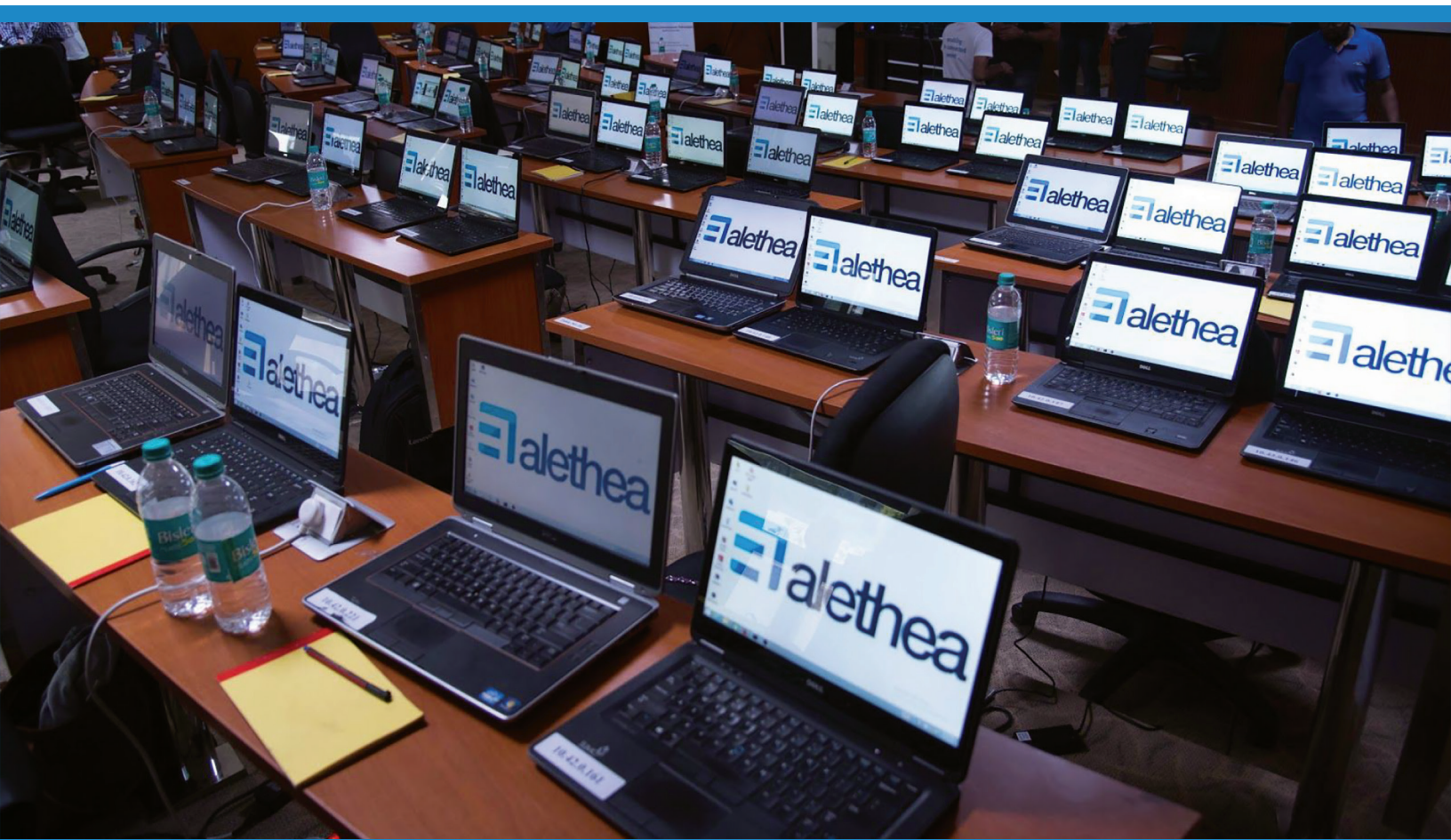




Access Point Benchmark Test Results



Report on High-Density Tests and Comparative Study Conducted on Ubiquiti UAP-AC-HD Access Points

Analysis Summary

Alethea conducted high density tests with **Both Bands (2.4 GHz and 5 GHz) Enabled** on a pre-release version of Ubiquiti AP, model UniFi AP-AC-HD, firmware version 3.7.37.6065, on January 18th, 19th, and 20th of 2017 in Bangalore. Performance of this particular Access Point was compared with Access Points from Ruckus [R710:R710_104.0.0.0.1347], Aruba [IAP-325-US:6.4.4.0-4.2.3] and Meraki [MR52:up-to-date]. Clients used in the tests were configured with 2x2 MIMO WiFi cards. 70% of the clients were 802.11a/b/g/n/ac capable and 30% were 802.11a/b/g/n capable.

We also conducted high density tests with **5 GHz only Enabled** on a released version of Ubiquiti AP, model UniFi AP-AC-HD, firmware version 3.7.44.6176, on 15 and 16 March, 2017 in Bangalore. Performance of this particular Access Point was compared with APs from Ruckus [R710:R710_104.0.0.0.1347], Aruba [IAP-325-US:6.5.1.0-4.3.1.1] and Meraki [MR52:up-to-date]. Clients used in the tests were configured with 2x2 MIMO WiFi cards. 75% of the clients were 802.11a/b/g/n/ac capable and 25% were 802.11a/b/g/n capable.

Two types of performance metrics were measured.

1. DL TCP throughput
2. Video Experience rating (5 - Excellent, 4 - Good, 3 - Satisfactory, 2 - Not Good, 1 - Poor, 0 - Fail).

Both tests were run on all APs with both 2.4 GHz and 5 GHz bands enabled and with 5 GHz only enabled at the respective test sessions. Measurements were taken with 40 clients, 70 clients and 100 clients.

High level summary of the results are as below:

Throughput Tests

Downlink Throughput Tests with 2.4 GHz and 5 GHz Enabled

Performance Goal: Aggregate TCP throughput should be above 250 Mbps at each client load level

Performance (DL TCP Throughput in Mbps) Measured

		Ubiquiti	Aruba	Meraki	Ruckus
40 Clients	Aggregate	282.72	233.94	280.33	251.01
	Std Deviation	2.12	0.9	7.01	6.28
	Pass	Yes	No	Yes	Yes
70 Clients	Aggregate	275.18	198.65	265.61	231.24
	Std Deviation	1.29	2.84	1.13	1.53
	Pass	Yes	No	Yes	No
100 Clients	Aggregate	349.32*	173.57	233.15	213.76
	Std Deviation	3.81	0.71	4.87	0.83
	Pass	Yes	No	No	No

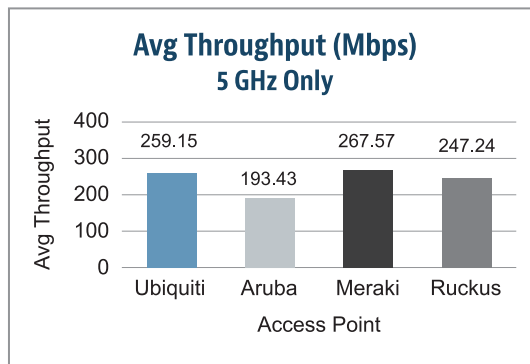
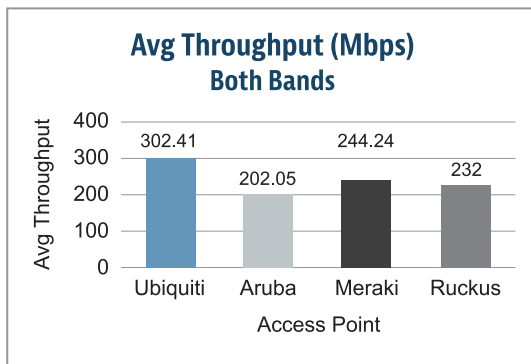
* In Ubiquiti, when all 11ac clients go to 5 GHz and all 11n clients go to 2.4 GHz, the throughput is recorded around 350 Mbps. It falls to around 270 Mbps when clients are mixed up.

Downlink Throughput Tests with 5 GHz (only) Enabled

Performance Goal: Aggregate TCP throughput should be above 200 Mbps at each client load level

Performance (DL TCP Throughput in Mbps) Measured

		Ubiquiti	Aruba	Meraki	Ruckus
40 Clients	Aggregate	249.54	222.35	232.04	292.75
	Std Deviation	0.29	1.88	5.86	2.20
	Pass	Yes	Yes	Yes	Yes
70 Clients	Aggregate	262.50	180.74	287.74	239.59
	Std Deviation	2.80	1.14	5.49	0.90
	Pass	Yes	No	Yes	Yes
100 Clients	Aggregate	265.40	177.21	282.95	209.39
	Std Deviation	3.66	1.22	3.80	0.91
	Pass	Yes	No	Yes	Yes



Video Tests

Video Streaming Tests with Both 2.4 GHz and 5 GHz Enabled

Performance Goal: Cumulative Rating should be 3 and above

Performance (Video Streaming) Measured

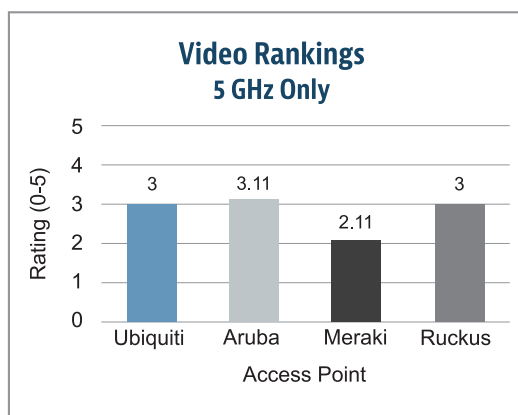
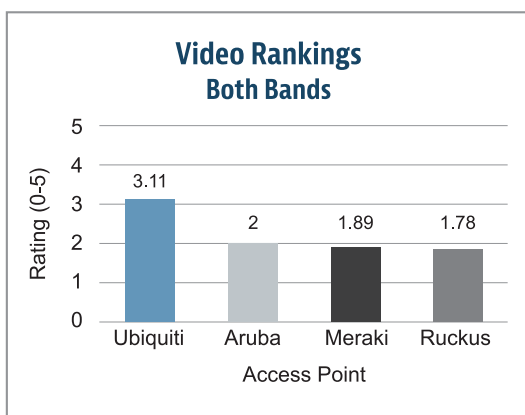
		Ubiquiti	Aruba	Meraki	Ruckus
40 Clients	Video Rating	4.67	3.67	3	3.67
	Pass	Yes	Yes	Yes	Yes
70 Clients	Video Rating	2	1.33	2.33	1
	Pass	No	No	No	No
100 Clients	Video Rating	2.67	1	0.33	0.67
	Pass	No	No	No	No
Average	Video Rating	3.11	2.00	1.89	1.78
	Pass	Yes	No	No	No

Video Streaming Tests with Only 5 GHz Enabled

Performance Goal: Cumulative Rating should be 3 and above

Performance (Video Streaming) Measured

		Ubiquiti	Aruba	Meraki	Ruckus
40 Clients	Video Rating	4.33	5	3.67	3.33
	Pass	Yes	Yes	Yes	Yes
70 Clients	Video Rating	3	3	1.67	3
	Pass	Yes	Yes	No	Yes
100 Clients	Video Rating	1.67	1.33	1	2.67
	Pass	No	No	No	No
Average	Video Rating	3	3.11	2.11	3
	Pass	Yes	Yes	No	Yes



Rankings

Comparison of Performance by 4 APs when Both Bands Enabled

Overall Performance

	Ubiquiti	Aruba	Meraki	Ruckus
TCP DL Both Bands	1	4	2	3
Video Both Bands	1	2	3	4

Comparison of Performance by 4 APs when Only 5 GHz Band Enabled

Overall Performance

	Ubiquiti	Aruba	Meraki	Ruckus
TCP DL 5 GHz	2	4	1*	3
Video 5 GHz	2	1	4	2

Ubiquiti ranked 1 for the below tests:

- **TCP DL Both bands**
- **Video streaming Both bands**

* Ubiquiti and Meraki had similar cumulative throughput for TCP DL test when 5 GHz alone is enabled. However, with Meraki Access Point, quite a few clients had nil to very low throughput while the remaining clients had very high DL rates.

Ubiquiti, Aruba and Ruckus performed equally well and reached satisfactory performance goal in video streaming test at 5 GHz only band.

Introduction

At the point of testing in January, Ubiquiti was yet to release the product UniFi-AP-AC-HD. This is an 802.11ac Wave 2 4x4 MU-MIMO Access Point that is expected to be able to handle 100+ clients simultaneously with throughput good enough to serve HD video streams. The company wanted an independent third party to evaluate the Access Point from the point of view of HD video experience.

Alethea offers testing and benchmarking services for scale and load testing of wireless networks, involving multiple real clients Alethea uses a standard test procedure for such requirements. Formal tests were conducted with all Access points. This report shares all the details from the tests including expectations, results, findings, analysis, insights and rankings.

Test purpose

Purpose is to evaluate user experience of 4 access points, Ubiquiti UniFi-AP-AC-HD, Aruba IAP 325 US, Ruckus R710 & Meraki MR52 and benchmark their performance by running throughput tests and video rating tests with both bands enabled and 5GHz only enabled configurations.

Purpose of the Video Test is to measure the HD video performance. Performance is manually (subjectively) measured on a scale of 5 to 0 - 5 being Excellent and 0 being Fail. Expected performance goal is to get the rating of 3 or above at each resolution and load combination.

Purpose of Throughput Tests is to measure the throughput and standard deviation. Performance goal is to achieve aggregate TCP Throughput of 250 Mbps in Both bands configuration and Throughput of 200 Mbps in 5 GHz only band.

Test Methodology

Throughput Tests

Iperf was used to measure Downlink Throughput. Each of the clients runs an iperf server and the Linux server behind the Access Point runs iperf clients for all the iperf servers. This starts simultaneous data traffic with all the clients. Test is run for 3 minutes and reading is taken for throughput achieved.

With this reading, we can measure the total throughput and also the distribution of throughput across various clients. This can be measured using standard deviation. Lower the Standard deviation, fairer the distribution. Higher the Standard Deviation, less fair is the distribution.

Video Tests

For each video, experience is rated from 5 to 0 - 5 being Excellent and 0 being Fail. Overall score is arrived at each load level, by taking average of all the videos.

For access point to be able to say it supports HD, we need to check multiple type of videos. HD Video quality depends on the bit rate. Higher the bitrate, higher the quality. There is no specific bit rate that suggests video can be HD. HD bitrate depends on nature or content of the video. A Slow moving animation video may offer a good viewer experience at 1000 Kbps bit rate but a live sports video involving lot of fast movement may not provide good viewing experience even at 5000 Kbps bit rate .

Operators watched for the following types of artifacts:

1. Buffering
2. Stuttering
3. Lost frames
4. Smudges & pixelation

Failure scenarios

- If any one instance of buffering lasted more than 20 seconds, the client was adjudged a fail immediately
- If the video failed to finish (with all the additional delays) within 30 seconds of the first client to finish
- If the total number of artifacts were 6 or more in number

Based on study, Alethea uses video test vectors at bit rates starting from 100 kbps to 10000 kbps. Based on dry runs at both bands configuration, we chose a set of 5 video levels that are relevant for HD Videos & the loads under consideration. 1000 kbps, 2000 kbps, 3000 kbps, 4000 kbps, 5000 kbps.

- Video_Level_1 - mp4, 1080p, 1000 kbps, Slow moving animation
- Video_Level_2 - mp4, 1080p, 2000 kbps, Hollywood movie
- Video_Level_3 - mp4, 1080p, 3000 kbps, Football match
- Video_Level_4 - mp4, 1080p, 4000 kbps, Fast moving Animation
- Video_Level_5 - mp4, 1080p, 5000 kbps, Gaming Level

For Both Bands

- Client Level 40, we expected video Levels 3, 4, 5 to work with performance rating of 3 or above
- Client Level 70, we expected video Levels 2, 3, 4 to work with performance rating of 3 or above.
- Client Level 100, we expected video Levels 1, 2, 3 to work with performance rating of 3 or above.

For 5 GHz only

Based on dry runs, we chose a set of 6 video levels that are relevant for HD Videos & the loads under consideration. 1000 kbps, 1500 kbps, 2000 kbps, 3000 kbps, 4000 kbps, 5000 kbps.

- Video_Level_1 - mp4, 1080p, 1000 kbps, Slow moving speech video
- Video_Level_2 - mp4, 1080p, 1500 kbps, Slow Animation
- Video_Level_3 - mp4, 1080p, 2000 kbps, Hollywood movie
- Video_Level_4 - mp4, 1080p, 3000 kbps, Fast Moving Animation
- Video_Level_5 - mp4, 1080p, 4000 kbps, Gaming Level Animation
- Video_Level_6 - mp4, 1080p, 5000 kbps, Fast moving Sports

Below are the video levels used:

- Client Load 40, we expected video Levels 4, 5, 6 to work with performance rating of 3 or above
- Client Load 70, we expected video Levels 2, 3, 4 to work with performance rating of 3 or above.
- Client Load 100, we expected video Levels 1, 2, 3 to work with performance rating of 3 or above.

At each client load, a video is marked pass or fail depending on interruptions, buffering, frame drops, smudges etc. Then based on pass percentage across clients, ratings are given

5 - Excellent, (80%+)

4 - Good (70-80%)

3 - Average (60-70%)

2 - Not Good (50-60%)

1 - Poor (30-50%)

0 - Fail (<30%)

Test Setup

- Access Point under Test
- 100 Clients for Both Band Configuration
 - 65 x Dell Latitude 7440 (Core I5 / I7 with 8GB RAM, 256 GB SSD, Intel 7260 dual-band 2x2 11ac Wave 1 Wi-Fi Card) running Windows
 - 5 x Dell Latitude 6430 (Core I5 with 4GB RAM, 500GB HDD, Intel 7260 dual-band 2x2 11ac Wave 1 Wi-Fi Card) running Windows
 - 30 x Dell Latitude 5430 (Core I5 with 4GB RAM, 500GB HDD, Intel 2x2 dual-band 11n Wi-Fi Card) running Windows
 - All were powered from mains all the time, power save was not turned ON
- 100 Clients for 5 GHz Only Configuration
 - 75x Dell Latitude 7440 (Core I5 / I7 with 8GB RAM, 256 GB SSD, Intel 7260 dual-band 2x2 11ac Wave 1 WiFi Card) running Windows
 - 25x Dell Latitude 5430 (Core I5 with 4GB RAM, 500GB HDD, Intel 2x2 dual-band 11n WiFi Card) running Windows
 - All were powered from mains all the time, power save was not turned ON
- Behind the AP, media server hosted on an Intel i7 based box with 16GB RAM running Ubuntu Server
- Controller PC, intel i7 PC running Ubuntu
- AP, Media Server and Controller / Management PC were powered over an UPS and connected through a Gigabit Switch



Test results - Both Bands

Tests were conducted over the period of 3 days on January 18th, 19th, and 20th of 2017 for both bands configuration.

Test Sessions & Data

We ran 12 sessions for both bands configuration. 4 Sessions on each day. In each session, we ran

- 1 Throughput Test
- 3 Video Tests

We had 4 APs and 3 Client Load Levels (40, 70, 100) so 12 such sessions were planned.

