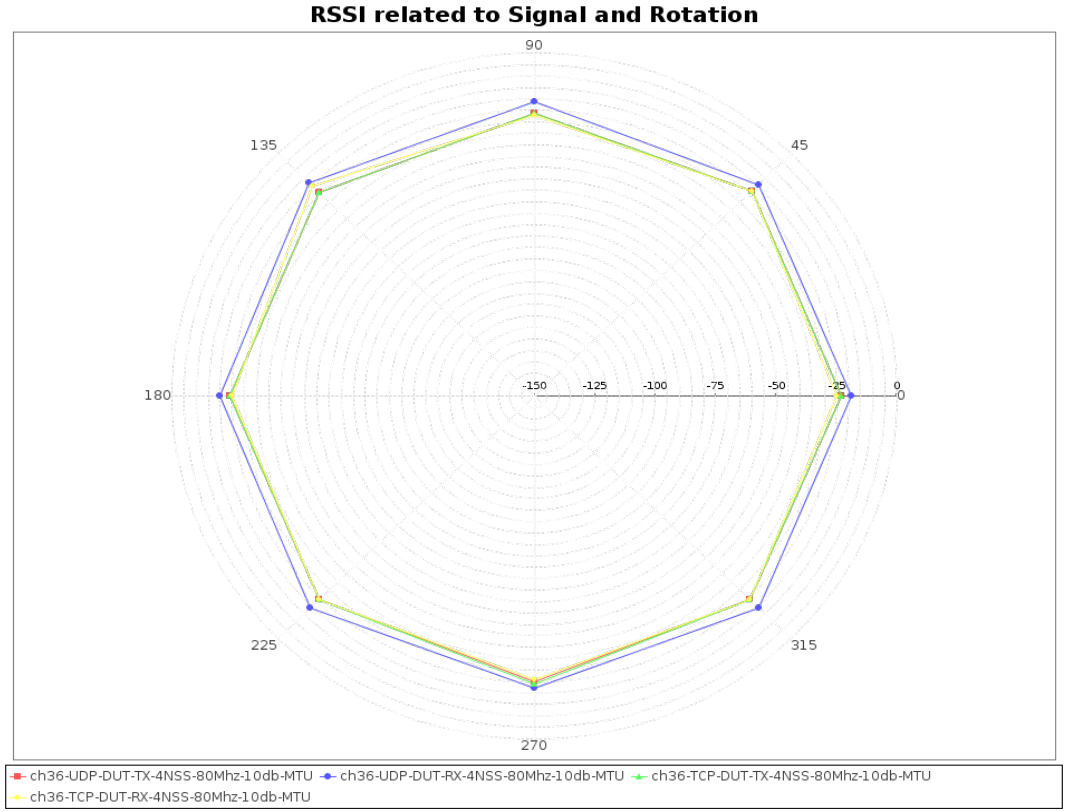
- Here we change both the distance and the angular position of the CPE and calculate the throughput.
- Changing the distance means in terms of increasing the attenuation.
- The maximum attenuation at which the client can connect to the CPE IS 60dbm.
- Changing the orientation means in terms of changing the angle of the turntable.
- The turntable can rotate from 0 to 360 degrees.
- We can run both the TCP and UDP traffics.

Rate vs Orientation test at 0db (5GHz):