Configuration

Access Points

- All Access Points were configured with latest released firmware we found on the Internet and Ubiquiti with the pre-release firmware provided to us for both bands configuration. For Meraki, the Access Point showed that the firmware version is up to date and we did not make any changes
- Channels were chosen manually based on lowest interference. Same channels were used for all access points for fair comparison. Auto channel select was disabled to effect this
- Bandwidth 40 MHz for 2.4 GHz band, 80 MHz for 5 GHz
- Air Time Fairness set to ON, if the access point provided the option
- Power set to Maximum

Clients

- All Clients were running Windows.
- Same Clients, Same Location for testing all access points
- For both bands configuration, 70% 11ac Clients & 30% 11n Clients at any client load level
- PINGs were checked to be working on all clients before any test was run
- All Video runs used Mozilla Firefox with applicable plug-ins in place for http video streaming
- Browser cache was cleared before each Run

Commands

- Ipers Server command - iperf3 -s
- Iperf Client Command - iperf3 -c <Server IP Address> -t 180 -i 1

Video - Both Bands

Video levels used for both bands configuration were as below:

- Video_Level_1 - mp4, 1080p, 1000 kbps, Slow moving animation
- Video_Level_2 - mp4, 1080p, 2000 kbps, Hollywood movie
- Video_Level_3 - mp4, 1080p, 3000 kbps, Football match
- Video_Level_4 - mp4, 1080p, 4000 kbps, Fast moving Animation
- Video_Level_5 - mp4, 1080p, 5000 kbps, Gaming Level

Ubiquiti

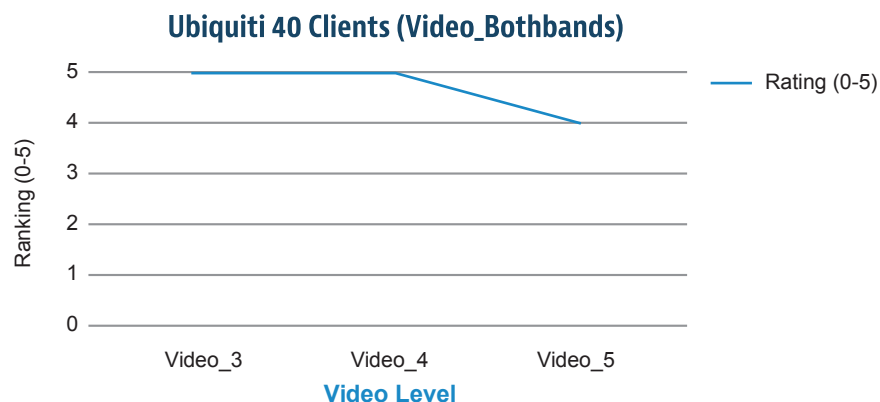
40 Clients

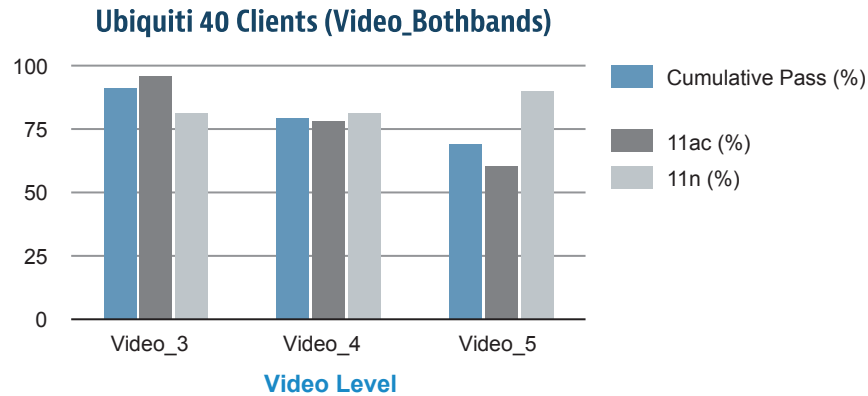
For Ubiquiti 40 clients, Video level 3, 4, and 5 were run. Results were as shown below:

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_3 (3000 kbps)	92.50	5	96.55	81.82
Video_4 (4000 kbps)	80.00	5	79.31	81.82
Video_5 (5000 kbps)	70.27	4	61.54	90.91
Average	80.92	4.67	79.13	84.85

Points to Note:

- Clients pass percentage decreased from Video level 3 to level 5
- At Video Level 3 (3000 kbps), 11ac clients performed significantly better compared to 11n clients
- For Video Levels 4 (4000 kbps) and 5 (5000 kbps), performance of 11n clients was better compared to 11ac clients
- There was a significant difference in the performance of 11n and 11ac when video level 5 (5000 kbps) ran
- Overall, 11n clients' pass rate was higher





For Ubiquiti, we ran tests with ATF and without ATF. The results were as follows for Video 5 (5000 kbps):

Test	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
With ATF	70.27	4	61.53	90.90
Without ATF	37.50	1	24.10	72.72

Points to Note:

- Ubiquiti performed better with ATF enabled

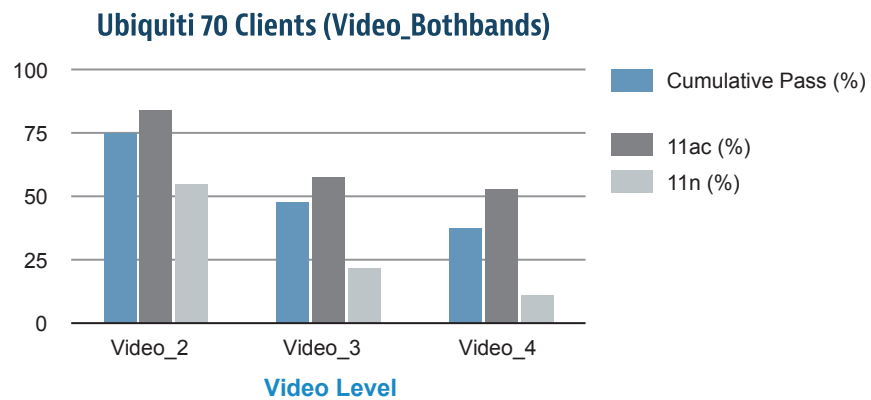
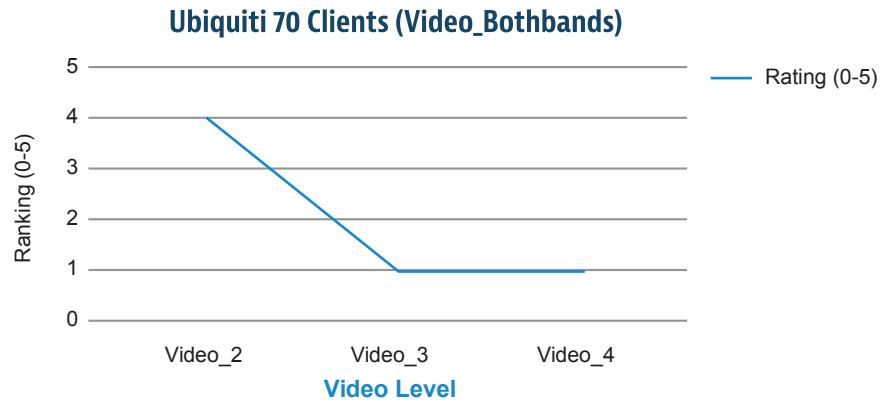
70 clients

For 70 clients, Video Levels 2, 3 and 4 were run.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (2000 kbps)	76.47	4	85.42	55.00
Video_3 (3000 kbps)	46.38	1	57.14	20.00
Video_4 (4000 kbps)	39.71	1	51.02	10.53
Average	54.19	2	64.53	28.51

Points to Note:

- Overall pass percentage deteriorated significantly when bitrates were increased (from 2000 kbps to 4000 kbps)
- 11ac clients performed significantly better compared to 11n clients, clearly differing from the results of the video test run with 40 clients



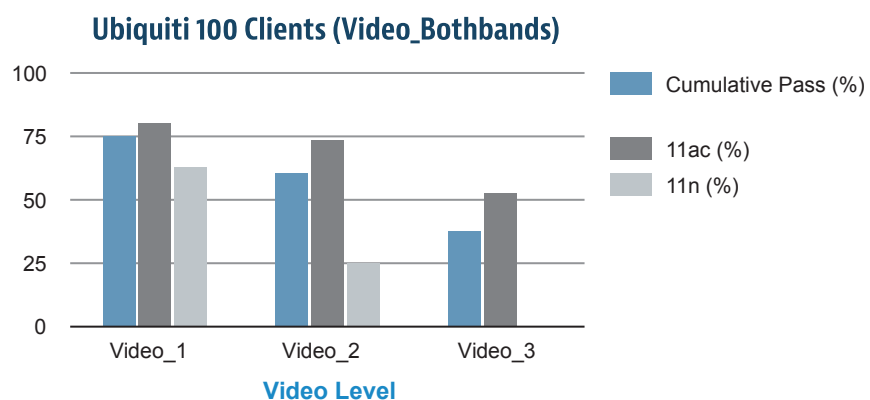
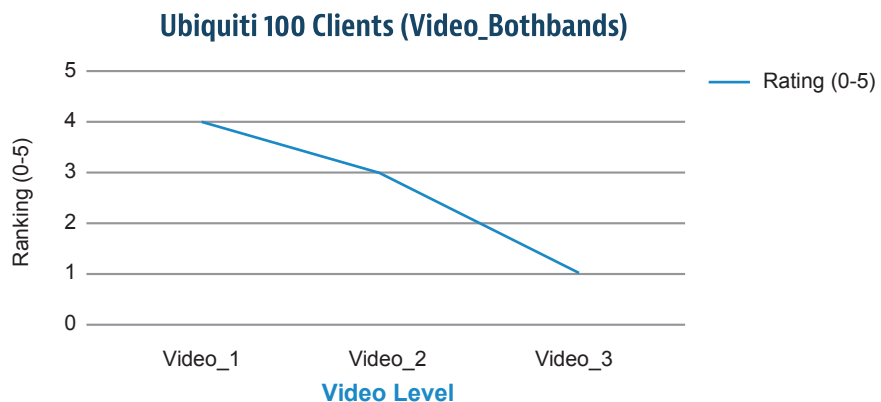
100 Clients

For 100 clients, Video Level 1, 2 and 3 were run

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	76.00	4	81.43	63.33
Video_2 (2000 kbps)	60.00	3	74.29	26.67
Video_3 (3000 kbps)	38.00	1	54.29	0.00
Average	58.00	2.67	70.00	30.00

Points to Note:

- 11n clients failed completely in streaming video level 3 (3000 kbps)
- Cumulative pass rate decreased by 50% between Video Levels 1 (1000 kbps) & 3 (3000 kbps)



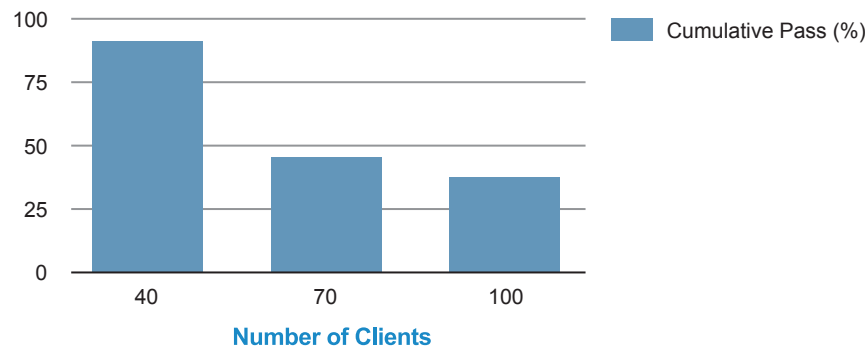
Video Level 3 (3000 kbps) degradation with increasing number of clients:

Number of Clients	Cumulative Pass (%)
40	92.50
70	46.38
100	38.00

Points to Note:

- With increase in number of clients, there was a significant decrease in pass percentage
- When number of clients increased from 40 to 70, there was a decrease of approximately 50% in the pass rate

Ubiquiti performance degradation with increase in number of clients



Aruba

40 Clients

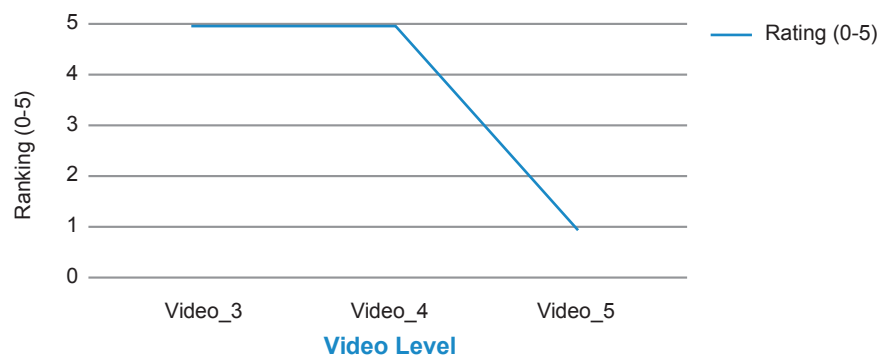
For 40 clients, Video level 3, 4 and 5 were run

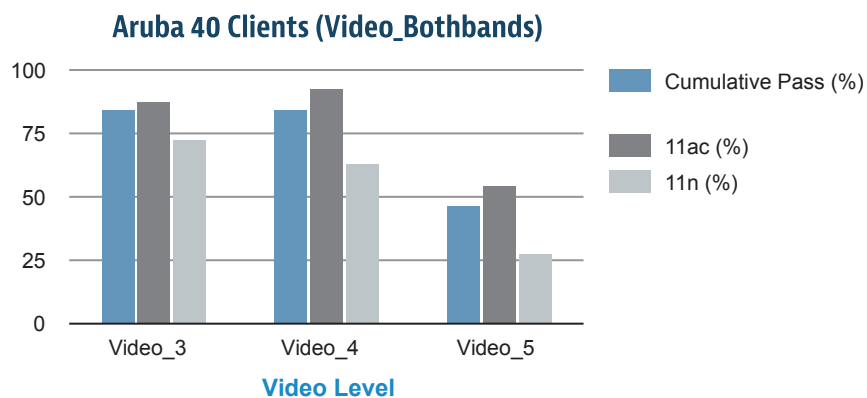
Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_3 (3000 kbps)	85.00	5	89.66	72.73
Video_4 (4000 kbps)	85.00	5	93.10	63.64
Video_5 (5000 kbps)	47.50	1	55.17	27.27
Average	72.50	3.67	79.31	54.55

Points to Note:

- Performance of 11ac clients was always better compared to 11n clients
- Cumulative pass rate was the same for Video Level 3 and 4 though 11ac clients performed better when Video Level 4 ran
- Performance of 11n clients dropped by more than 50% with the increase in video bitrate to 5000 kbps

Aruba 40 Clients (Video_Bothbands)





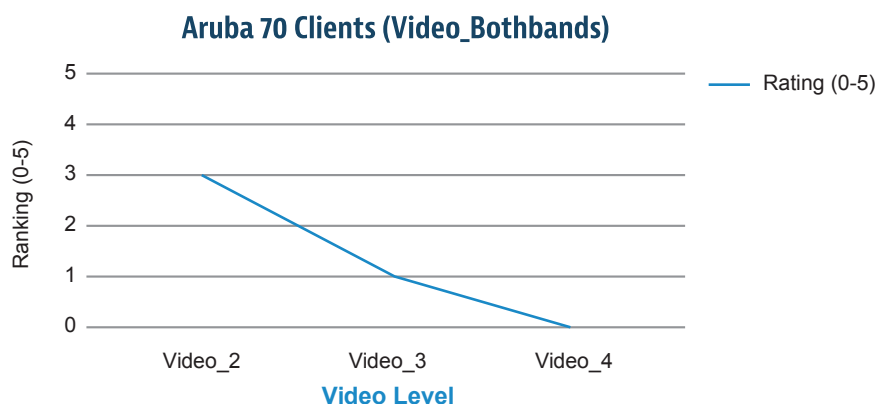
70 Clients

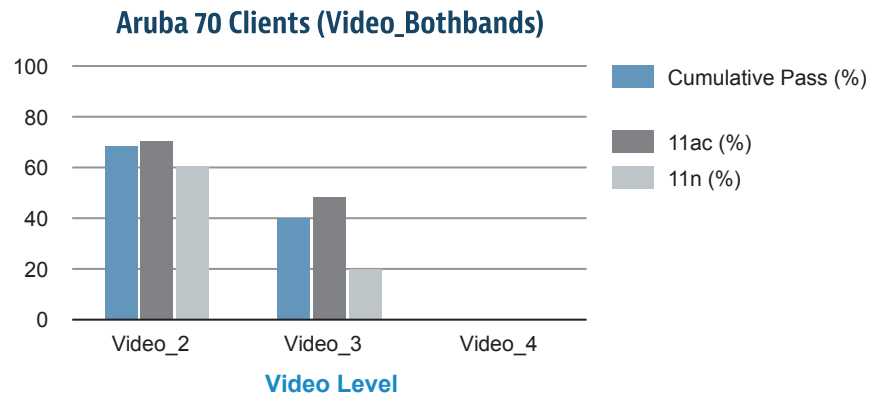
For Aruba 70 clients test case, video levels 2 & 3 were tested. Video level 4 was not attempted since cumulative pass percentage for video level 3 was around 40% already.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (2000 kbps)	68.57	3	72.00	60.00
Video_3 (3000 kbps)	41.43	1	50.00	20.00
Video_4 (4000 kbps)	Did Not Execute	0	NA	NA
Average	55.00	1.33	61.00	40.00

Points to Note:

- Aruba was not able to handle 70 clients at higher video bitrates
- As expected, 11ac clients performed better compared to 11n clients





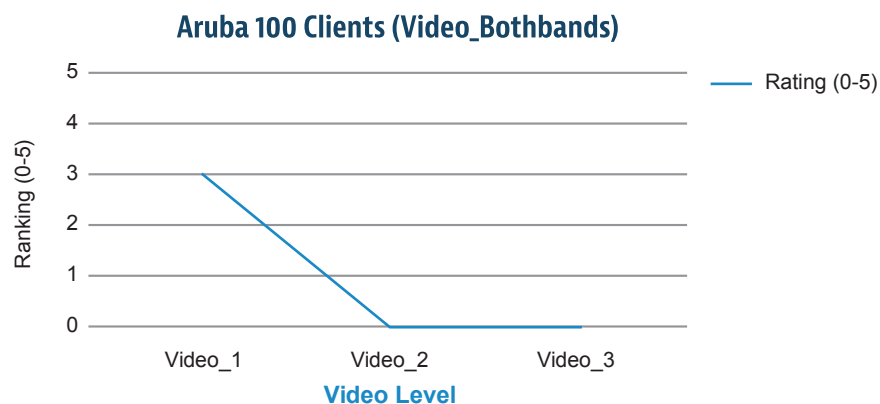
100 Clients

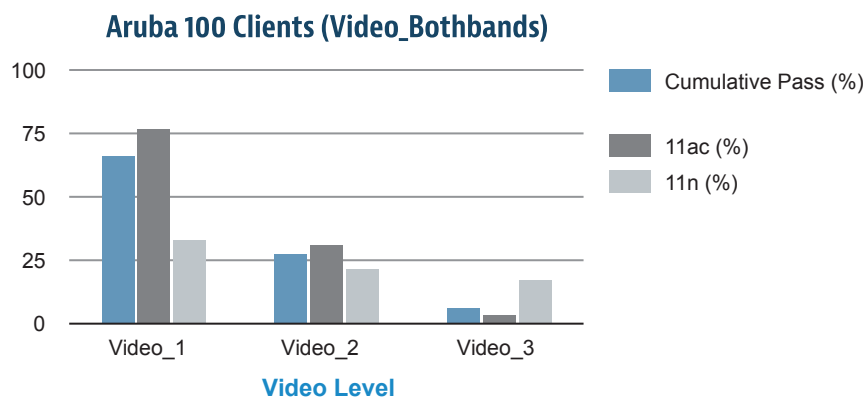
For Aruba 100 clients test, Video levels 1, 2 & 3 were used.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	64.00	3	77.14	33.33
Video_2 (2000 kbps)	29.00	0	32.86	20.00
Video_3 (3000 kbps)	8.00	0	4.29	16.67
Average	33.67	1.00	38.10	23.33

Points to Note:

- Aruba performance was not up to the expectation for 100 clients. When bitrate of video was less, it managed to stream to 64% of clients
- As expected, 11ac clients performed significantly better for video 1 and 2 but not for video 3 (overall pass percentage was poor, so could have been a statistical anomaly)



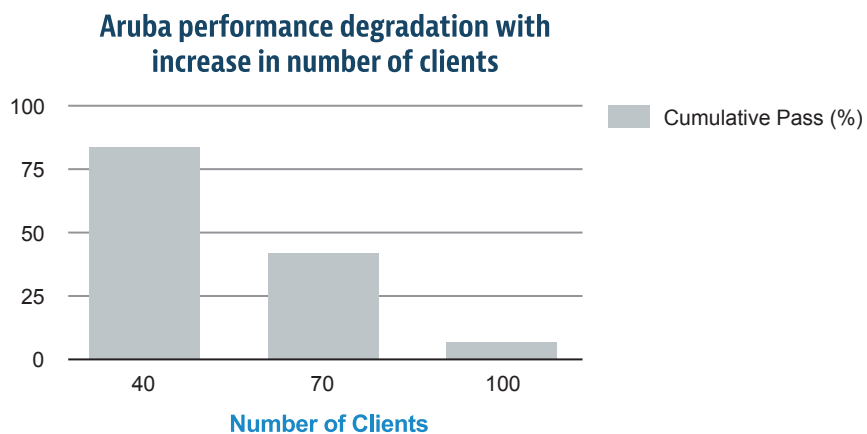


Video Level 3 (3000 kbps) degradation with increasing number of clients:

Number of Clients	Cumulative Pass (%)
40	85.00
70	41.43
100	8.00

Points to Note:

- Aruba failed to handle 100 clients
- Performed fairly good for 40 clients but failed in case of 70 and 100 clients



Meraki

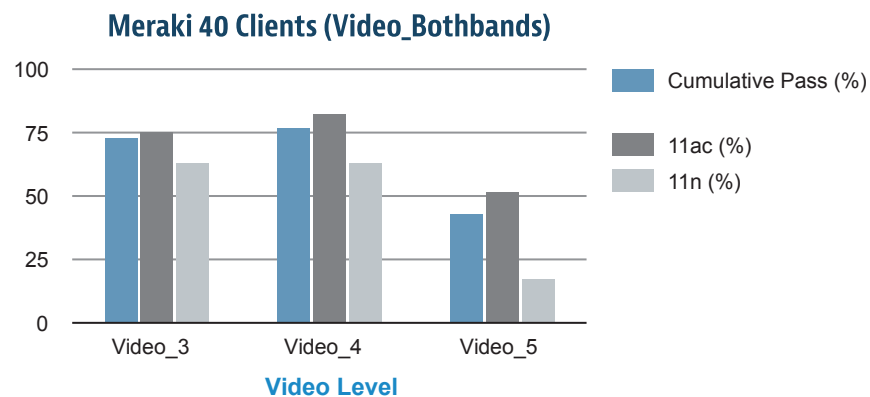
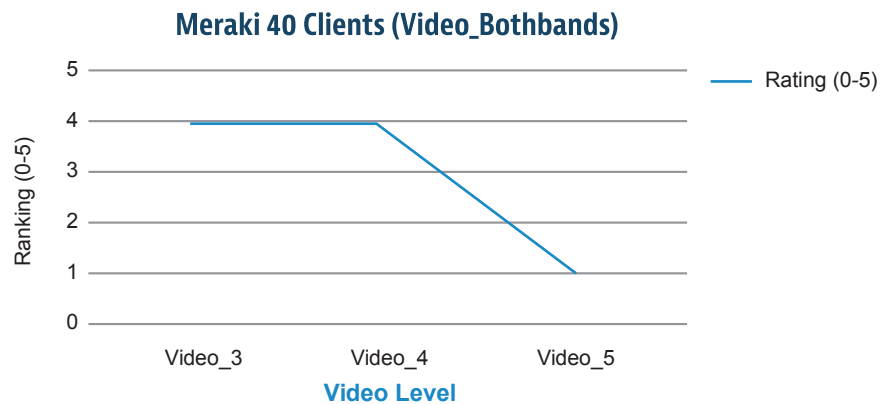
40 Clients

For Meraki 40 clients test case, video levels 3, 4 & 5 were used to verify the performance.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_3 (3000 kbps)	72.50	4	75.86	63.64
Video_4 (4000 kbps)	77.50	4	82.76	63.64
Video_5 (5000 kbps)	42.50	1	51.72	18.18
Average	64.17	3	70.11	48.49

Points to Note:

- For Video Levels 3 and 4, performance was almost same
- Pass percentage decreased sharply when bit rate was increased from 4000 kbps to 5000 kbps
- 11n clients did not perform well at video level 5



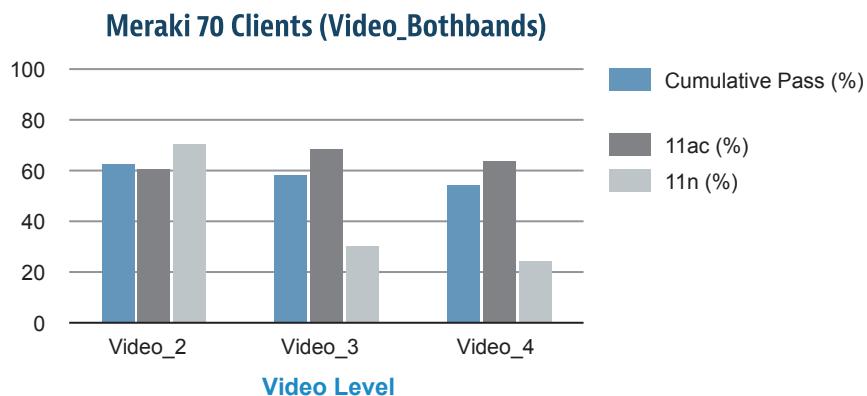
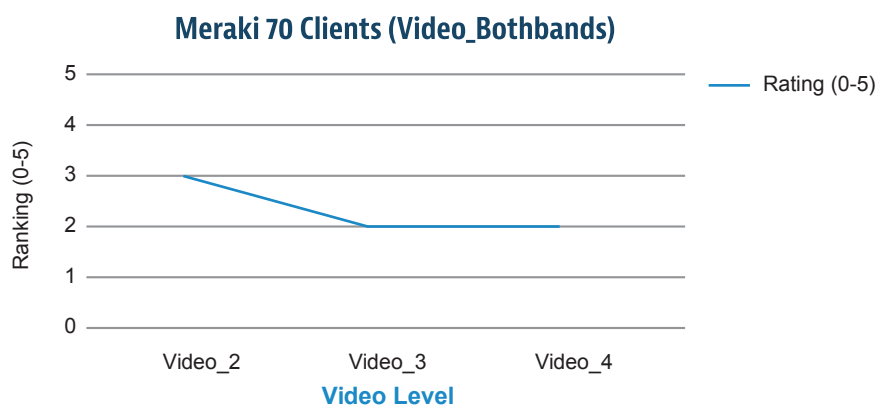
70 Clients

For Meraki 70 clients test case, video levels 2, 3 & 4 were used for testing.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (2000 kbps)	64.29	3	62.00	70.00
Video_3 (3000 kbps)	58.82	2	69.39	31.58
Video_4 (4000 kbps)	55.07	2	66.00	26.32
Average	59.39	2.33	65.80	42.63

Points to Note:

- No significant change in performance level when video quality increased (bit rate changed from 2000 to 4000 kbps)
- 11n clients performed slightly better in Video level 2 (2000 kbps)
- 11ac clients' performance was stable with the increase in video quality



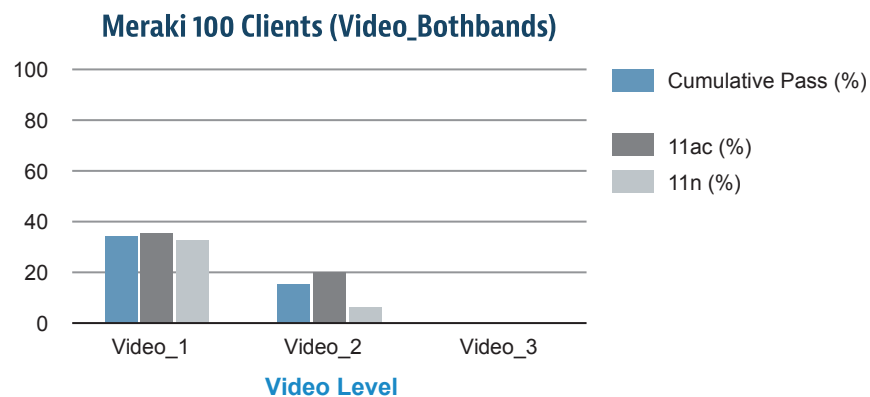
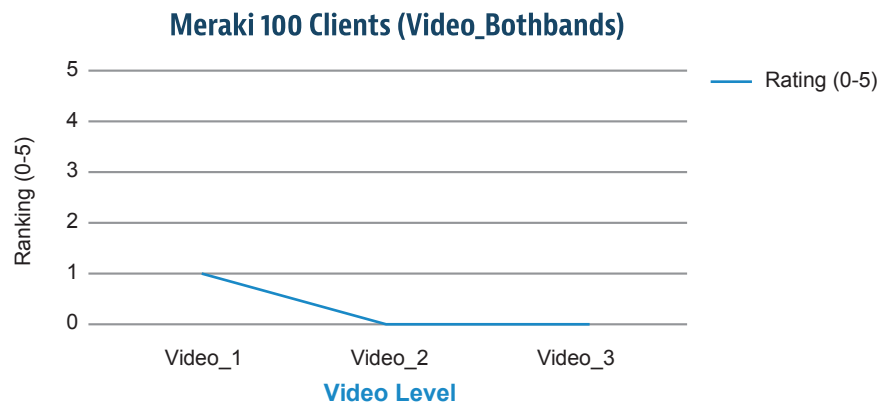
100 Clients

For Meraki 100 clients, video level 3 was not tested as it failed to handle 100 clients with video level 2 (bitrate 2000 kbps)

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	35.00	1	35.71	33.33
Video_2 (2000 kbps)	16.00	0	20.00	6.67
Video_3 (3000 kbps)	Fail	0	Fail	Fail
Average	25.50	0.33	27.86	20.00

Points to Note:

- Meraki could not handle 100 clients
- For video levels 1 & 2 also, performance was too low to go ahead with video level 3

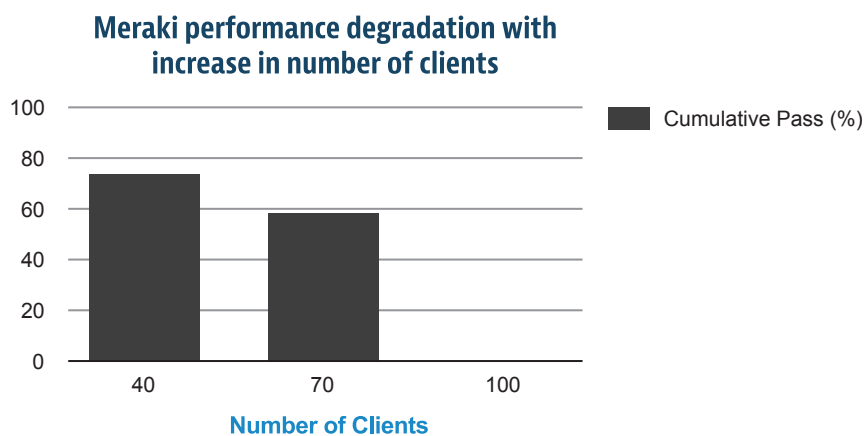


Video Level 3 (3000 kbps) degradation with increasing number of clients:

Number of Clients	Cumulative Pass (%)
40	72.50
70	58.82
100	Cannot Be Tested

Points to Note :

As expected, with increase in number of clients, performance degradation was noted.



Ruckus

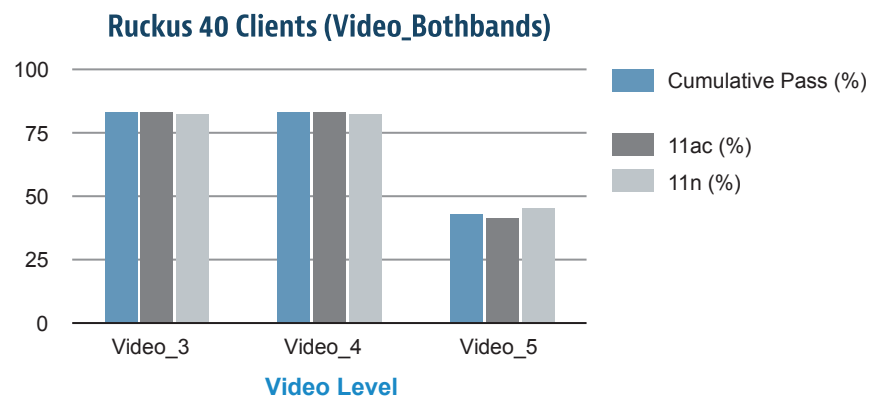
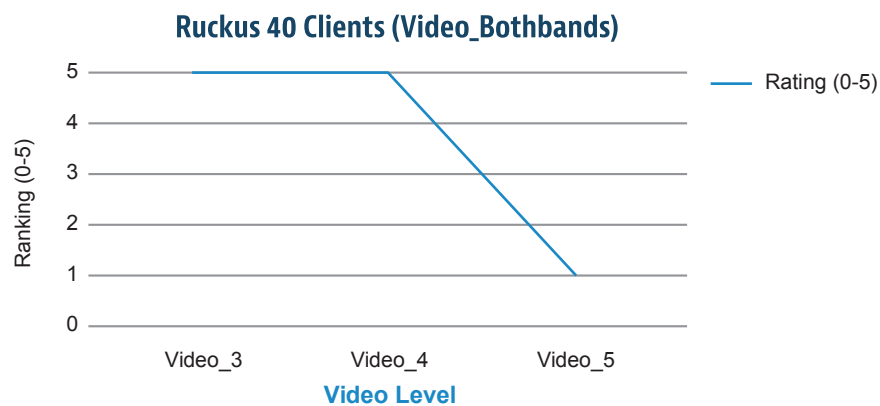
40 Clients

Video levels 3, 4 and 5 were used for testing.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_3 (3000 kbps)	82.50	5	82.76	81.82
Video_4 (4000 kbps)	82.50	5	82.76	81.82
Video_5 (5000 kbps)	42.50	1	41.38	45.45
Average	69.17	3.67	68.97	69.70

Points to Note:

- For video level 3 and 4, there was no difference in the performance
- When test vector was changed to video level 5 (bitrate 5000 kbps), performance decreased by almost 50%
- 11ac and 11n clients performed almost similar, there was no significant difference in results between the two technologies as far as video is concerned



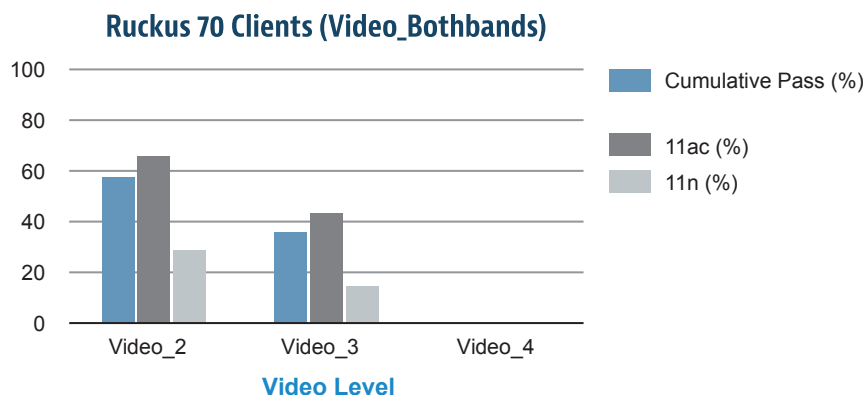
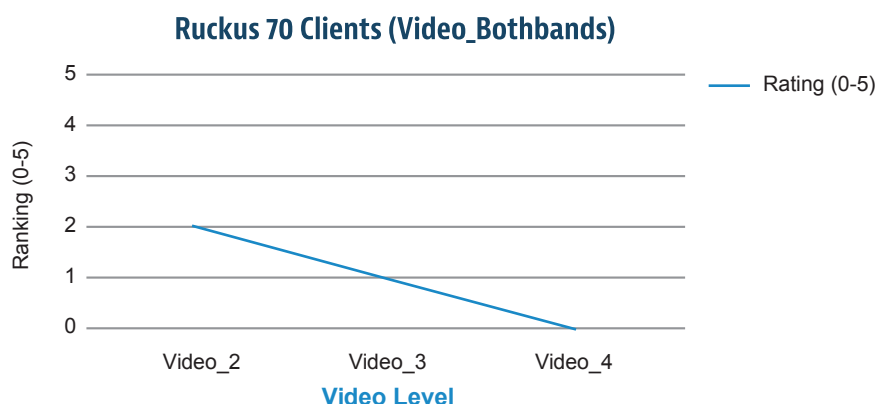
70 Clients

Video levels 1, 2 and 3 were used to test the performance. As Video level 3 did not play well, test was not done with Video level 4.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (2000 kbps)	56.72	2	68.09	30.00
Video_3 (3000 kbps)	35.82	1	44.68	15.00
Video_4 (4000 kbps)	Fail	0	Fail	Fail
Average	46.27	1	56.39	22.50

Points to Note:

- Did not perform well with 70 clients. Even at video level 2, pass percentage was below 60%
- 11ac clients performed better compared to 11n clients



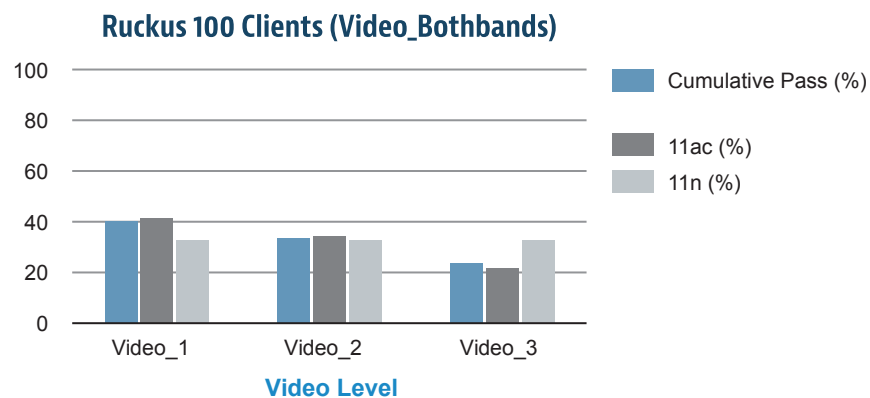
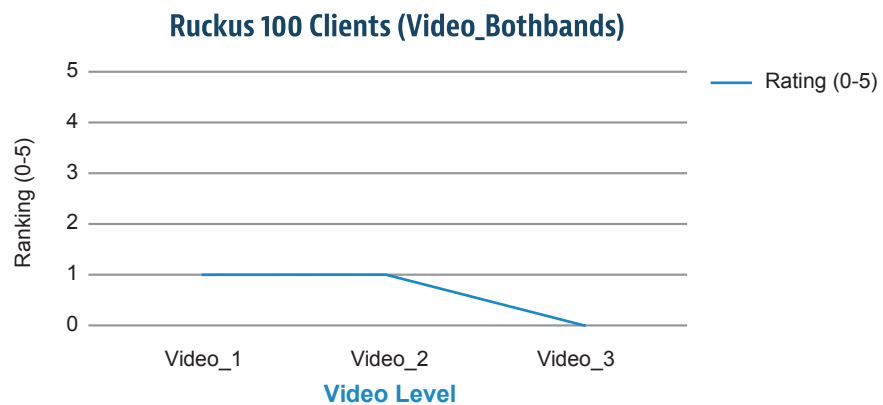
100 Clients

Video level 1, 2 and 3 were tested under this test case. Results below indicate that Ruckus could not scale up to 100 clients.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	40.00	1	42.86	33.33
Video_2 (2000 kbps)	35.00	1	35.71	33.33
Video_3 (3000 kbps)	25.00	0	21.43	33.33
Average	33.33	0.67	33.33	33.33

Points to note:

- Ruckus failed to scale to 100 clients in a meaningful way
- Even for video level 1, pass rate was below 50%
- 11n clients' performance was stable irrespective of video quality (bitrate)
- 11ac clients' performance deteriorated when the video bitrate was increased

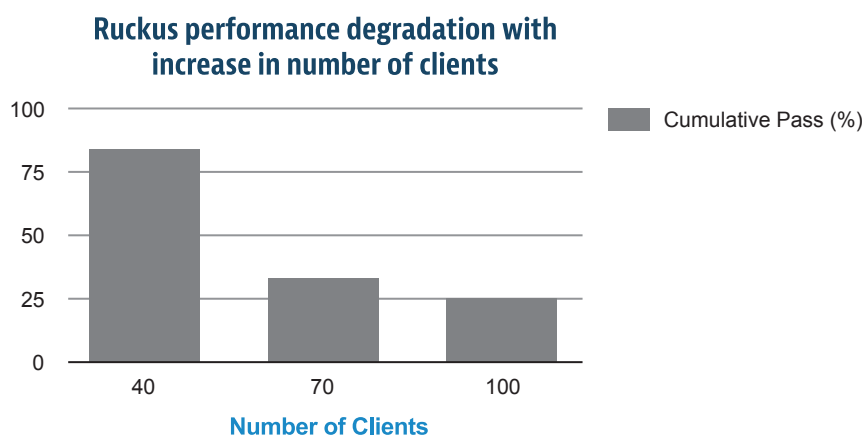


Video level 3 (3000 kbps) degradation from increasing number of clients

Number of Clients	Cumulative Pass (%)
40	82.50
70	35.82
100	25.00

Points to Note:

- Ruckus failed to handle 100 clients at video level 3
- There was a significant deterioration in pass percentage when the number of clients increased from 40 to 70 (pass percentage dropped by more than 50%)



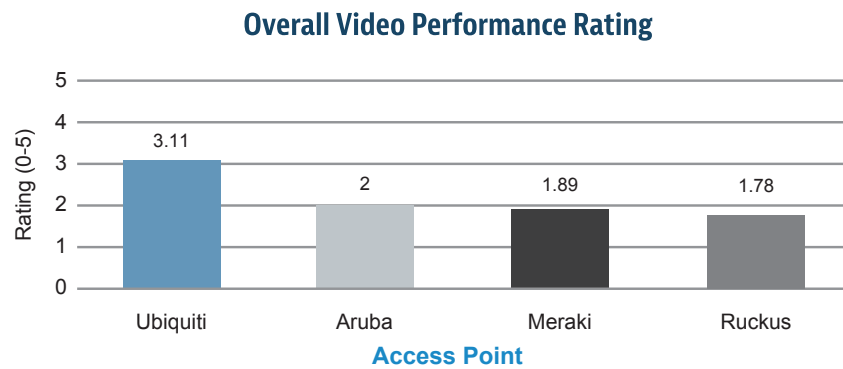
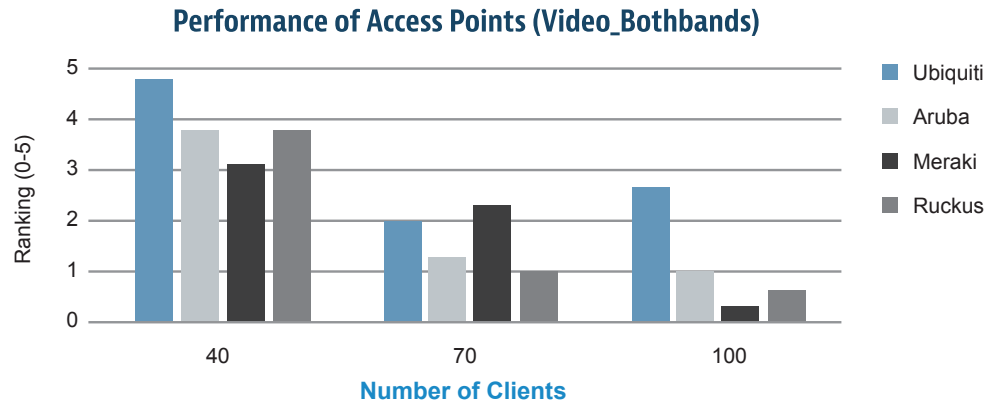
Comparison