Vendor-A



VENDOR-B



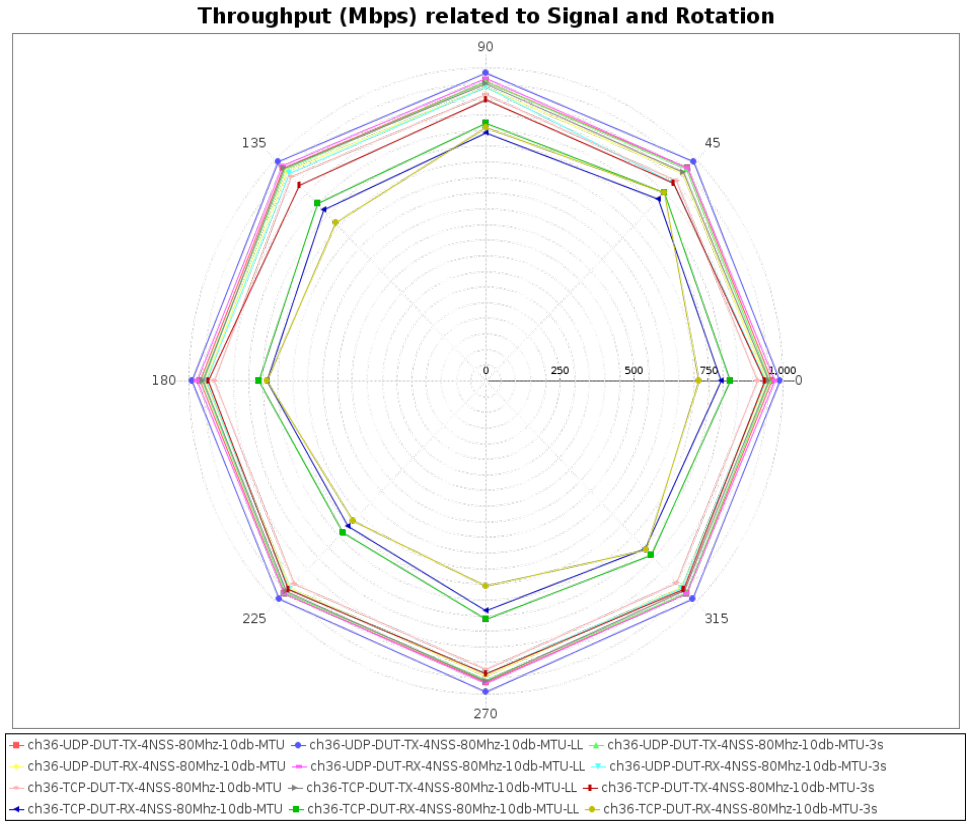
Test Analysis:

- Attenuation=0db, orientation= 0-360 degrees with an increment of 45degrees.
- Here the RSSI values are between 25dbm to 50dbm for Vendor-A.
- The RSSI values are at 25dbm constantly for Vendor-B.

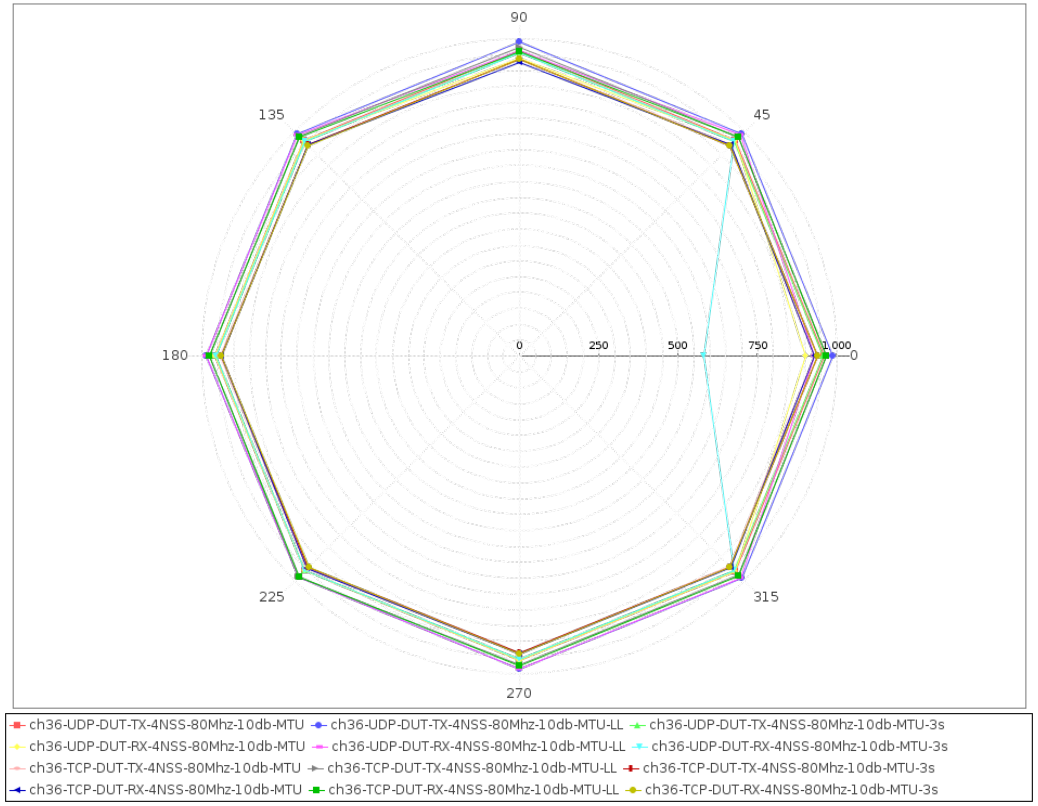
Result:
Vendor-B is showing good RSSI values.