Performance of Access Points with increase in number of clients was shown below:

Number of Clients	Ubiquiti	Aruba	Meraki	Ruckus
40	4.67	3.67	3.00	3.67
70	2.00	1.33	2.33	1.00
100	2.67	1.00	0.33	0.67
Overall	3.11	2.00	1.89	1.78

Points to Note:

- Overall, Ubiquiti topped in video streaming at both bands test
- Ruckus and Meraki failed completely to handle 100 clients
- Performance decreased with increase in number clients for all access points



Throughput - Both Bands

Ubiquiti

Number of clients	Throughput	Std. Deviation
40	282.72	2.12
70	275.18	1.29
100	349.32	3.81
Average	302.41	2.41

Points to Note:

- Throughput of Ubiquiti when tested with 100 clients increased compared to the test with 40 clients

For 40 clients, with ATF and without ATF enabled, Throughput results were as below:

	Throughput	Std. Deviation
With ATF	282.718	2.109
Without ATF	312.9	2.416

Points to Note:

- Throughput when ATF enabled was slightly lesser compared to without ATF enabled
- Due to fair distribution (as Standard Deviation is lesser), it managed to perform well in video streaming

Aruba

Number of clients	Throughput	Std. Deviation
40	233.94	0.9
70	198.65	2.84
100	173.57	0.71
Average	202.05	1.48

Points to Note:

- Throughput decreased with number of clients
- Standard Deviation was very less for Aruba compared to other Access Points, which might helped to perform better in video streaming

Meraki

Number of clients	Throughput	Std. Deviation
40	280.33	7.01
70	265.61	1.13
100	233.15	4.87
Average	244.24	4.34

Points to Note:

- Like other access points, throughput decreased with increase in number of clients
- Standard Deviation was quite high compared to others

Ruckus

Number of clients	Throughput	Std. Deviation
40	251.01	6.28
70	231.24	1.53
100	213.76	0.83
Average	232	2.88

Points to Note:

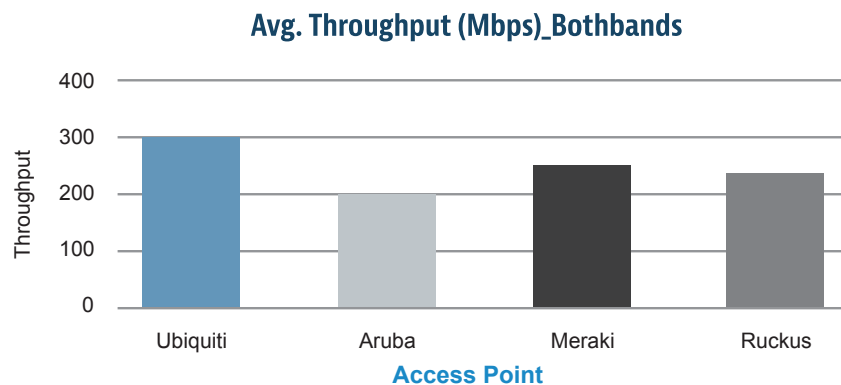
- Throughput decreased as expected with the increase in number of clients

Comparison

Average result	Ubiquiti	Aruba	Meraki	Ruckus
Avg.Throughput (Mbps)	302.41	202.05	244.24	232
Avg. Std. Deviation	2.41	1.48	4.34	2.88

Points to Note:

- Throughput of Ubiquiti was higher compared to other Access Points
- Though Aruba's throughput was the least compared to others, it managed to perform well in video streaming because of its low standard deviation



Test results - 5GHz only

Tests were conducted over the period of 2 days i.e. 15th and 16th of March 2017.

Test Sessions & Data

We ran 12 sessions. In each session , we ran

- 1 Throughput Test
- 3 Video Tests

We had 4 APs and 3 Client Load Levels (40, 70, 100) so 12 such sessions were planned.

Configuration

Access Points

- All Access Points were configured with latest released firmware we found on the internet and Ubiquiti with the 3.7.37.6065 firmware provided to us. For Meraki, the Access Point showed that the firmware version is up to date and we did not make any changes
- Channels were chosen manually based on lowest interference. Same channels were used for all access points for fair comparison. Auto channel select was disabled to effect this
- Bandwidth 80 MHz for 5 GHz
- Air Time Fairness set to ON, if the access point provided the option
- Power set to Maximum

Clients

- All Clients running on Windows.
- Same Clients, Same Location for testing all access points
- 75% 11ac Clients & 25% 11n Clients at any client load level
- PINGs are checked to be working on all clients before any test is run
- All Video runs used Mozilla Firefox with applicable plug-ins in place for http video streaming
- Browser cache was cleared before each Run

Commands

- Ipers Server command - iperf3 -s
- Iperf Client Command - iperf3 -c <Server IP Address> -t 180 -i 1 -w 64M

Note:

For 5Ghz only -w 64M was used which gives higher throughput. So it is fair to compare access points with each other. But we should not use these results to compare 5GHz Throughput with Both Bands Throughput

Video - 5GHz only

Video levels used for different loads were as below:

Video_Level_1 - mp4, 1080p, 1000 kbps, Slow moving speech video

Video_Level_2 - mp4, 1080p, 1500 kbps, Slow Animation

Video_Level_3 - mp4, 1080p, 2000 kbps, Hollywood movie

Video_Level_4 - mp4, 1080p, 3000 kbps, Fast Moving Animation

Video_Level_5 - mp4, 1080p, 4000 kbps, Gaming Level Animation

Video_Level_6 - mp4, 1080p, 5000 kbps, Fast moving Sports

Ubiquiti

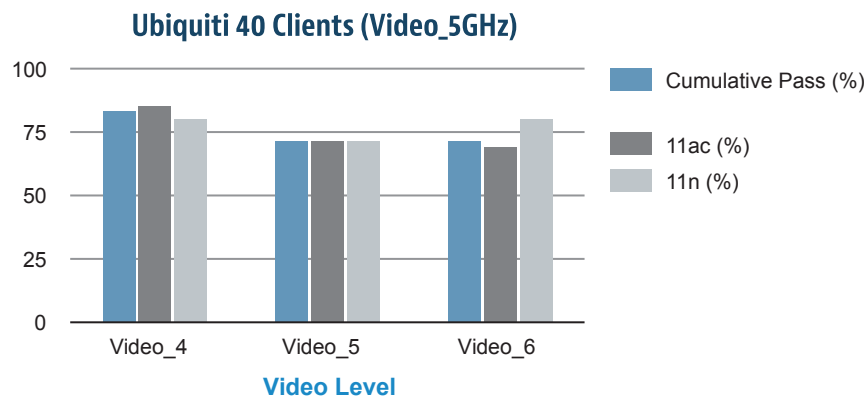
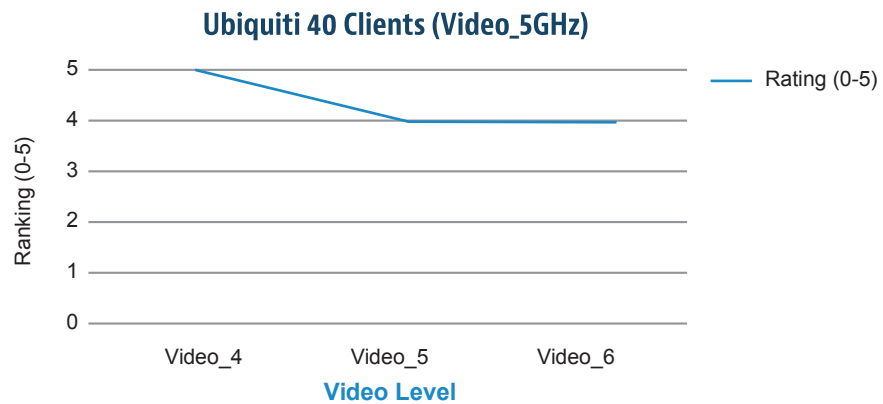
40 clients

For Ubiquiti 40 clients, Video level 4, 5 and 6 were run. Results were as shown below:

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_4 (3000 kbps)	85	5	86.67	80
Video_5 (4000 kbps)	70	4	70	70
Video_6 (5000 kbps)	70	4	66.67	80
Average	75	4.33	74.45	76.67

Points to Note:

- When load was 40 clients, ubiquiti performed well with an average pass (%) of 75
- There was a significant difference in the performance of 11n and 11ac when video level 6 ran. 11n performed better than 11ac clients in this case.
- The overall performance of 11ac and 11n clients was almost same



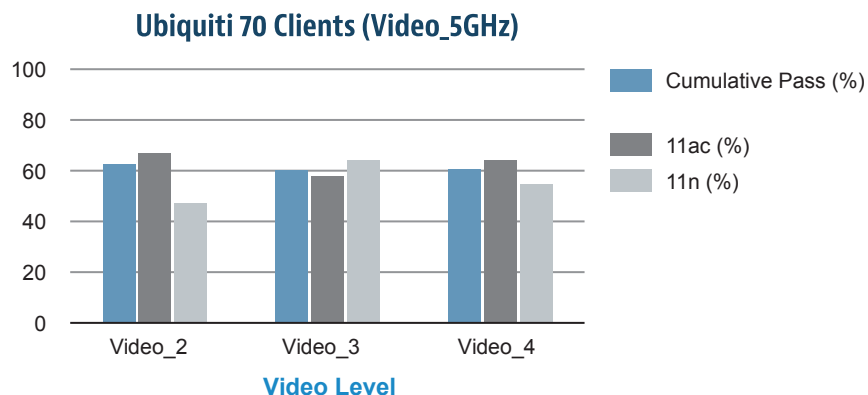
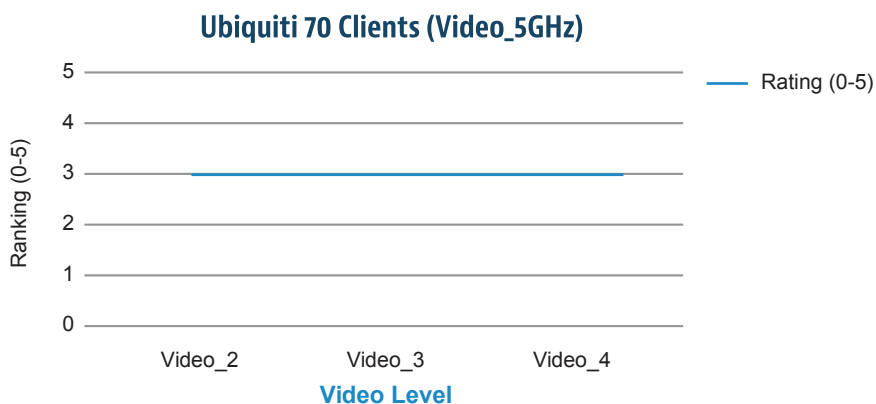
70 clients

For 70 clients, Video Levels 2, 3 and 4 were run. Results were as below:

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (1500 kbps)	62.85	3	68	50
Video_3 (2000 kbps)	60	3	58	65
Video_4 (3000 kbps)	61.43	3	64	55
Average	61.43	3	63.33	56.67

Points to Note:

- There was no significant performance degradation with the increase in bit rate of videos
- Overall, 11ac clients performed well compared to 11n clients



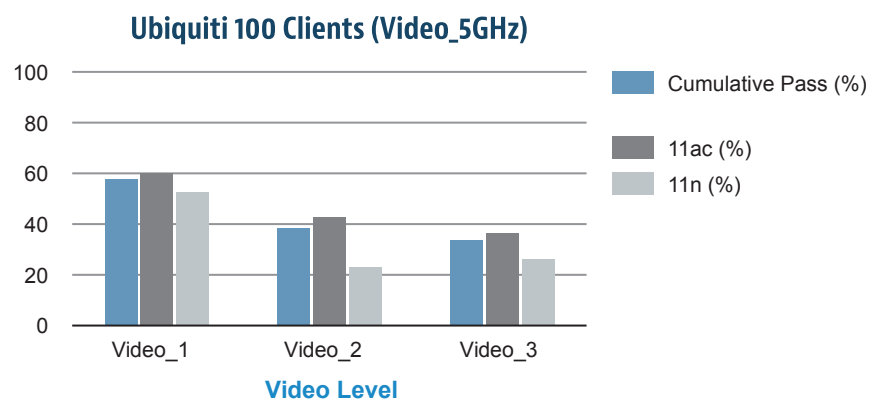
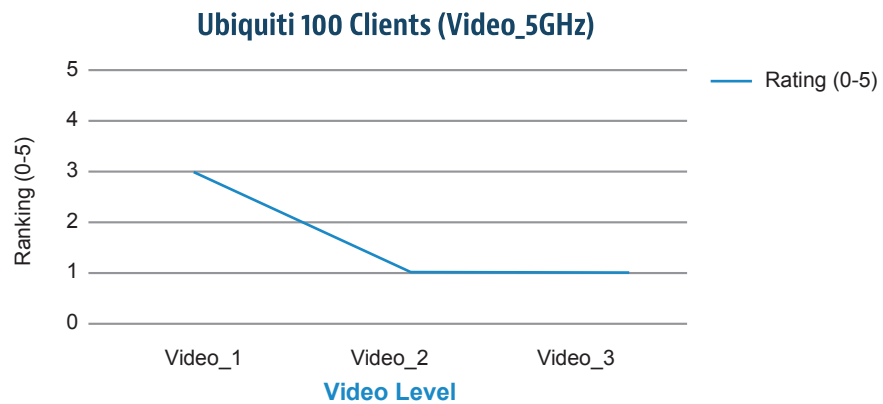
100 clients

For 100 clients, Video Levels 1, 2 and 3 were run

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	58	3	60	52
Video_2 (1500 kbps)	39	1	44	24
Video_3 (2000 kbps)	35	1	37.33	28
Average	44	1.67	47.11	34.67

Points to Note:

- Performance was degraded with the increase in bitrate of video
- 11ac clients performed slightly better compared to 11n clients
- Overall, Ubiquiti could not perform well when Access Point was stressed with 100 clients

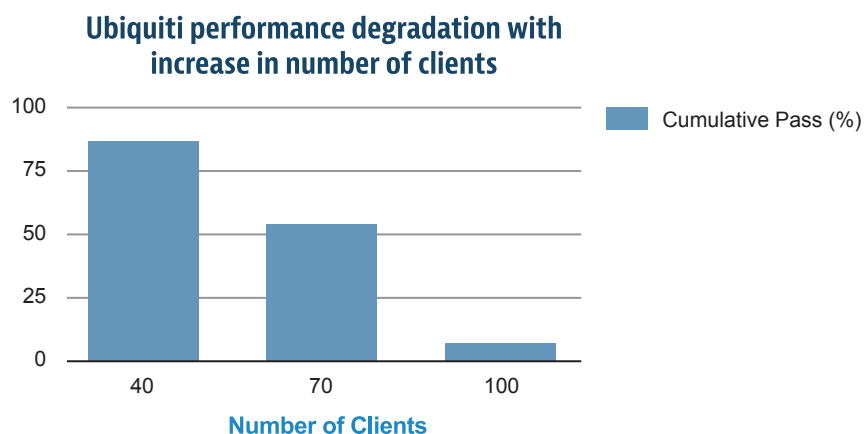


Performance degradation with increasing number of clients:

Number of clients	Cumulative Pass(%)
40	75
70	61.43
100	44

Points to Note:

- Performance was degraded with increase in number of clients

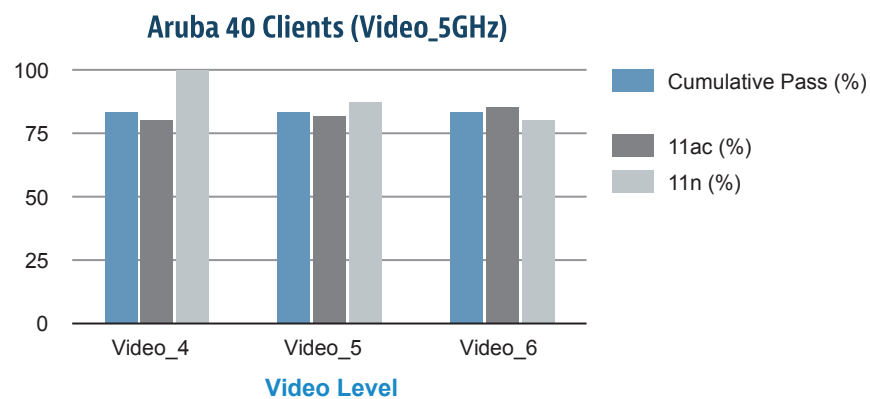
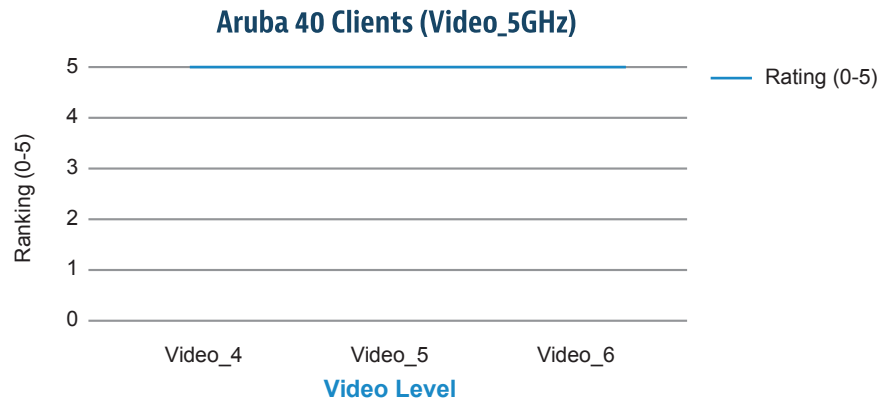
**Aruba****40 clients**

For 40 clients, Video levels 4, 5 and 6 were run

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_4 (3000 kbps)	85	5	80	100
Video_5 (4000 kbps)	85	5	83.33	90
Video_6 (5000 kbps)	85	5	86.67	80
Average	85	5	83.33	90

Points to Note:

- There was no change in the performance with the increase in bitrate of video from 3000 kbps to 5000 kbps
- Overall, 11n clients performed well



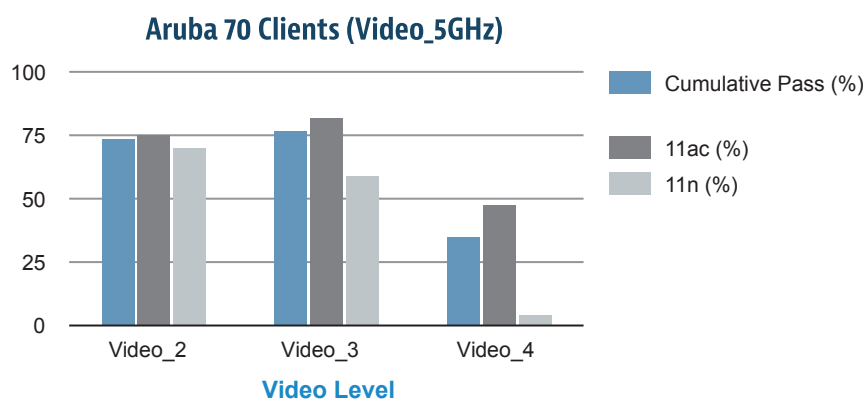
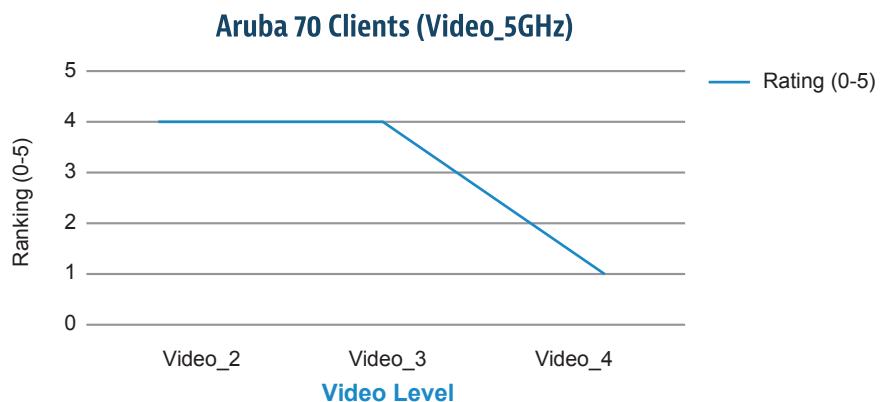
70 clients

For Aruba 70 clients test case, video levels 2, 3 and 4 were tested.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (1500 kbps)	74.29	4	76	70
Video_3 (2000 kbps)	77.14	4	84	60
Video_4 (3000 kbps)	35.71	1	48	5
Average	62.38	3	69.33	45

Points to Note:

- Performance was almost same with the increase in bitrate of video from 1500 kbps to 2000 kbps
- When bit rate increased from 2000 kbps to 3000 kbps, performance was reduced by more than 50%
- 11n clients did not perform well in the test with video level 4



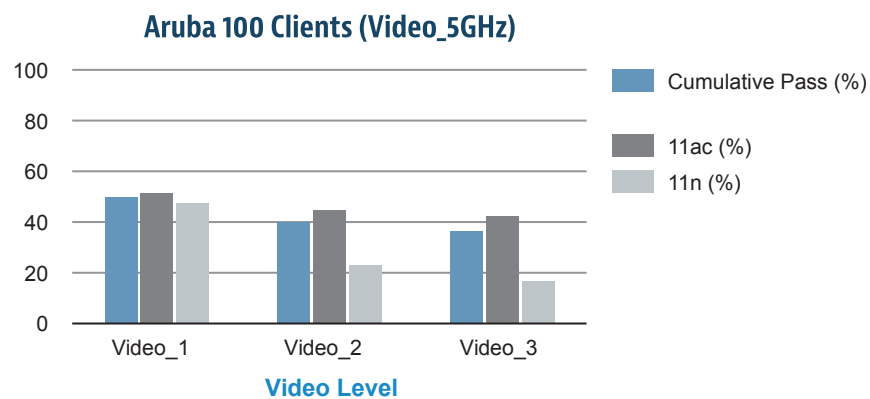
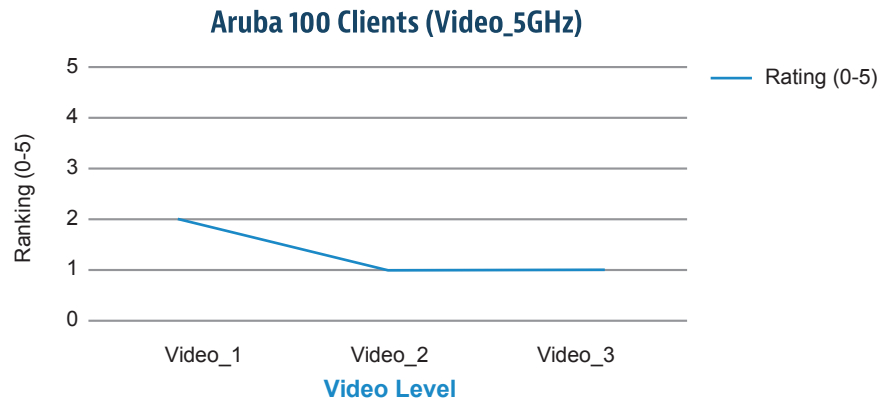
100 clients

For Aruba 100 clients test, Video levels 1, 2 & 3 were used.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	50	2	50.67	48
Video_2 (1500 kbps)	40	1	45.33	24
Video_3 (2000 kbps)	37	1	44	16
Average	42.33	1.33	46.67	29.33

Points to Note:

- Aruba also could not handle the stress of 100 clients
- Performance degraded significantly with increase in bitrate of video
- 11ac clients performed well compared to 11n clients

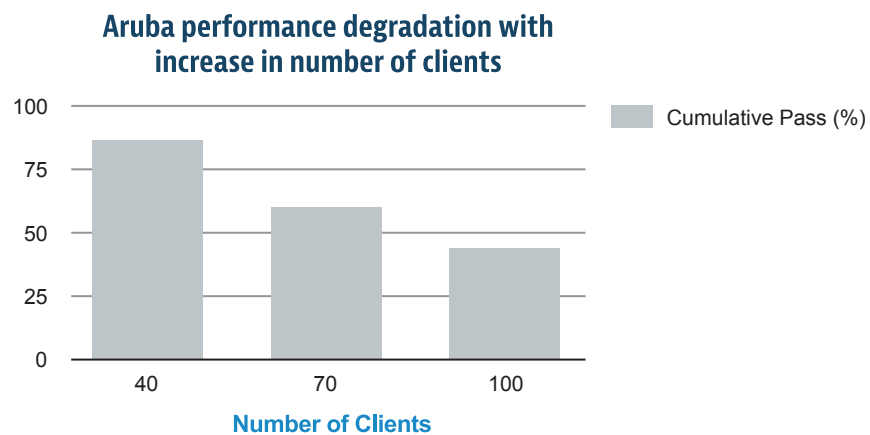


Performance degradation with increasing number of clients:

Number of clients	Cumulative Pass(%)
40	85
70	62.38
100	42.33

Points to Note:

- Performance was below 50% when client load was 100



Meraki

40 clients

Video levels 4, 5 and 6 were used for testing.

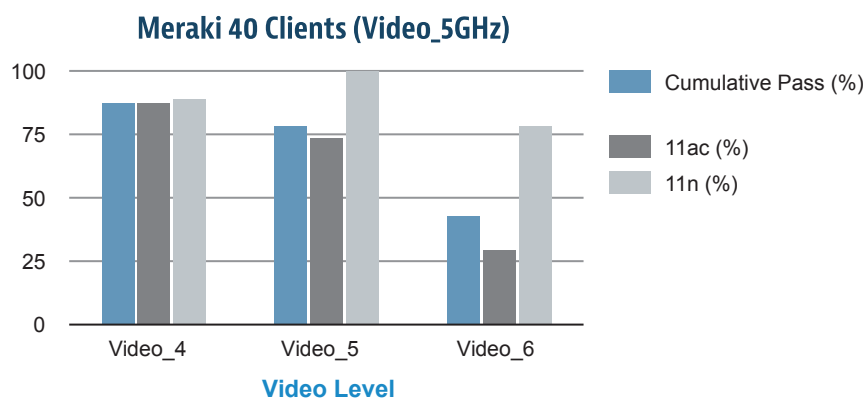
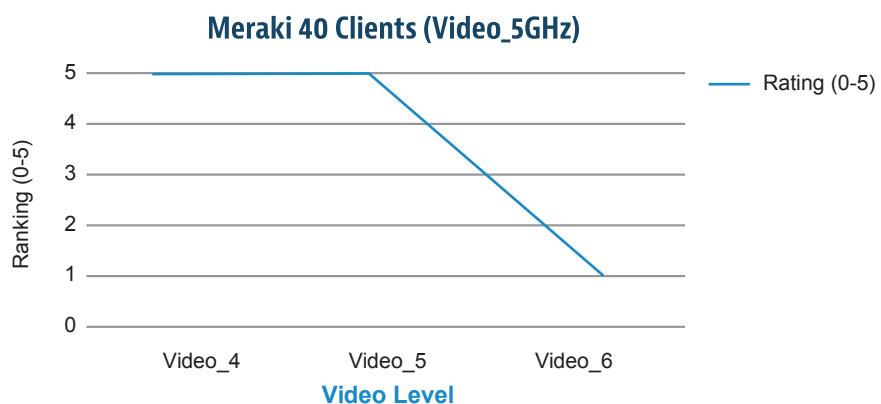
Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_4 (3000 kbps)	87.5	5	86.67	90
Video_5 (4000 kbps)	80	5	73.33	100
Video_6 (5000 kbps)	42.5	1	30	80
Average	70	3.67	63.33	90

Points to Note:

When video levels 4 and 5 were played, there was no significant difference in the performance, but observed degradation in performance by 50% when tested with video level 6

Performance was comparatively lower than other access points under test

11n clients stayed remarkably stable across different video levels



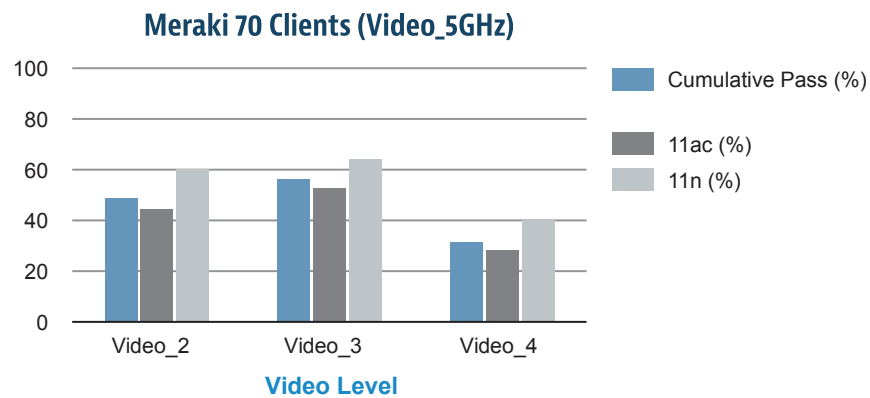
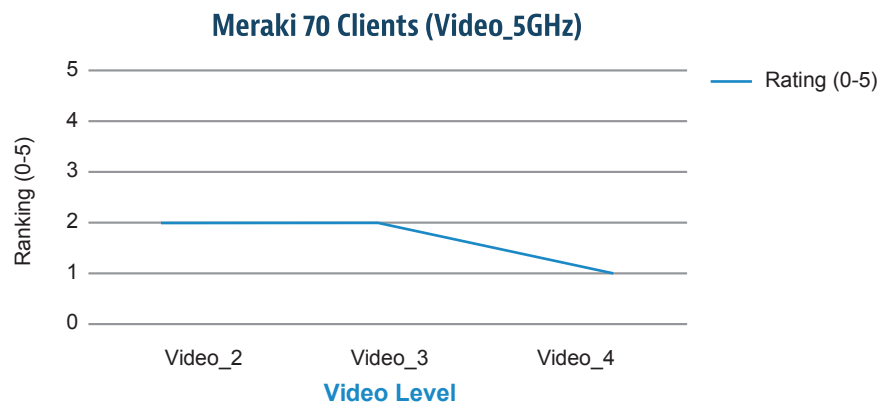
70 clients

Video levels 2, 3 and 4 were used to test the performance.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (1500 kbps)	50	2	46	60
Video_3 (2000 kbps)	55.71	2	52	65
Video_4 (3000 kbps)	32.86	1	30	40
Average	46.19	1.67	42.67	55

Points to Note:

- Meraki could not handle 70 clients also when increased bitrate of video to 3000 kbps
- Overall, 11n clients performed better than 11ac clients



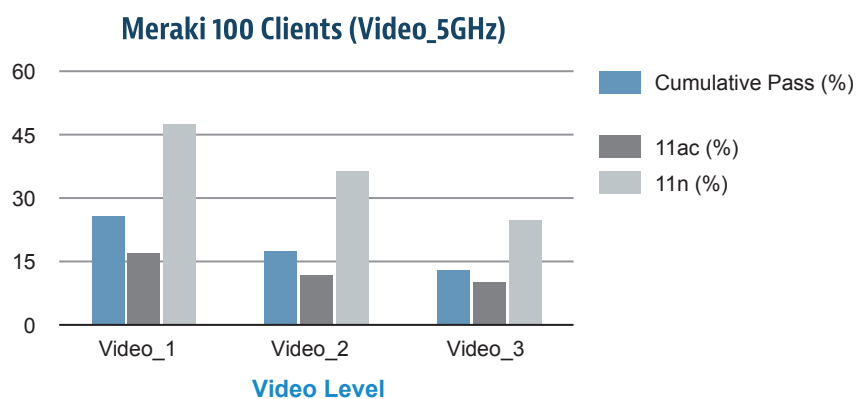
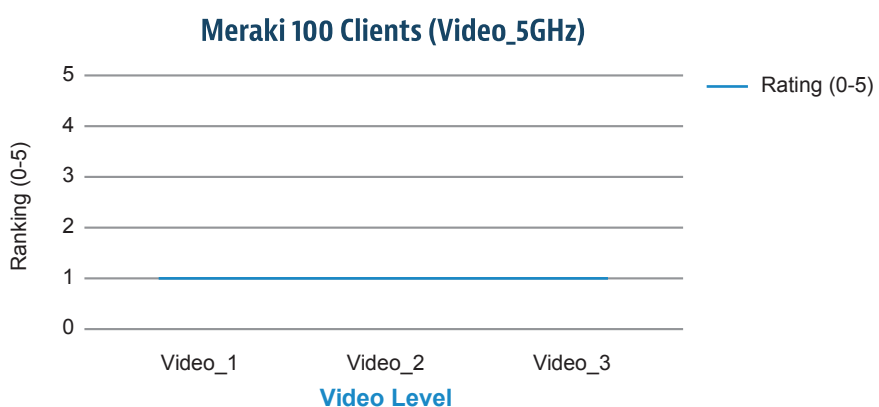
100 clients

Video levels 1, 2 and 3 were tested under this test case.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	37	1	32	52
Video_2 (1500 kbps)	32	1	28	44
Video_3 (2000 kbps)	29	1	26.67	36
Average	32.67	1	28.89	44

Points to note:

- For all the videos, performance was poor
- 11n clients performed significantly better than 11ac clients

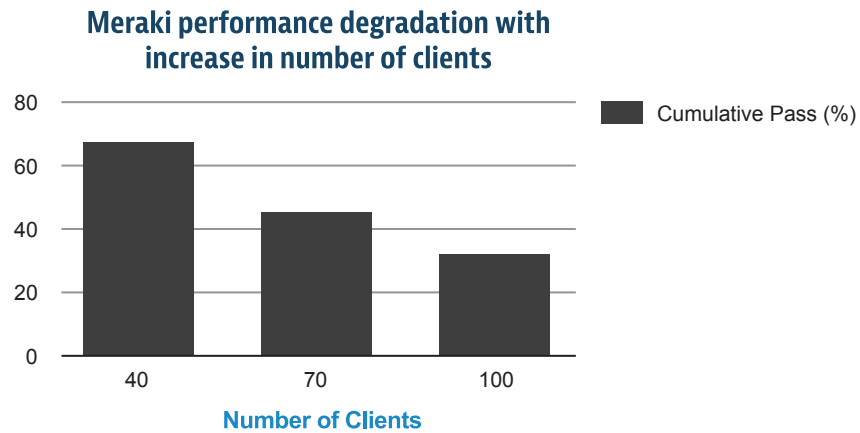


Performance degradation with increasing number of clients:

Number of clients	Cumulative Pass(%)
40	70
70	46.19
100	32.67

Points to Note:

- Meraki could not handle 70 and 100 client load



Ruckus

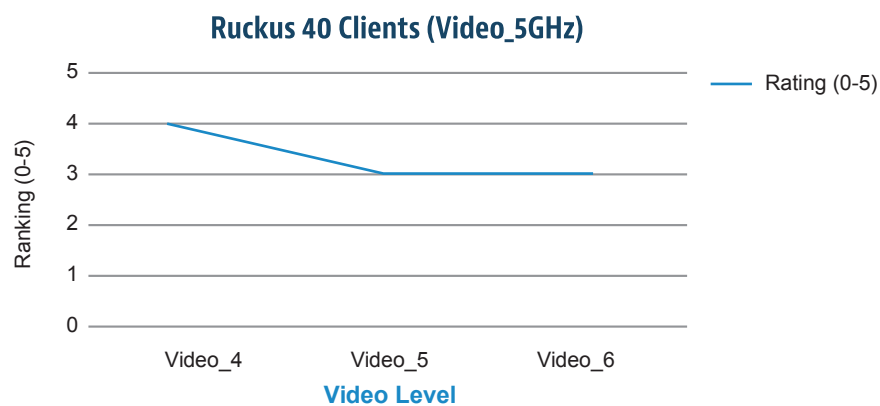
40 clients

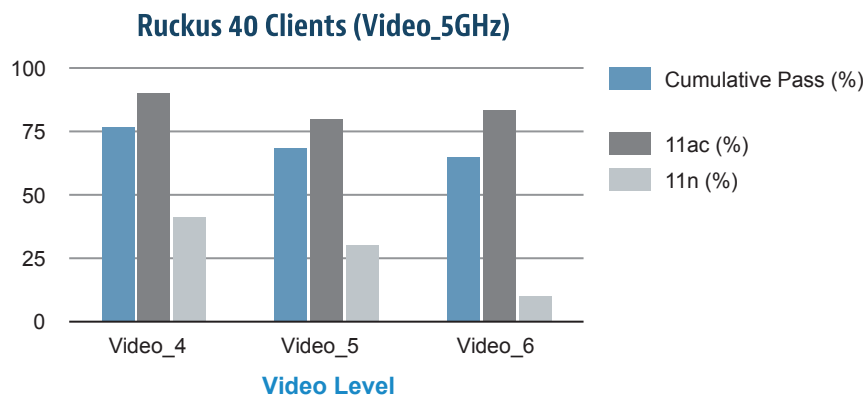
Video levels 4, 5 and 6 were used for testing.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_4 (3000 kbps)	77.5	4	90	40
Video_5 (4000 kbps)	67.5	3	80	30
Video_6 (5000 kbps)	65	3	83.33	10
Average	70	3.33	84.44	26.66

Points to Note:

- With increase in video level from 4 to 6, there was a significant decrease in the performance
- 11ac clients performed well across all video levels compared to 11n clients





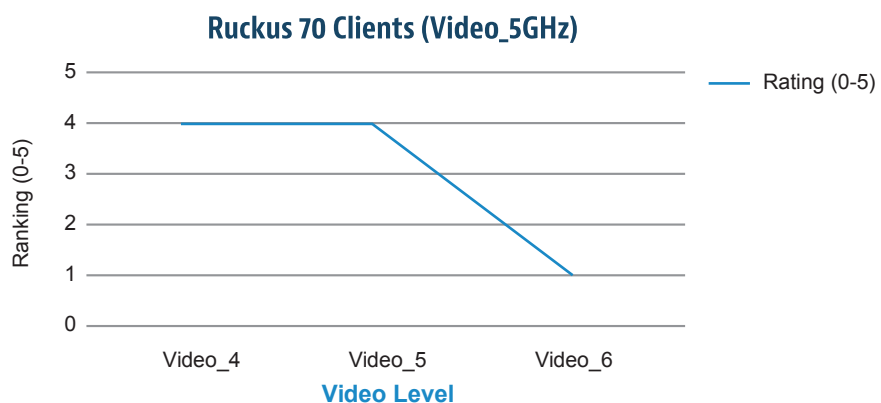
70 clients

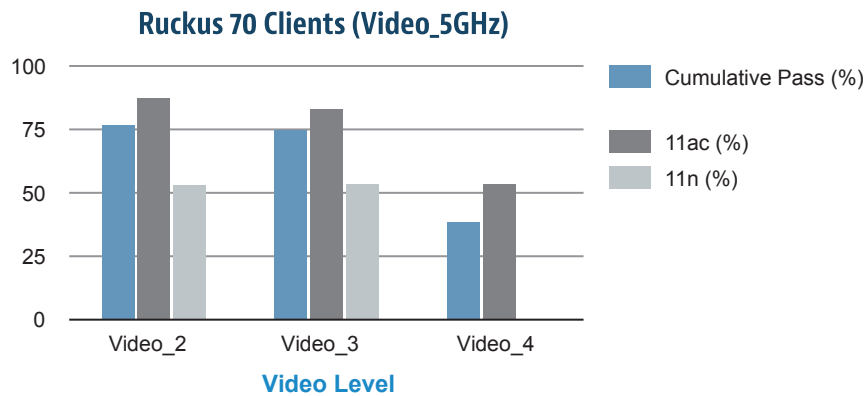
Video level 2, 3 and 4 were used to test the performance.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_2 (1500 kbps)	78.57	4	88	55
Video_3 (2000 kbps)	74.29	4	82	55
Video_4 (3000 kbps)	38.57	1	54	0
Average	63.81	3	74.67	36.67

Points to Note:

- 11ac clients performed better than 11n clients
- From video level 2 to 4, there was a reduction in pass percentage by more than 50%





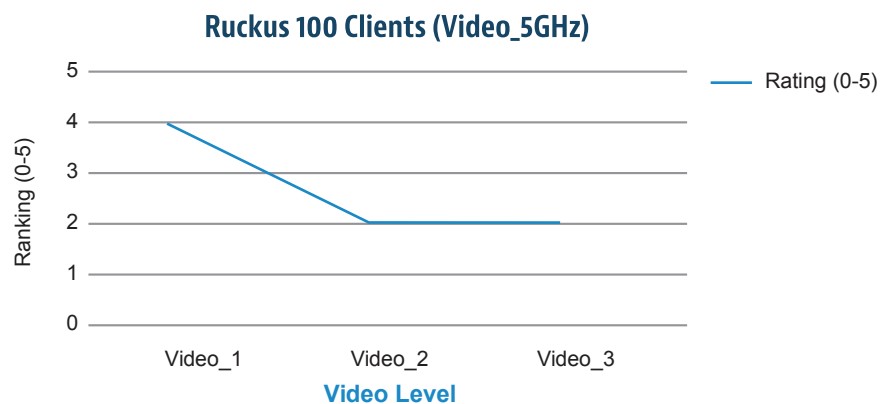
100 clients

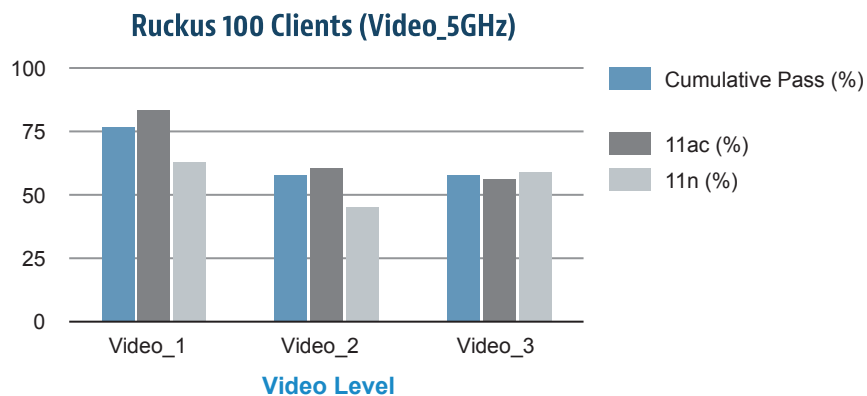
Video level 1, 2 and 3 were tested under this test case.