Throughput at 0db (5GHz):

Vendor-A



VENDOR-B



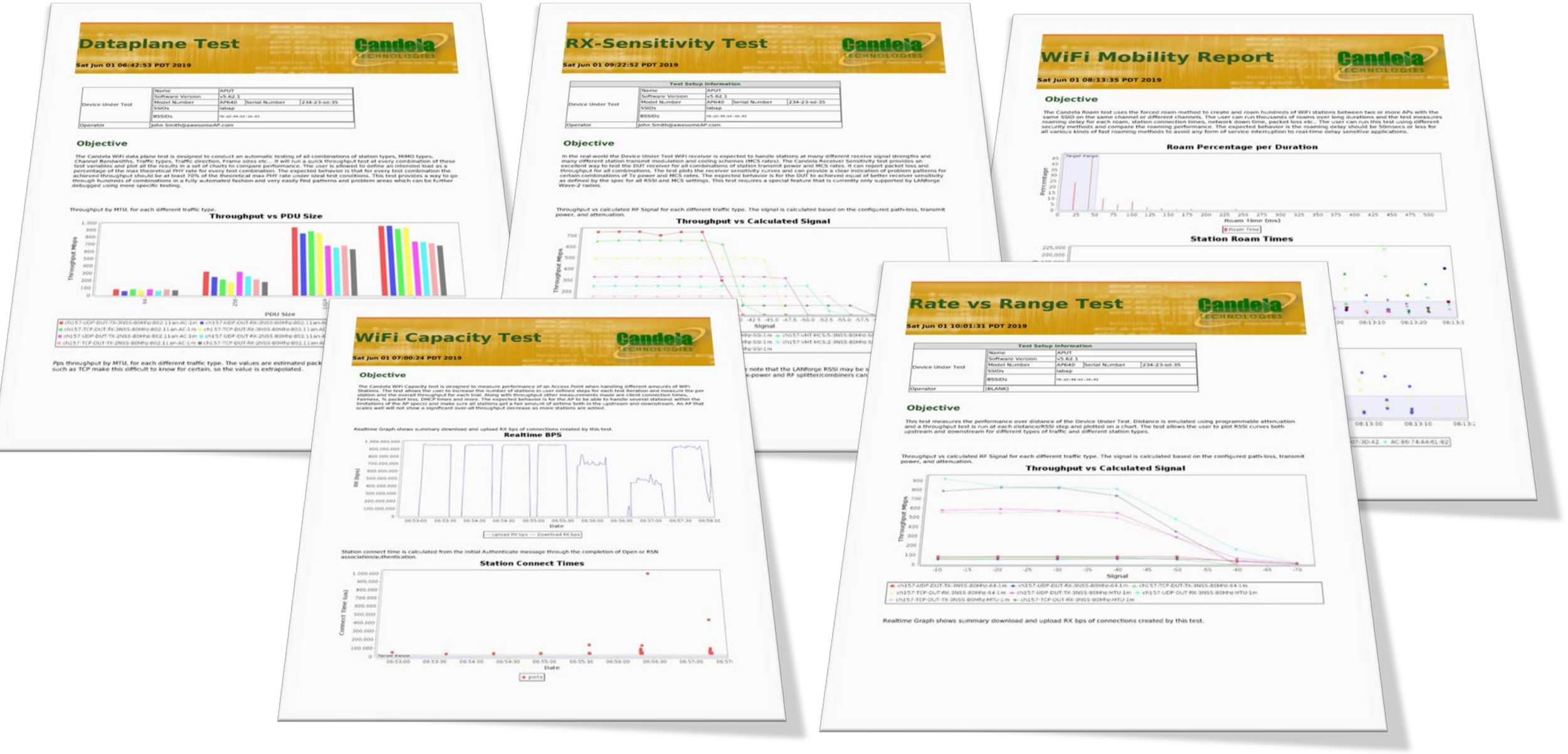
Test analysis:

- Attenuation=0db, orientation= 0-360 degrees with an increment of 45degrees.
- Here the Throughput values are between 730mbps to 950mbps for Vendor-A from 0-360 degrees.
- Here the Throughput 900mbps to 950mbps above for Vendor-B from 0-360 degrees.