Video Level	Cumulative Pass (%)	Rating (0-5)	11ac (%)	11n (%)
Video_1 (1000 kbps)	78	4	82.67	64
Video_2 (1500 kbps)	58	2	62.67	44
Video_3 (2000 kbps)	57	2	56	60
Average	64.33	2.67	67.11	56

Points to note:

- 11ac clients performed slightly better than 11n clients
- There was a slight degradation in the performance with increase in video level from 1 to video level 3



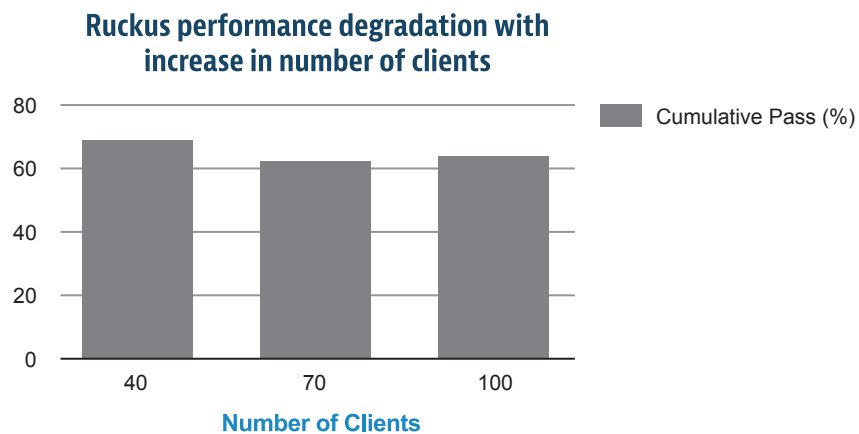


Performance degradation with increasing number of clients:

Number of clients	Cumulative Pass(%)
40	70
70	63.81
100	64.33

Points to Note:

- No significant change in performance with increase in load from 40 to 70 clients



Comparison

Performance of Access Points with increase in number of clients was shown below:

Number of Clients	Ubiquiti	Aruba	Meraki	Ruckus
40	4.33	5	3.67	3.33
70	3	3	1.67	3
100	1.67	1.33	1	2.67
Overall	3	3.11	2.11	3

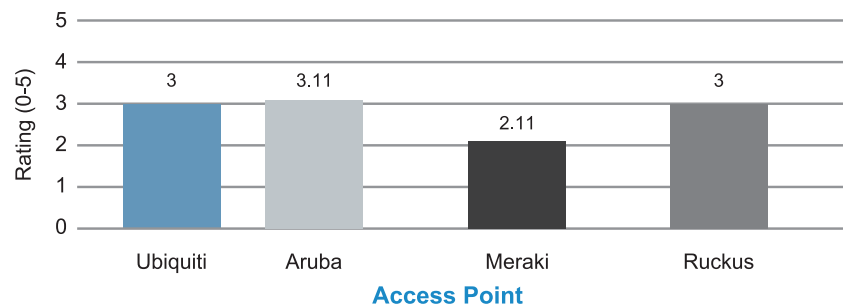
Points to Note:

- Aruba, Ubiquiti and Ruckus performed well compared Meraki
- Ubiquiti, Ruckus and Aruba access points met the performance goal

Video Performance_5GHz Only



Overall Video Performance Rating



Throughput - 5GHz only

Ubiquiti

Number of clients	Throughput	Std. Deviation
40	249.54	0.29
70	262.50	2.80
100	265.40	3.66
Average	259.15	2.25

Points to Note:

- There was no significant change in the throughput with increase in load from 40 to 100

Aruba

Number of clients	Throughput	Std. Deviation
40	222.35	1.88
70	180.74	1.14
100	177.205	1.22
Average	193.43	1.41

Points to Note:

- Standard Deviation was found to be very low compared to other access points
- Throughput was also comparatively less

Meraki

Number of clients	Throughput	Std. Deviation
40	232.04	5.86
70	287.74	5.49
100	282.95	3.80
Average	267.57	5.05

Points to Note:

- Throughput increased with the increase in clients from 40 to 70
- Standard Deviation was highest compared to other access points

Ruckus

Number of clients	Throughput	Std. Deviation
40	292.75	2.2
70	239.59	0.9
100	209.39	0.91
Average	247.24	1.34

Points to Note:

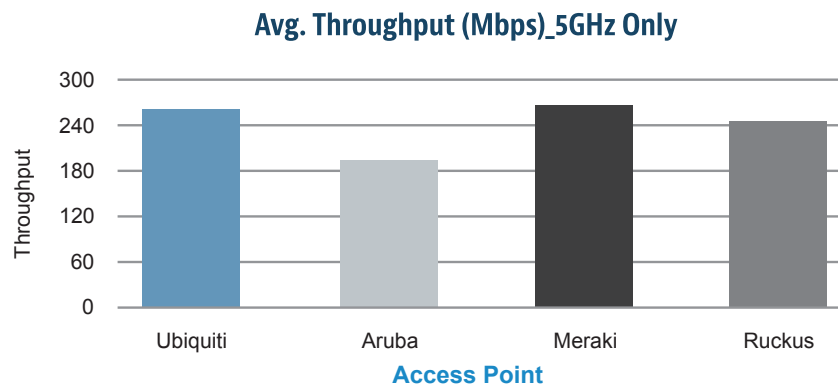
- Throughput decreased with the increase in clients from 40 to 100
- Average standard deviation was less compared to other access points

Comparison

Average result	Ubiquiti	Aruba	Meraki	Ruckus
Avg.Throughput (Mbps)	259.15	193.43	267.57	247.24
Avg. Std. Deviation	2.25	1.41	5.05	1.34

Points to Note:

- Ubiquiti and Meraki performed well in the throughput tests, whereas Aruba was the least performer
- Ruckus and Aruba's standard deviation is very less compared to other access points. They can provide a relatively uniform user experience across different user loads



Summary of Findings

- a. In **Both bands configuration**, **Ubiquiti** was best in throughput and the only one to meet the video performance goals. It did significantly better than others.
- b. In **5GHz only configuration**, **Meraki** was best in throughput and Aruba was the least performer. But in video, Aruba, Ubiquiti and Ruckus could meet the video performance goals while Meraki could not perform well.
- c. HD video streaming performance cannot be assessed based on raw throughput figures. It has to be tested separately.

Check our YouTube video at: https://youtu.be/72iokPF_fzc

Full disclosure: The tests were sponsored by Ubiquiti. However Ubiquiti was not involved with definition of test cases, planning, device configuration, execution or analysis of results. All these tasks were independently undertaken by Alethea. Ubiquiti representatives were not present during the test preparation and execution, nor exerted any indirect influence on these activities.

APPENDIX

The following sheets capture results from individual client for each session.

Videostreaming_Bothbands - Ubiquiti_40

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_3	Video_4	Video_5
101	Pass	Pass	Fail
102	Pass	Pass	Fail
103	Pass	Pass	Fail
113	Pass	Pass	Fail
114	Pass	Pass	Pass
115	Pass	Pass	Pass
116	Pass	Pass	Pass
117	Pass	Pass	Fail
118	Pass	Pass	Fail
128	Pass	Fail	Fail
129	Pass	Fail	Pass
130	Pass	Pass	Pass
134	Pass	Pass	Fail
135	Pass	Pass	Pass
136	Pass	Pass	Fail
140	Pass	Pass	Fail
141	Fail	Pass	Fail
142	Pass	Pass	Fail
149	Pass	Fail	Fail
150	Pass	Pass	Fail
151	Pass	Pass	Fail
152	Pass	Pass	Fail
153	Pass	Pass	Fail
154	Pass	Fail	Fail
155	Pass	Pass	Fail
156	Pass	Pass	Fail
157	Pass	Fail	Fail
165	Pass	Pass	Pass
166	Pass	Fail	Fail
201	Pass	Pass	Pass
205	Pass	Pass	Pass
206	Pass	Pass	Fail
210	Fail	Fail	Fail
212	Pass	Pass	Pass
214	Pass	Pass	Pass
217	Pass	Pass	Pass
218	Pass	Pass	Pass
219	Fail	Fail	Fail

225	Pass	Pass	Pass
226	Pass	Pass	Pass
Number of Clients "Passed"	37	32	15
Number of Clients "Failed"	3	8	25
Number of Clients with "No Data"	0	0	0
Total Number of Clients	40	40	40

Videostreaming_Bothbands - Ubiquiti_40

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_3					
AC	28	1	0	29	96.55%
N	9	2	0	11	81.82%
AC+N	37	3	0	40	92.50%
Video_4					
AC	23	6	0	29	79.31%
N	9	2	0	11	81.82%
AC+N	32	8	0	40	80.00%
Video_5					
AC	7	22	0	29	24.14%
N	8	3	0	11	72.73%
AC+N	15	25	0	40	37.50%

Videostreaming_Bothbands - With ATF_Ubiquiti_40

System Number	Expert Verdict
	Both Bands
	Video_5
101	Pass
102	Fail
103	Pass
113	Pass
114	Pass
115	Fail
116	Fail
117	Fail
118	Pass
128	Pass
129	Fail
130	Pass
134	Pass
135	Pass
136	Fail
140	Pass
141	Fail
142	Pass
149	Pass
150	No data
151	Fail
152	Pass
153	Pass
154	Pass
155	Fail
156	Fail
157	Pass
165	No data
166	No data
201	Pass
205	Pass
206	Fail
210	Pass
212	Pass
214	Pass
217	Pass
218	Pass
219	Pass
225	Pass
226	Pass
Number of Clients "Passed"	26
Number of Clients "Failed"	11

Number of Clients with "No Data"	3
Total Number of Clients	37

Videostreaming_Bothbands - With ATF_Ubiquiti_40

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_3					
AC	16	10	3	26	61.54%
N	10	1	0	11	90.91%
AC+N	26	11	3	37	70.27%

Videostreaming_Bothbands - Aruba_40

System Number	Expert Verdict		
	Both Bands (2.4 + 5 GHz)		
	Video_3	Video_4	Video_5
101	Pass	Pass	Pass
102	Pass	Pass	Fail
103	Pass	Pass	Fail
113	Pass	Pass	Pass
114	Pass	Pass	Pass
115	Pass	Pass	Pass
116	Pass	Pass	Pass
117	Pass	Pass	Fail
118	Pass	Pass	Fail
128	Pass	Pass	Fail
129	Fail	Fail	Fail
130	Pass	Pass	Pass
134	Pass	Pass	Pass
135	Pass	Pass	Pass
136	Pass	Pass	Fail
140	Pass	Pass	Pass
141	Pass	Pass	Pass
142	Pass	Pass	Fail
149	Pass	Pass	Pass
150	Fail	Fail	Fail
151	Pass	Pass	Pass
152	Pass	Pass	Fail
153	Pass	Pass	Pass
154	Pass	Pass	Fail
155	Pass	Pass	Fail
156	Pass	Pass	Fail
157	Pass	Pass	Pass
165	Pass	Pass	Pass
166	Fail	Pass	Pass
201	Pass	Fail	Fail
205	Pass	Fail	Fail
206	Pass	Pass	Fail
210	Fail	Fail	Fail
212	Fail	Fail	Fail
214	Fail	Pass	Pass
217	Pass	Pass	Pass
218	Pass	Pass	Fail
219	Pass	Pass	Pass
225	Pass	Pass	Fail
226	Pass	Pass	Fail
Number of Clients "Passed"	34	34	19
Number of Clients "Failed"	6	6	21

Number of Clients with "No Data"	0	0	0
Total Number of Clients	40	40	40

Videostreaming_Bothbands - Aruba_40

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_3					
AC	26	3	0	29	89.66%
N	8	3	0	11	72.73%
AC+N	34	6	0	40	85.00%
Video_4					
AC	27	2	0	29	93.10%
N	7	4	0	11	63.64%
AC+N	34	6	0	40	85.00%
Video_5					
AC	16	13	0	29	55.17%
N	3	8	0	11	27.27%
AC+N	19	21	0	40	47.50%

Videostreaming_Bothbands - Meraki_40

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_3	Video_4	Video_5
101	Pass	Pass	Pass
102	Pass	Pass	Pass
103	Fail	Pass	Fail
113	Pass	Pass	Fail
114	Fail	Pass	Fail
115	Pass	Pass	Fail
116	Pass	Pass	Pass
117	Pass	Pass	Pass
118	Pass	Pass	Pass
128	Pass	Pass	Pass
129	Pass	Pass	Pass
130	Pass	Pass	Fail
134	Pass	Pass	Pass
135	Pass	Pass	Pass
136	Fail	Pass	Fail
140	Pass	Pass	Pass
141	Pass	Fail	Fail
142	Fail	Pass	Pass
149	Pass	Pass	Pass
150	Pass	Pass	Pass
151	Fail	Fail	Fail
152	Fail	Fail	Fail
153	Pass	Pass	Fail
154	Pass	Pass	Fail
155	Fail	Fail	Fail
156	Pass	Pass	Fail
157	Pass	Pass	Pass
165	Pass	Fail	Pass
166	Pass	Pass	Fail
201	Pass	Pass	Pass
205	Pass	Pass	Fail
206	Fail	Pass	Pass
210	Fail	Pass	Fail
212	Pass	Pass	Fail
214	Pass	Pass	Fail
217	Fail	Fail	Fail
218	Pass	Fail	Fail
219	Pass	Pass	Fail
225	Pass	Fail	Fail
226	Fail	Fail	Fail
Number of Clients "Passed"		29	31
Number of Clients "Failed"		11	23

Number of Clients with "No Data"	0	0	0
Total Number of Clients	40	40	40

Videostreaming_Bothbands - Meraki_40

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_3					
AC	22	7	0	29	75.86%
N	7	4	0	11	63.64%
AC+N	29	11	0	40	72.50%
Video_4					
AC	24	5	0	29	82.76%
N	7	4	0	11	63.64%
AC+N	31	9	0	40	77.50%
Video_5					
AC	15	14	0	29	51.72%
N	2	9	0	11	18.18%
AC+N	17	23	0	40	42.50%

Videostreaming_Bothbands - Ruckus_40

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_3	Video_4	Video_5
101	Pass	Pass	Fail
102	Pass	Fail	Fail
103	Pass	Pass	Pass
113	Pass	Pass	Pass
114	Pass	Pass	Fail
115	Pass	Pass	Pass
116	Pass	Pass	Pass
117	Pass	Pass	Pass
118	Pass	Pass	Fail
128	Pass	Pass	Fail
129	Pass	Pass	Pass
130	Pass	Pass	Fail
134	Fail	Pass	Pass
135	Pass	Pass	Fail
136	Fail	Pass	Fail
140	Pass	Fail	Fail
141	Fail	Fail	Fail
142	Pass	Pass	Pass
149	Pass	Pass	Fail
150	Pass	Pass	Fail
151	Pass	Pass	Pass
152	Pass	Pass	Pass
153	Pass	Pass	Fail
154	Pass	Pass	Pass
155	Pass	Pass	Fail
156	Pass	Pass	Fail
157	Fail	Fail	Fail
165	Pass	Pass	Pass
166	Fail	Fail	Fail
201	Pass	Pass	Fail
205	Pass	Fail	Fail
206	Pass	Pass	Pass
210	Pass	Pass	Pass
212	Fail	Fail	Fail
214	Pass	Pass	Pass
217	Pass	Pass	Fail
218	Pass	Pass	Pass
219	Pass	Pass	Pass
225	Pass	Pass	Fail
226	Fail	Pass	Fail
Number of Clients "Passed"	33	33	17
Number of Clients "Failed"	7	7	23

Number of Clients with "No Data"	0	0	0
Total Number of Clients	40	40	40

Videostreaming_Bothbands - Ruckus_40

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_3					
AC	24	5	0	29	82.76%
N	9	2	0	11	81.82%
AC+N	33	7	0	40	82.50%
Video_4					
AC	24	5	0	29	82.76%
N	9	2	0	11	81.82%
AC+N	33	7	0	40	82.50%
Video_5					
AC	12	17	0	29	41.38%
N	5	6	0	11	45.45%
AC+N	17	23	0	40	42.50%

Videostreaming_Bothbands - Ubiquiti_70

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_2	Video_3	Video_4
102	Pass	Pass	Pass
103	Pass	Fail	Fail
105	Pass	Fail	Fail
106	Pass	Pass	Fail
108	Pass	Pass	Pass
109	Fail	Fail	Fail
111	Fail	Fail	Fail
112	Pass	Fail	Pass
113	Pass	Fail	Fail
115	Pass	Fail	Pass
117	Pass	Fail	Fail
118	Pass	Fail	Fail
120	Pass	Pass	Pass
121	Pass	Pass	Pass
123	Pass	Pass	Fail
124	Fail	Pass	Pass
125	Fail	Fail	Fail
127	Pass	Pass	Pass
129	Pass	Pass	Pass
130	Pass	Fail	Fail
132	Pass	Pass	Pass
133	Pass	Fail	Pass
135	Pass	Fail	Pass
136	Pass	Pass	Pass
138	Pass	Fail	Fail
139	Pass	Pass	Pass
141	Pass	Pass	Fail
142	Pass	Pass	Fail
144	Pass	Pass	Pass
145	No data	No data	No data
147	Pass	Pass	Pass
148	Pass	Pass	Pass
150	Pass	Fail	Fail
151	Pass	Fail	Pass
152	Pass	Fail	Pass
154	Pass	Pass	Pass
156	Fail	Pass	Fail
157	Pass	Fail	Fail
159	No data	Fail	Pass
160	Pass	Pass	Fail
161	Pass	Pass	Pass
162	Fail	Fail	Fail

163	Pass	Pass	Pass
164	Pass	Fail	Fail
165	Fail	Pass	Pass
166	Pass	Pass	Fail
167	Pass	Pass	Pass
168	Pass	Pass	Fail
169	Pass	Pass	Fail
170	Pass	Pass	Fail
201	Pass	Fail	Fail
202	Fail	Fail	Fail
203	Fail	Fail	Fail
204	Pass	Fail	Fail
205	Fail	Fail	No data
206	Pass	Fail	Pass
207	Pass	Fail	Fail
208	Fail	Fail	Fail
209	Fail	Fail	Fail
210	Pass	Fail	Fail
211	Fail	Fail	Fail
212	Fail	Fail	Fail
213	Pass	Pass	Fail
214	Pass	Pass	Fail
215	Fail	Fail	Fail
216	Pass	Pass	Fail
217	Fail	Fail	Fail
218	Pass	Pass	Pass
219	Pass	Fail	Fail
220	Pass	Fail	Fail
Number of Clients "Passed"	52	32	27
Number of Clients "Failed"	16	37	41
Number of Clients with "No Data"	2	1	2
Total Number of Clients	68	69	68

Videostreaming_Bothbands - Ubiquiti_70

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_2					
AC	41	7	2	48	85.42%
N	11	9	0	20	55.00%
AC+N	52	16	2	68	76.47%
Video_3					
AC	28	21	1	49	57.14%
N	4	16	0	20	20.00%
AC+N	32	37	1	69	46.38%
Video_4					
AC	25	24	1	49	51.02%
N	2	17	1	19	10.53%
AC+N	27	41	2	68	39.71%

Videostreaming_Bothbands - Aruba_70

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_1	Video_2	Video_3
102	Pass	Pass	Fail
103	Fail	Pass	Pass
105	Fail	Pass	Pass
106	Fail	Fail	Pass
108	Fail	Pass	Fail
109	Pass	Pass	Pass
111	Fail	Fail	Pass
112	Pass	Pass	Fail
113	Fail	Pass	Pass
115	Pass	Pass	Fail
117	Pass	Pass	Pass
118	Pass	Pass	Pass
120	Fail	Pass	Fail
121	Pass	Pass	Pass
123	Pass	Pass	Pass
124	Pass	Pass	Fail
125	Pass	Fail	Fail
127	Pass	Pass	Fail
129	Fail	Pass	Fail
130	Fail	Fail	Fail
132	Fail	Pass	Pass
133	Pass	Pass	Pass
135	Pass	Pass	Fail
136	Pass	Pass	Fail
138	Pass	Pass	Fail
139	Fail	Pass	Pass
141	Fail	Pass	Fail
142	Fail	Fail	Fail
144	Pass	Pass	Fail
145	Fail	Fail	Fail
147	Fail	Fail	Fail
148	Fail	Pass	Pass
150	Fail	Pass	Pass
151	Pass	Fail	Pass
152	Fail	Fail	Fail
154	Fail	Fail	Pass
156	Fail	Pass	Pass
157	Pass	Pass	Pass
159	Pass	Fail	Pass
160	Fail	Fail	Fail
161	Pass	Pass	Fail
162	Fail	Pass	Pass

163	Fail	Fail	Fail
164	Fail	Pass	Pass
165	Pass	Pass	Pass
166	Pass	Pass	Fail
167	Pass	Fail	Fail
168	Pass	Pass	Pass
169	Fail	Pass	Pass
170	Pass	Pass	Fail
201	Fail	Pass	Fail
202	Fail	Fail	Fail
203	Fail	Fail	Fail
204	Fail	Pass	Fail
205	Pass	Pass	Fail
206	Fail	Pass	Fail
207	Pass	Pass	Pass
208	Fail	Fail	Fail
209	Pass	Pass	Fail
210	Pass	Pass	Fail
211	Fail	Fail	Fail
212	Fail	Fail	Fail
213	Fail	Fail	Pass
214	Pass	Pass	Pass
215	Pass	Pass	Fail
216	Fail	Pass	Pass
217	Fail	Pass	Fail
218	Pass	Fail	Fail
219	Fail	Fail	Fail
220	Fail	Pass	Fail
Number of Clients "Passed"	32	48	29
Number of Clients "Failed"	38	22	41
Number of Clients with "No Data"	0	0	0
Total Number of Clients	70	70	70

Videostreaming_Bothbands - Aruba_70

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	25	25	0	50	50.00%
N	7	13	0	20	35.00%
AC+N	32	38	0	70	45.71%
Video_2					
AC	36	14	0	50	72.00%
N	12	8	0	20	60.00%
AC+N	48	22	0	70	68.57%

Video_3					
AC	25	25	0	50	50.00%
N	4	16	0	20	20.00%
AC+N	29	41	0	70	41.43%

Videostreaming_Bothbands - Meraki_70

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_2	Video_3	Video_4
102	Pass	Fail	Pass
103	Fail	Pass	Pass
105	Pass	Pass	Pass
106	Pass	Pass	Pass
108	Pass	Pass	Pass
109	Pass	Pass	Pass
111	Pass	Pass	Pass
112	Pass	Pass	Pass
113	Fail	Pass	Pass
115	Fail	Fail	Pass
117	Fail	Pass	Pass
118	Pass	Pass	Pass
120	Pass	Fail	Pass
121	Fail	Pass	Pass
123	Pass	Pass	Pass
124	Pass	Pass	Pass
125	Pass	Pass	Pass
127	Pass	Pass	Pass
129	Fail	Pass	Pass
130	Fail	Fail	Fail
132	Fail	Pass	Fail
133	Pass	Pass	Pass
135	Pass	Pass	Pass
136	Pass	Pass	Pass
138	Pass	Pass	Fail
139	Fail	Fail	Fail
141	Pass	Pass	Pass
142	Fail	Pass	Pass
144	Pass	Pass	Pass
145	Fail	Fail	Fail
147	Pass	Pass	Fail
148	Pass	Pass	Fail
150	Pass	Fail	Pass
151	Fail	Pass	Pass
152	Fail	Pass	Fail
154	Fail	Pass	Fail
156	Pass	Pass	Fail
157	Pass	No Data	Fail
159	Pass	Pass	Fail
160	Pass	Fail	Fail
161	Fail	Fail	Pass
162	Pass	Fail	Pass

163	Pass	Fail	Pass
164	Fail	Pass	Pass
165	Pass	Pass	Pass
166	Pass	Fail	Fail
167	Fail	Fail	Fail
168	Fail	Fail	Fail
169	Pass	Fail	Fail
170	Fail	Pass	Pass
201	Pass	No Data	No Data
202	Fail	Fail	Fail
203	Fail	Fail	Fail
204	Pass	Fail	Fail
205	Pass	Fail	Fail
206	Pass	Pass	Fail
207	Pass	Pass	Fail
208	Pass	Fail	Fail
209	Pass	Pass	Pass
210	Fail	Fail	Fail
211	Fail	Fail	Pass
212	Fail	Fail	Fail
213	Fail	Fail	Fail
214	Pass	Fail	Fail
215	Pass	Pass	Pass
216	Pass	Fail	Fail
217	Pass	Fail	Pass
218	Pass	Pass	Fail
219	Pass	Pass	Pass
220	Pass	Fail	Fail
Number of Clients "Passed"	45	40	38
Number of Clients "Failed"	25	28	31
Number of Clients with "No Data"	0	2	1
Total Number of Clients	70	68	69

Videostreaming_Bothbands - Meraki_70

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	31	19	0	50	62.00%
N	14	6	0	20	70.00%
AC+N	45	25	0	70	64.29%
Video_2					
AC	34	15	1	49	69.39%
N	6	13	1	19	31.58%
AC+N	40	28	2	68	58.82%
Video_3					
AC	33	17	0	50	66.00%
N	5	14	1	19	26.32%
AC+N	38	31	1	69	55.07%

Videostreaming_Bothbands - Ruckus_70

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_1	Video_2	Video_3
102	Fail	Pass	Pass
103	Fail	Pass	Fail
105	Pass	Fail	Fail
106	Fail	Fail	Fail
108	Fail	Pass	Pass
109	Pass	Fail	Pass
111	Fail	Pass	Fail
112	Pass	Fail	Fail
113	Pass	Pass	Fail
115	Pass	Pass	Pass
117	Pass	Pass	Pass
118	Pass	Fail	Fail
120	Pass	Pass	Fail
121	Fail	Pass	Fail
123	Pass	Pass	Fail
124	Pass	Fail	Pass
125	Pass	Fail	Fail
127	Pass	Fail	Pass
129	Pass	Fail	Fail
130	Fail	Pass	Fail
132	Pass	Fail	Pass
133	Pass	Fail	Pass
135	Pass	Pass	Fail
136	Pass	Pass	Fail
138	Pass	Pass	Fail
139	Fail	Pass	Pass
141	Pass	Fail	Fail
142	Pass	Pass	Pass
144	Fail	Pass	Fail
145	Pass	No data	No data
147	Fail	Pass	Fail
148	Pass	Fail	Pass
150	Fail	Pass	Fail
151	Fail	Pass	Pass
152	Fail	Pass	Fail
154	Fail	Pass	Pass
156	Fail	Pass	Fail
157	Pass	Fail	Pass
159	Fail	Pass	Fail
160	Pass	Pass	Pass
161	Pass	Pass	Pass
162	Pass	Pass	Pass

163	Pass	Pass	Pass
164	Pass	Pass	Pass
165	Pass	Pass	Fail
166	Pass	Fail	Fail
167	Fail	No data	No data
168	Fail	No data	No data
169	Pass	Pass	Pass
170	Pass	Pass	Fail
201	Pass	Pass	Pass
202	Pass	Fail	Fail
203	Fail	Fail	Fail
204	Pass	Pass	Fail
205	Fail	Fail	Fail
206	Pass	Pass	Fail
207	Pass	Fail	Fail
208	Pass	Fail	Fail
209	Pass	Fail	Fail
210	Fail	Fail	Fail
211	Pass	Pass	Fail
212	Pass	Fail	Fail
213	Pass	Pass	Fail
214	Fail	Fail	Fail
215	Pass	Fail	Fail
216	Fail	Fail	Pass
217	Pass	Fail	Fail
218	Pass	Fail	Fail
219	Fail	Fail	Fail
220	Pass	Pass	Pass
Number of Clients "Passed"	46	38	24
Number of Clients "Failed"	24	29	43
Number of Clients with "No Data"	0	3	3
Total Number of Clients	70	67	67

Videostreaming_Bothbands - Ruckus_70

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	32	18	0	50	64.00%
N	14	6	0	20	70.00%
AC+N	46	24	0	70	65.71%
Video_2					
AC	32	15	3	47	68.09%
N	6	14	0	20	30.00%
AC+N	38	29	3	67	56.72%

Video_3					
AC	21	26	3	47	44.68%
N	3	17	0	20	15.00%
AC+N	24	43	3	67	35.82%

Videostreaming_Bothbands - Ubiquiti_100

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_1	Video_2	Video_3
101	Pass	Pass	Pass
102	Fail	Pass	Pass
103	Fail	Fail	Fail
104	Pass	Pass	Pass
105	Pass	Pass	Fail
106	Pass	Pass	Fail
107	Fail	Pass	Pass
108	Pass	Pass	Pass
109	Pass	Pass	Pass
110	Fail	Fail	Fail
111	Pass	Pass	Pass
112	Pass	Pass	Pass
113	Pass	Fail	Fail
114	Pass	Fail	Pass
115	Pass	Pass	Pass
116	Pass	Pass	Pass
117	Pass	Fail	Fail
118	Fail	Fail	Fail
119	Pass	Fail	Fail
120	Pass	Pass	Fail
121	Pass	Pass	Fail
122	Fail	Fail	Fail
123	Pass	Pass	Pass
124	Pass	Pass	Fail
125	Pass	Pass	Pass
126	Pass	Pass	Pass
127	Pass	Pass	Pass
128	Pass	Pass	Pass
129	Pass	Fail	Fail
130	Pass	Fail	Fail
131	Fail	Fail	Fail
132	Pass	Fail	Fail
133	Fail	Fail	Fail
134	Pass	Pass	Pass
135	Pass	Pass	Fail
136	Pass	Pass	Pass
137	Fail	Pass	Fail
138	Pass	Pass	Pass
139	Pass	Pass	Pass
140	Pass	Pass	Pass
141	Pass	Pass	Pass
142	Pass	Pass	Fail

143	Pass	Pass	Fail
144	Pass	Fail	Fail
145	Fail	Fail	Fail
146	Pass	Pass	Pass
147	Pass	Pass	Pass
148	Pass	Pass	Fail
149	Pass	Pass	Pass
150	Pass	Pass	Pass
151	Pass	Pass	Pass
152	Pass	Fail	Fail
153	Pass	Pass	Pass
154	Pass	Pass	Pass
155	Fail	Pass	Pass
156	Pass	Pass	Pass
157	Pass	Pass	Pass
158	Pass	Pass	Pass
159	Pass	Pass	Pass
160	Pass	Pass	Fail
161	Pass	Pass	Pass
162	Fail	Pass	Fail
163	Pass	Pass	Pass
164	Pass	Pass	Pass
165	Pass	Pass	Fail
166	Fail	Fail	Fail
167	Pass	Pass	Pass
168	Pass	Pass	Fail
169	Pass	Fail	Fail
170	Pass	Pass	Fail
201	Pass	Fail	Fail
202	Fail	Fail	Fail
203	Fail	Fail	Fail
204	Fail	Pass	Fail
205	Pass	Fail	Fail
206	Pass	Pass	Fail
207	Pass	Pass	Fail
208	Pass	Fail	Fail
209	Fail	Fail	Fail
210	Pass	Fail	Fail
211	Fail	Fail	Fail
212	Pass	Fail	Fail
213	Fail	Fail	Fail
214	Pass	Fail	Fail
215	Fail	Fail	Fail
216	Pass	Fail	Fail
217	Pass	Fail	Fail
218	Pass	Fail	Fail

219	Pass	Fail	Fail
220	Pass	Fail	Fail
221	Pass	Fail	Fail
222	Fail	Fail	Fail
223	Fail	Fail	Fail
224	Pass	Fail	Fail
225	Pass	Pass	Fail
226	Fail	Pass	Fail
227	Pass	Pass	Fail
228	Pass	Pass	Fail
229	Pass	Pass	Fail
230	Fail	Fail	Fail
Number of Clients "Passed"	76	60	38
Number of Clients "Failed"	24	40	62
Number of Clients with "No Data"	0	0	0
Total Number of Clients	100	100	100

Videostreaming_Bothbands - Ubiquiti_100

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	57	13	0	70	81.43%
N	19	11	0	30	63.33%
AC+N	76	24	0	100	76.00%
Video_2					
AC	52	18	0	70	74.29%
N	8	22	0	30	26.67%
AC+N	60	40	0	100	60.00%
Video_3					
AC	38	32	0	70	54.29%
N	0	30	0	30	0.00%
AC+N	38	62	0	100	38.00%

Videostreaming_Bothbands - Aruba_100

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_1	Video_2	Video_3
101	Pass	Pass	Fail
102	Fail	Pass	Fail
103	Pass	Pass	Fail
104	Pass	Fail	Fail
105	Fail	Pass	Fail
106	Pass	Fail	Fail
107	Fail	Fail	Fail
108	Pass	Pass	Fail
109	Pass	Fail	Fail
110	Pass	Fail	Fail
111	Pass	Fail	Fail
112	Fail	Pass	Fail
113	Pass	Fail	Fail
114	Pass	Fail	Fail
115	Pass	Fail	Fail
116	Pass	Fail	Fail
117	Fail	Fail	Fail
118	Fail	Fail	Fail
119	Pass	Fail	Fail
120	Fail	Fail	Pass
121	Pass	Fail	Fail
122	Pass	Pass	Fail
123	Pass	Pass	Fail
124	Fail	Fail	Fail
125	Pass	Fail	Fail
126	Pass	Fail	Fail
127	Pass	Pass	Fail
128	Pass	Pass	Fail
129	Pass	Pass	Fail
130	Fail	Fail	Fail
131	Pass	Fail	Fail
132	Pass	Pass	Fail
133	Fail	Fail	Fail
134	Pass	Fail	Fail
135	Pass	Fail	Fail
136	Fail	Pass	Fail
137	Pass	Fail	Fail
138	Pass	Fail	Fail
139	Pass	Fail	Fail
140	Fail	Fail	Fail
141	Pass	Pass	Fail
142	Pass	Pass	Fail

143	Pass	Pass	Fail
144	Pass	Fail	Fail
145	Fail	Fail	Fail
146	Pass	Pass	Fail
147	Pass	Pass	Pass
148	Pass	Pass	Fail
149	Fail	Fail	Fail
150	Pass	Fail	Fail
151	Pass	Pass	Fail
152	Pass	Fail	Fail
153	Pass	Fail	Fail
154	Pass	Fail	Fail
155	Pass	Pass	Fail
156	Pass	Fail	Fail
157	Pass	Fail	Fail
158	Pass	Fail	Pass
159	Pass	Fail	Fail
160	Pass	Fail	Fail
161	Fail	Fail	Fail
162	Pass	Fail	Fail
163	Pass	Fail	Fail
164	Pass	Fail	Fail
165	Pass	Fail	Fail
166	Pass	Pass	Fail
167	Pass	Pass	Fail
168	Pass	Fail	Fail
169	Fail	Fail	Fail
170	Pass	Fail	Fail
201	Pass	Fail	Fail
202	Fail	Fail	Fail
203	Fail	Fail	Fail
204	Fail	Fail	Fail
205	Fail	Fail	Fail
206	Fail	Fail	Fail
207	Fail	Fail	Fail
208	Pass	Fail	Fail
209	Fail	Fail	Fail
210	Pass	Fail	Fail
211	Fail	Fail	Fail
212	Fail	Fail	Fail
213	Fail	Pass	Fail
214	Pass	Fail	Fail
215	Fail	Fail	Fail
216	Fail	Fail	Fail
217	Fail	Fail	Fail
218	Pass	Fail	Fail

219	Fail	Fail	Fail
220	Pass	Fail	Fail
221	Pass	Fail	Pass
222	Fail	Pass	Fail
223	Fail	Pass	Fail
224	Fail	Fail	Fail
225	Fail	Fail	Pass
226	Fail	Pass	Fail
227	Pass	Pass	Pass
228	Pass	Fail	Pass
229	Pass	Pass	Pass
230	Fail	Fail	Fail
Number of Clients "Passed"	64	29	8
Number of Clients "Failed"	36	71	92
Number of Clients with "No Data"	0	0	0
Total Number of Clients	100	100	100

Videostreaming_Bothbands - Aruba_100

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	54	16	0	70	77.14%
N	10	20	0	30	33.33%
AC+N	64	36	0	100	64.00%
Video_2					
AC	23	47	0	70	32.86%
N	6	24	0	30	20.00%
AC+N	29	71	0	100	29.00%
Video_3					
AC	3	67	0	70	4.29%
N	5	25	0	30	16.67%
AC+N	8	92	0	100	8.00%

Videostreaming_Bothbands - Meraki_100

System Number	Expert Verdict	
	Both Bands	
	Video_1	Video_2
101	Fail	Fail
102	Fail	Fail
103	Fail	Fail
104	Fail	Fail
105	Fail	Fail
106	Fail	Fail
107	Fail	Fail
108	Fail	Fail
109	Pass	Fail
110	Fail	Fail
111	Pass	Fail
112	Pass	Fail
113	Pass	Fail
114	Pass	Pass
115	Pass	Fail
116	Fail	Fail
117	Fail	Pass
118	Pass	Fail
119	Fail	Fail
120	Fail	Fail
121	Pass	Fail
122	Fail	Fail
123	Pass	Fail
124	Pass	Fail
125	Fail	Fail
126	Fail	Fail
127	Pass	Pass
128	Pass	Fail
129	Fail	Pass
130	Fail	Fail
131	Fail	Fail
132	Fail	Fail
133	Fail	Fail
134	Fail	Pass
135	Pass	Pass
136	Fail	Fail
137	Pass	Pass
138	Pass	Pass
139	Fail	Fail
140	Fail	Fail
141	Pass	Fail
142	Fail	Fail

143	Fail	Fail
144	Fail	Fail
145	Fail	Fail
146	Pass	Fail
147	Fail	Fail
148	Fail	Fail
149	Pass	Pass
150	Fail	Fail
151	Pass	Fail
152	Fail	Fail
153	Pass	Fail
154	Fail	Fail
155	Fail	Fail
156	Fail	Pass
157	Pass	Fail
158	Fail	Pass
159	Pass	Fail
160	Fail	Fail
161	Fail	Fail
162	Fail	Fail
163	Pass	Fail
164	Fail	Pass
165	Fail	Fail
166	Fail	Fail
167	Fail	Fail
168	Pass	Pass
169	Pass	Pass
170	Fail	Fail
201	Fail	Fail
202	Fail	Fail
203	Fail	Fail
204	Pass	Fail
205	Pass	Fail
206	Fail	Fail
207	Fail	Fail
208	Pass	Fail
209	Fail	Fail
210	Pass	Fail
211	Pass	Fail
212	Fail	Fail
213	Pass	Pass
214	Pass	Fail
215	Pass	Pass
216	Pass	Fail
217	Fail	Fail
218	Fail	Fail

219	Fail	Fail
220	Fail	Fail
221	Fail	Fail
222	Fail	Fail
223	Fail	Fail
224	Fail	Fail
225	Fail	Fail
226	Pass	Fail
227	Fail	Fail
228	Fail	Fail
229	Fail	Fail
230	Fail	Fail
Number of Clients "Passed"	35	16
Number of Clients "Failed"	65	84
Number of Clients with "No Data"	0	0
Total Number of Clients	100	100

Videostreaming_Bothbands - Meraki_100

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	25	45	0	70	35.71%
N	10	20	0	30	33.33%
AC+N	35	65	0	100	35.00%
Video_2					
AC	14	56	0	70	20.00%
N	2	28	0	30	6.67%
AC+N	16	84	0	100	16.00%

Videostreaming_Bothbands - Ruckus_100

System Number	Expert Verdict		
	Both Bands (2.4 GHz + 5 GHz)		
	Video_1	Video_2	Video_3
101	Pass	Pass	Fail
102	Fail	Fail	Fail
103	Fail	Pass	Fail
104	Pass	Pass	Fail
105	Pass	Pass	Fail
106	Fail	Pass	Fail
107	Pass	Pass	Pass
108	Pass	Fail	Pass
109	Fail	Fail	Fail
110	Pass	Pass	Fail
111	Fail	Pass	Pass
112	Fail	Fail	Fail
113	Fail	Fail	Pass
114	Fail	Fail	Fail
115	Pass	Pass	Fail
116	Fail	Fail	Fail
117	Pass	Fail	Fail
118	Fail	Pass	Fail
119	Pass	Fail	Fail
120	Fail	Fail	Fail
121	Fail	Fail	Fail
122	Pass	Fail	Fail
123	Fail	Fail	Fail
124	Fail	Fail	Fail
125	Fail	Fail	Fail
126	Pass	Fail	Fail
127	Pass	Fail	Fail
128	Fail	Fail	Fail
129	Pass	Fail	Fail
130	Pass	Fail	Fail
131	Fail	Fail	Fail
132	Pass	Pass	Fail
133	Fail	Pass	Pass
134	Pass	Fail	Pass
135	Fail	Fail	Pass
136	Fail	Pass	Fail
137	Fail	Pass	Fail
138	Pass	Fail	Pass
139	Fail	Fail	Fail
140	Fail	Fail	Fail
141	Pass	Pass	Pass
142	Pass	Pass	Pass