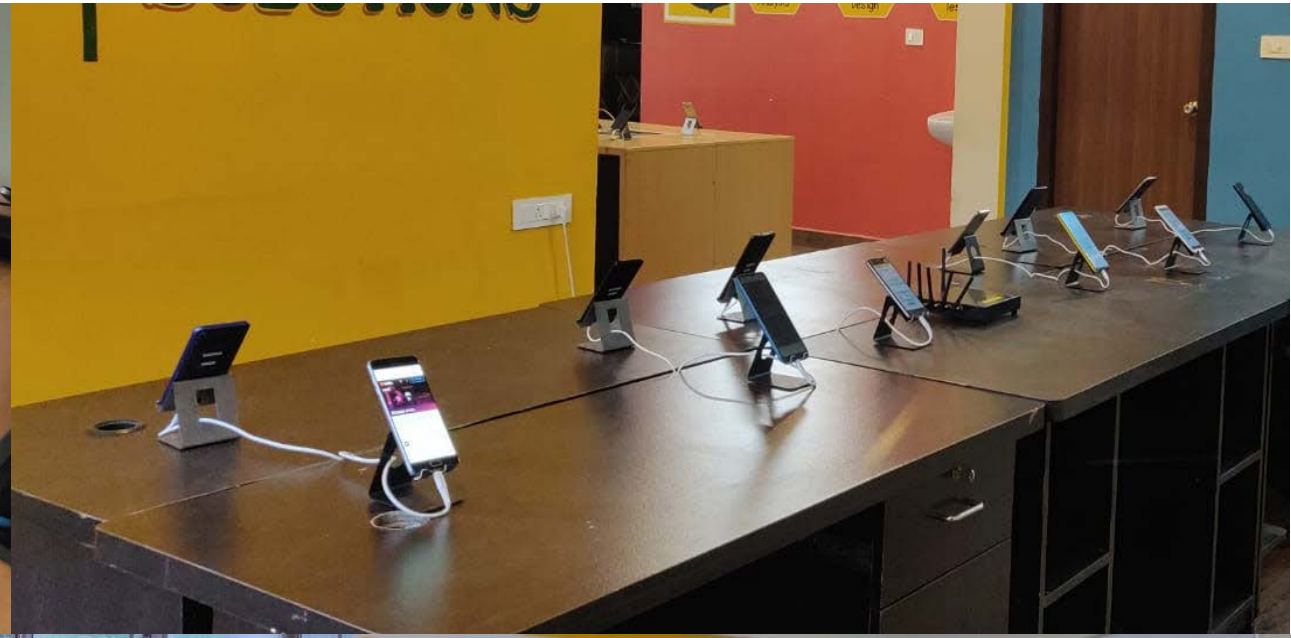
Result:
Vendor-B is showing a consistent performance in throughput compared to Vendor-A.

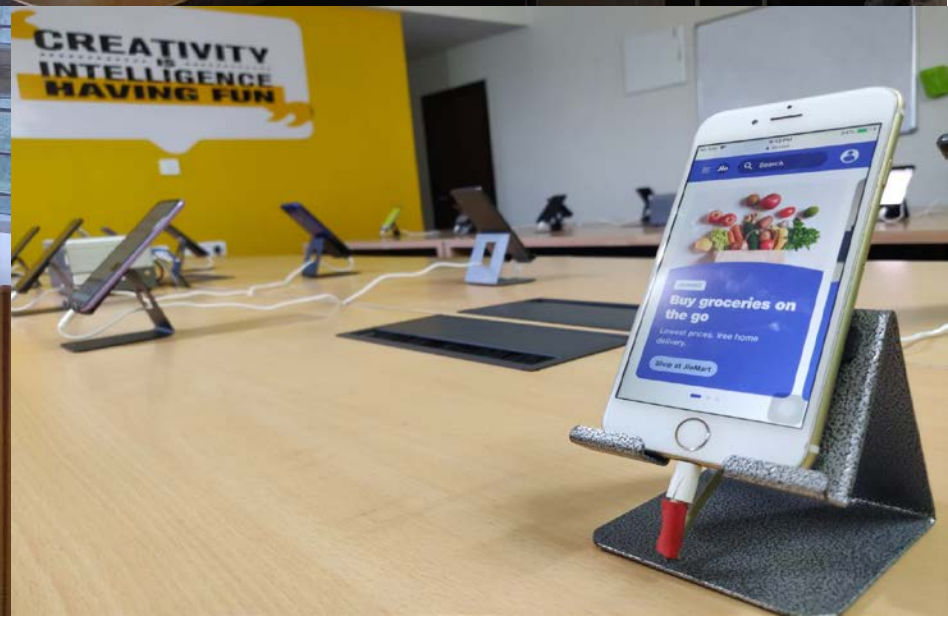
Report link: https://www.dropbox.com/s/p925d4qdz8ma996/o-att.pdf?dl=0

Lots of Tests Run……



Capacity Test House



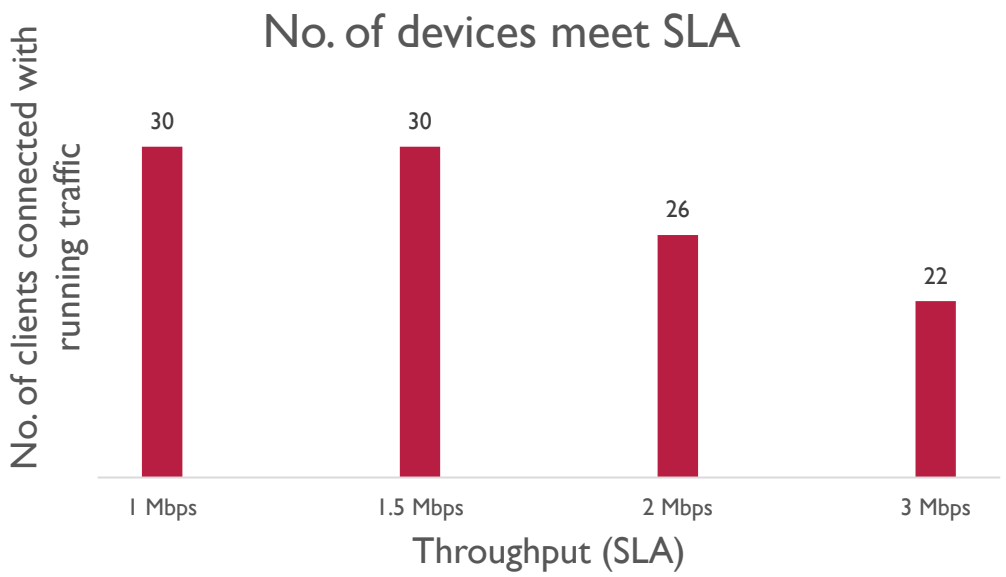


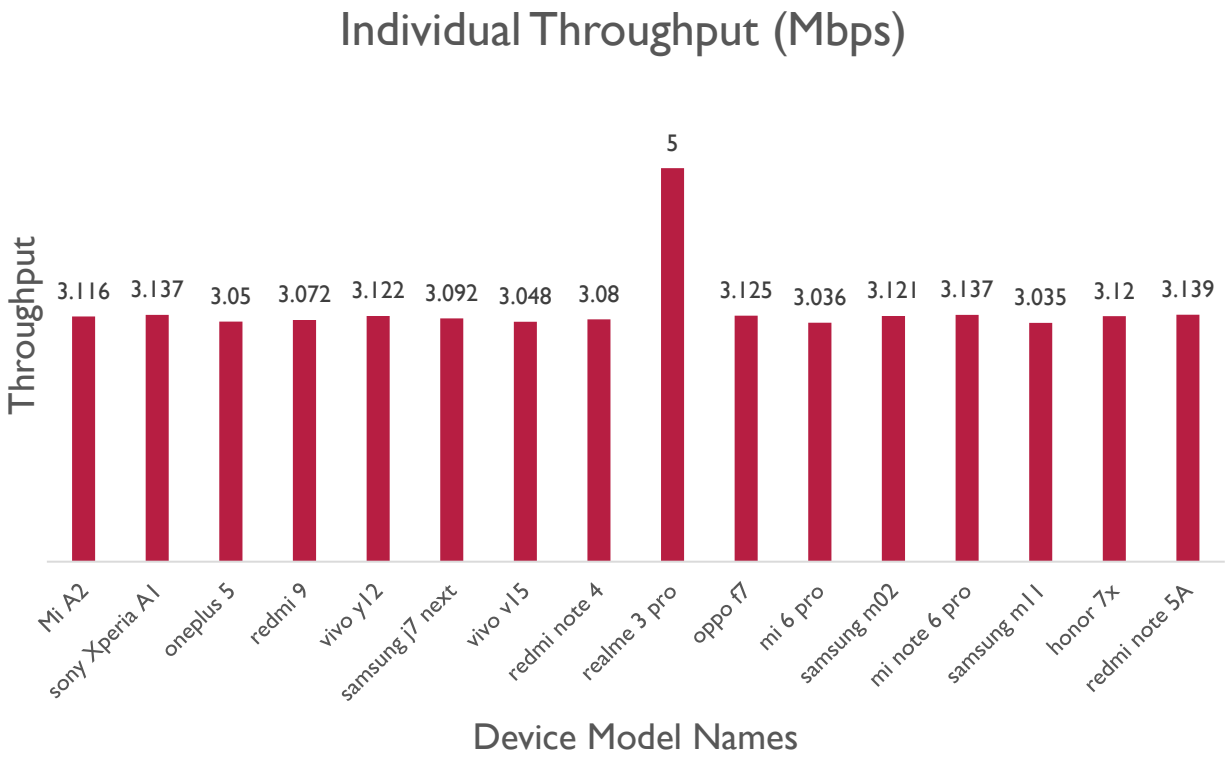
Throughput Capacity Test Results – Wi-Fi Capacity

Test Objective

This Test is to verify the maximum number of clients connected to AP meeting with different throughput SLA.

Client mode	Traffic	Intended traffic	SLA	No. of stations met SLA
5 GHz	UDP DL	2 Mbps	1 Mbps	30
		3 Mbps	1.5 Mbps	30
		4 Mbps	2 Mbps	26
		5 Mbps	3 Mbps	22





Test Results Summary

S. No	Test case name	Vendor-A Pass/Fail		Comments
		2.4G	5G	
1.	Maximum Connection Test	Pass	Fail	This test is failed because Vendor-A supports 30-clients only.
2.	Maximum Throughput Test	Pass	Pass	
3.	Airtime Fairness	Pass	Fail	This test is failed because of the packet error rate.
4.	Dual-Band Throughput	Pass	Fail	This test case is failed because of the throughput drop in the 5GHz.
5.	Bi-Directional Throughput	Pass	Pass	The test is failed with a marginal packet error rate at 1 point (< 0.01%) in 2.4G. So, considering the test is passed in 2.4 GHz.
6.	Multiple Assoc/Disassoc test	Pass	Pass	
7.	AP coexistence test	Pass	Pass	
8.	Receiver Sensitivity test	Pass	Pass	
9.	Rate vs Range	Fail	Pass	Slightly the throughput is decreasing with the increase of attenuation.
10.	Spatial consistency test	Fail	Fail	The throughput drop is observed in both 2.4GHz and 5GHz.
11.	AX Peak Performance test	Pass	Fail	This test case is failed because of the throughput drop in the 5GHz.
12.	Multiple STAs Performance	Pass	Fail	This test case is failed because of the throughput drop in the 5GHz.
13.	Downlink MU-MIMO test	NA	Pass	We didn't perform this test case in 2.4Ghz because CPE supports 3x3 for 2.4Ghz.
14.	Long term stability	Fail	Fail	The throughput drop is observed in both 2.4GHz and 5GHz.
15.	Automatic channel selection test	Pass	Pass	

sales@candelatech.com

1-360-380-1618