143	Pass	Pass	Fail
144	Pass	Pass	Pass
145	Fail	Fail	Fail
146	Fail	Fail	Fail
147	Pass	Fail	Fail
148	Pass	Fail	Fail
149	Pass	Fail	Fail
150	Pass	Fail	Pass
151	Fail	Fail	Fail
152	Fail	Pass	Fail
153	Fail	Fail	Fail
154	Fail	Fail	Pass
155	Pass	Pass	Pass
156	Pass	Pass	Fail
157	Fail	Pass	Fail
158	Fail	Fail	Fail
159	Fail	Pass	Fail
160	Fail	Fail	Fail
161	Fail	Fail	Fail
162	Fail	Fail	Fail
163	Pass	Pass	Pass
164	Pass	Fail	Fail
165	Pass	Fail	Fail
166	Fail	Fail	Fail
167	Fail	Pass	Fail
168	Fail	Fail	Fail
169	Fail	Fail	Fail
170	Fail	Fail	Fail
201	Pass	Pass	Fail
202	Fail	Fail	Fail
203	Fail	Pass	Pass
204	Fail	Pass	Fail
205	Pass	Fail	Fail
206	Pass	Pass	Pass
207	Fail	Fail	Fail
208	Fail	Fail	Fail
209	Fail	Pass	Pass
210	Fail	Pass	Fail
211	Pass	Pass	Fail
212	Fail	Fail	Pass
213	Fail	Fail	Fail
214	Pass	Fail	Fail
215	Fail	Fail	Fail
216	Fail	Fail	Fail
217	Pass	Fail	Pass
218	Fail	Fail	Pass

219	Pass	Fail	Fail
220	Fail	Fail	Fail
221	Pass	Fail	Fail
222	Fail	Fail	Fail
223	Fail	Fail	Fail
224	Pass	Fail	Fail
225	Fail	Pass	Fail
226	Fail	Fail	Pass
227	Fail	Fail	Fail
228	Pass	Pass	Pass
229	Fail	Pass	Pass
230	Fail	Fail	Pass
Number of Clients "Passed"	40	35	25
Number of Clients "Failed"	60	65	75
Number of Clients with "No Data"	0	0	0
Total Number of Clients	100	100	100

Videostreaming_Bothbands - Ruckus_100

Configuration	Pass	Fail	No Data	Total	Pass (%)
Video_1					
AC	30	40	0	70	42.86%
N	10	20	0	30	33.33%
AC+N	40	60	0	100	40.00%
Video_2					
AC	25	45	0	70	35.71%
N	10	20	0	30	33.33%
AC+N	35	65	0	100	35.00%
Video_3					
AC	15	55	0	70	21.43%
N	10	20	0	30	33.33%
AC+N	25	75	0	100	25.00%

Throughput_Bothbands - Ubiquiti

Clients	40_clients	40_Clients (With ATF)	70_Clients	100_Clients
1	8.2	8.52	1.46	5.31
2	8.66	8.45	5.31	5.04
3	8.66	6.58	2.24	1.9
4	9.89	7.59	3.03	3.55
5	9.11	7.93	5.12	3.49
6	8.81	7.95	4.23	1.97
7	8.36	6.92	5.24	2.67
8	8.95	0.117	1.84	5.77
9	8.89	7.83	5.73	5.33
10	8.4	7.78	5.79	0.255
11	9.38	8.23	2.96	0.192
12	7.58	3.59	2.57	3.2
13	9.51	8.96	0	1.97
14	8.94	7.45	5.55	38
15	9.25	5.81	5.04	2.99
16	9.34	8.59	5.89	2.98
17	8.95	7.72	4.64	2.57
18	8.84	6.94	1.29	3.13
19	8.69	8.84	4.33	2.75
20	10.1	8.87	1.44	5.71
21	9.19	8.14	3.65	1.85
22	10.2	7.47	4.68	2.13
23	8.81	8.59	3.39	2.13
24	8.96	7.74	4.26	2.06
25	8.56	8.75	5.14	5
26	8.32	0.117	1.19	2.5
27	7.96	7.01	2.26	1.5
28	8.13	7.53	6.01	1.56
29	9.31	7.65	3.07	3.45
30	11.3	3.3	0.421	3.6
31	7	7.55	5.61	1.64
32	10.8	7.69	4.53	5.51
33	7.04	5.14	3.27	2.53
34	8.65	6.04	4.9	2.59
35	7.94	9.59	3.84	2.93
36	7.59	8.35	2.47	1.18
37	11.4	5.57	5.07	1.79
38	6.75	5.26	4.49	2.8
39	8.06	6.69	4.75	3.83
40	7.28	9.47	4.38	2.23
41			3.71	6.02
42			2.49	3.19
43			1.63	0.921

44			5.41	3.15
45			4.91	4.34
46			3.75	5.55
47			3.91	2.98
48			2.57	3.63
49			5.05	1.83
50			4.82	5.83
51			3.86	2.39
52			4.81	2.57
53			6.56	4.87
54			2.62	2.23
55			0	2.35
56			4.41	2.7
57			2.45	2.8
58			2.43	3.93
59			4.04	5.42
60			3.44	2.74
61			4.28	5.85
62			4.2	4.07
63			0.292	2.23
64			4.13	0.254
65			4.49	0.953
66			4.06	1.65
67			4.83	4.77
68			5.43	2.37
69			3.73	1.14
70			4.89	1.95
71				2.25
72				7.18
73				2.31
74				2.47
75				1.4
76				2
77				2.32
78				3.29
79				2.9
80				2.16
81				1.95
82				2.32
83				2.91
84				2.23
85				1.34
86				3.83
87				1.88
88				2.07
89				0.89

90				1.63
91				1.94
92				2.79
93				2.13
94				2.45
95				1.96
96				2.43
97				2.4
98				2.74
99				2.23
100				2.5
Data From Server				
Throughput Result in Mbps	352.44	282.718	275.183	349.32
Count	40	40	68	98
Average	8.811	2.109	4.046	3.813
Standard Deviation	1.044	7.067	1.292	3.564

Throughput_Bothbands - Aruba

Clients	40_Clients	70_Clients	100_Clients
1	7.02	1.52	1.06
2	5.21	1.15	1.89
3	5.97	1.16	1.34
4	5.74	1.62	2.82
5	6.07	4.81	1.67
6	6.62	1.64	1.86
7	5.7	1.63	1.95
8	6.44	1.6	2.01
9	6.46	4.49	2.72
10	4.49	1.62	1.76
11	6.5	3.74	1.91
12	6.78	3.95	2.02
13	5.98	1.45	0.247
14	6.9	1.57	2.01
15	6.63	1.59	0.369
16	6.89	1.63	1.62
17	5.55	2.94	0.331
18	5.08	4.85	0.361
19	6.29	4.57	0
20	6.36	2.02	0.22
21	6.42	3.46	1.88
22	4.41	4.87	2.77
23	5.72	0.001	1.94
24	5.84	3.41	2.02
25	6.57	1.65	1.87
26	6.85	1.61	1.92
27	5.73	1.7	1.86
28	5.7	1.68	1.92
29	6.28	1.68	1.83
30	4.49	4.51	1.39
31	0	1.52	2.45
32	6.03	3.82	0
33	4.15	4.47	0
34	0	1.59	3.12
35	4.16	3.5	2.08
36	6.66	3.93	1.49
37	6.49	1.57	1.84
38	4.1	6.74	1.87
39	4.7	1.56	
40	6.72	4.09	1.98
41		4.23	2.07
42		4.66	1.95
43		1.48	2
44		4.3	1.58

45		0.272	1.8
46		4.49	1.52
47		1.53	0
48		3.87	1.88
49		1.6	1.97
50		4.31	2.6
51		4.32	1.76
52		1.35	1.71
53		4.45	2.38
54		4	1.76
55		1.68	2.02
56		4.2	2.09
57		3.66	2.07
58		3.26	4.26
59		4.98	2.11
60		3.45	1.7
61		3.62	0.26
62		2.56	1.93
63		0.8	1.66
64		3.54	1.96
65		3.45	1.41
66		1.57	2.83
67		4.7	2.17
68		4.56	1.88
69		3.27	1.66
70		3.06	1.81
71			1.52
72			1.26
73			1.69
74			1.48
75			1.52
76			1.41
77			1.61
78			1.18
79			1.15
80			1.26
81			0.27
82			1.49
83			1.44
84			1.33
85			1.27
86			0.96
87			1.49
88			1.59
89			1.27
90			1.24

91			3.78
92			0
93			3.32
94			1.65
95			3.41
96			1.57
97			3.58
98			3.32
99			3.35
100			0.91
Data From Server			
Throughput Result in Mbps	233.94	198.645	173.566
Count	40	70	96
Average	0.903	1.399	0.707
Standard Deviation	5.848	2.837	1.807

Throughput_Bothbands - Meraki

Clients	40_Clients	70_Clients	100_Clients
1	4.71	3.51	2.47
2	5.44	2.96	0.65
3	2.44	4.03	1.16
4	3.8	3.26	1.3
5	5.12	4.4	0.78
6	4.72	3.63	1.33
7	1.17	5.13	6.21
8	2.06	2.32	1.87
9	5.33	2.72	1.92
10	4.66	3.34	1.34
11	4.97	4.06	2.3
12	4.47	2.93	1.35
13	4.43	3.2	0.46
14	1.65	3.74	2.52
15	1.65	1.85	0.66
16	5.32	4.9	0.85
17	93.4	5.21	1.31
18	4.83	3.59	0.4
19	4.3	4.99	0.72
20	4.17	3.74	1.15
21	5.64	3.72	1.22
22	5.03	4.62	1
23	4.47	2.59	0.729
24	4.47	2.03	3.7
25	5.53	3.89	0.87
26	5.1	3	0.5
27	4.57	9.2	3.19
28	4.81	4.19	0.37
29	4.65	2.89	1.47
30	6.84	3.3	1.23
31	6.27	3.95	0.39
32	4.59	2.7	0.77
33	5.98	2.9	1.42
34	6.64	5.39	0.56
35	6.05	3.45	2.62
36	5.53	4.56	1.51
37	5.89	3.8	0.43
38	6.68	2.31	0.84
39	6.98	1.92	1.19
40	6.26	3.07	1.1
41		2.54	1.52
42		3.33	1.33
43		3.79	1.8
44		3.41	0.55

45		3.39	2.62
46		3.17	0.35
47		2.92	1.17
48		3.08	1.2
49		2.45	1.65
50		2.55	2.26
51		4.21	1.1
52		4.78	0.37
53		4.71	1.15
54		2.75	0.94
55		3.95	1.9
56		4.98	0.62
57		4.71	1.24
58		3.68	2.65
59		5.23	0.972
60		3.94	0.338
61		5.48	0.14
62		4.49	2.69
63		3.83	2.91
64		3.98	3
65		4.01	0.9
66		4.24	1.66
67		3.68	2.33
68		6.1	40.8
69		4.96	25.6
70		3.81	1.56
71			1.65
72			4.69
73			1.85
74			1.14
75			6.6
76			0.74
77			0.817
78			1.53
79			1.66
80			2.44
81			1.2
82			14.9
83			2.07
84			0.8
85			2.27
86			2.84
87			0.96
88			1.43
89			1.41
90			0.59

91			0.34
92			2.72
93			1.64
94			2.29
95			2.42
96			3.46
97			0.7
98			3.39
99			0.94
100			0.49
Data From Server			
Throughput Result in Mbps	280.33	265.61	233.147
Count	40	70	100
Average	13.902	1.128	4.871
Standard Deviation	7.008	3.794	2.331

Throughput_Bothbands - Ruckus

Clients	40_Clients	70_Clients	100_Clients
1	6.8	5.78	0.94
2	5.55	4.05	2.76
3	5.58	5.4	1.4
4	6	1.34	2.07
5	6.37	3.4	2.22
6	5.53	2.24	2.05
7	5.79	0.051	1.97
8	6.2	0.671	2.76
9	6.46	4.42	3.08
10	6.39	4.72	2.27
11	6.17	4.72	2.36
12	6.25	3.19	2.21
13	5.73	2.52	1.08
14	5.52	1.34	0.84
15	5.36	3.64	1.84
16	5.38	2.34	0.08
17	5.83	2.41	2.53
18	2.16	5.12	2.46
19	5.42	4.78	2.63
20	5.67	3.46	1.86
21	5.68	5.16	2.24
22	5.36	4.2	3.45
23	5.58	1.96	1.3
24	5.84	No data	2.29
25	5.99	4.84	1.41
26	5.69	No data	2.53
27	4.74	5.97	3.04
28	5.56	3.99	3.57
29	6.43	4.01	2.01
30	5.56	3.55	2.18
31	5.06	2.1	2.49
32	10.1	5.73	0.87
33	13.9	1.71	1.02
34	8.75	4.57	1.19
35	7.28	1.72	1.56
36	5	6.85	1.34
37	10.08	5.42	2.04
38	8.87	4.77	2.6
39	4.71	2.61	2.36
40	5.31	5.83	2.5
41		3.71	1.91
42		2.21	1.48
43		5.73	1.76
44		5,15	2.87

45		4.7	3.31
46		5.85	1.68
47		1.88	1.99
48		2.39	1.07
49		3.5	1.68
50		2.11	0.93
51		2.4	0.953
52		3.05	2.01
53		2.03	2.39
54		1.68	2.4
55		2.5	2.09
56		4.54	2.22
57		1.8	3.49
58		1.9	1.72
59		2.48	0.65
60		1.84	2.45
61		2.37	0
62		1.6	1.69
63		3.03	0.545
64		1.52	2.07
65		2.36	3.14
66		1.47	2.53
67		2.62	2.08
68		2.38	1.22
69		2.15	0.053
70		2.74	1.87
71			3.44
72			2.98
73			2.82
74			3.38
75			2.52
76			2.63
77			2.47
78			1.47
79			4
80			2.23
81			0
82			1.64
83			1.47
84			1.9
85			3.25
86			2.2
87			3.43
88			2.81
89			3.41
90			1.85

91			2.52
92			1.99
93			2.48
94			2.79
95			2.63
96			2.51
97			3.18
98			3.61
99			2.99
100			2.86
Data From Server			
Throughput Result in Mbps	251.01	231.235	213.759
Count	40	70	99
Average	1.881	3.303	0.828
Standard Deviation	6.275	1.526	2.159

Videostreaming_5GHz - Ubiquiti_40

IP Address		Video_4		Video_5		Video_6
AC		Final		Final		Final
101		P		P		P
102		P		P		P
103						
104		P		P		P
105		P		P		P
106						
107		P		F		F
108		P		P		P
109						
110		F		P		F
111		P		P		P
112						
113		F		P		P
114		P		F		F
115						
116		P		P		F
117		P		F		F
118						
119		P		P		P
120		P		F		F
121						
122		P		P		P
123		P		P		P
124						
125		P		P		P
126		P		P		P
127						
128		P		F		P
129		F		F		F
130						
131		P		P		P
132		P		P		P
133						
134		P		P		P
135		P		P		F
136						
137		P		P		F
138		P		P		P
139						
140		F		F		P
141		P		F		P
142						
143		P		F		F

144		P		P		P
145						
146						
147						
148						
149						
150						
151						
152						
153						
154						
155						
156						
157						
158						
159						
160						
161						
162						
163						
164						
165						
166						
167						
168						
169						
170						
171						
172						
173						
174						
175						
	AC Total					
	Pass	26		21		20
	Fail	4		9		10
	No Data	0		0		0
	Total	30		30		30
	Pass Percentage	86.67%		70.00%		66.67%
N						
201						
202						
203						
204						
205						

206						
207						
208						
209						
210						
211						
212						
213						
214						
215						
216		P		P		P
217		P		F		F
218		P		P		P
219		P		P		P
220		F		F		P
221		P		P		P
222		P		P		P
223		P		P		P
224		F		F		F
225		P		P		P
	N Total					
	Pass	8		7		8
	Fail	2		3		2
	No Data	0		0		0
	Total	10		10		10
	Pass Percentage	80.00%		70.00%		80.00%
	Total (AC+N)					
	Pass	34		28		28
	Fail	6		12		12
	No Data	0		0		0
	Total	40		40		40
	Pass Percentage	85.00%		70.00%		70.00%

Videostreaming_5GHz - Aruba_40

IP Address		Video_4		Video_5		Video_6
AC		Final		Final		Final
101		P		P		P
102		P		P		P
103						
104		P		P		P
105		P		P		P
106						
107		P		P		P
108		F		F		P
109						
110		F		F		F
111		F		F		P
112						
113		P		P		P
114		P		P		P
115						
116		P		P		P
117		P		P		P
118						
119		P		P		P
120		P		P		P
121						
122		F		F		F
123		P		P		F
124						
125		P		P		P
126		F		P		P
127						
128		P		P		P
129		F		F		F
130						
131		P		P		P
132		P		P		P
133						
134		P		P		P
135		P		P		P
136						
137		P		P		P
138		P		P		P
139						
140		P		P		P
141		P		P		P
142						
143		P		P		P

144		P		P		P
145						
146						
147						
148						
149						
150						
151						
152						
153						
154						
155						
156						
157						
158						
159						
160						
161						
162						
163						
164						
165						
166						
167						
168						
169						
170						
171						
172						
173						
174						
175						
	AC Total					
	Pass	24		25		26
	Fail	6		5		4
	No Data	0		0		0
	Total	30		30		30
	Pass Percentage	80.00%		83.33%		86.67%
N						
201						
202						
203						
204						
205						

206						
207						
208						
209						
210						
211						
212						
213						
214						
215						
216		P		P		F
217		P		P		P
218		P		P		P
219		P		P		P
220		P		P		P
221		P		P		P
222		P		P		P
223		P		F		P
224		P		P		F
225		P		P		P
	N Total					
	Pass	10		9		8
	Fail	0		1		2
	No Data	0		0		0
	Total	10		10		10
	Pass Percentage	100.00%		90.00%		80.00%
	Total (AC+N)					
	Pass	34		34		34
	Fail	6		6		6
	No Data	0		0		0
	Total	40		40		40
	Pass Percentage	85.00%		85.00%		85.00%

Videostreaming_5GHz - Meraki_40

IP Address		Video_4		Video_5		Video_6
AC		Final		Final		Final
101		P		F		F
102		P		P		P
103						
104		P		P		P
105		P		P		F
106						
107						
108		P		P		F
109		P		P		F
110		P		F		F
111		P		P		F
112						
113		P		P		P
114		F		P		F
115						
116		P		F		F
117		P		P		P
118						
119		P		P		P
120		P		P		F
121						
122						
123		P		F		F
124		P		P		F
125		F		F		F
126		P		F		F
127						
128		P		P		P
129						
130		P		P		P
131		P		P		F
132		P		P		F
133						
134		P		P		P
135		P		P		F
136						
137						
138		F		F		F
139		P		P		F
140		P		P		F
141		P		P		F
142						
143						

144		P		F		F
145		F		P		P
146						
147						
148						
149						
150						
151						
152						
153						
154						
155						
156						
157						
158						
159						
160						
161						
162						
163						
164						
165						
166						
167						
168						
169						
170						
171						
172						
173						
174						
175						
	AC Total					
	Pass	26		22		9
	Fail	4		8		21
	No Data	0		0		0
	Total	30		30		30
	Pass Percentage	86.67%		73.33%		30.00%
N						
201						
202						
203						
204						
205						

206						
207						
208						
209						
210						
211						
212						
213						
214						
215						
216		P		P		P
217		P		P		P
218		P		P		P
219		P		P		F
220		P		P		P
221		P		P		F
222		P		P		P
223		P		P		P
224		F		P		P
225		P		P		P
	N Total					
	Pass	9		10		8
	Fail	1		0		2
	No Data	0		0		0
	Total	10		10		10
	Pass Percentage	90.00%		100.00%		80.00%
	Total (AC+N)					
	Pass	35		32		17
	Fail	5		8		23
	No Data	0		0		0
	Total	40		40		40
	Pass Percentage	87.50%		80.00%		42.50%

Videostreaming_5GHz - Ruckus_40

IP Address		Video_4		Video_5		Video_6
AC		Final		Final		Final
101		P		P		P
102		P		P		P
103		P		P		P
104						
105						
106						
107						
108						
109						
110						
111						
112						
113		P		P		F
114		P		P		P
115		P		P		F
116		P		P		P
117		F		F		F
118		P		F		P
119						
120						
121						
122						
123						
124						
125						
126						
127						
128		P		P		P
129		P		F		P
130		P		P		P
131						
132						
133						
134		P		F		P
135		P		P		P
136		P		P		P
137						
138						
139						
140		P		F		P
141		P		P		P
142		P		P		F
143						

144						
145						
146						
147						
148						
149		P		P		P
150		P		P		P
151		F		F		F
152		P		P		P
153		F		P		P
154		P		P		P
155		P		P		P
156		P		P		P
157		P		P		P
158						
159						
160						
161						
162						
163						
164						
165						
166						
167		P		P		P
168		P		P		P
169		P		P		P
170						
171						
172						
173						
174						
175						
	AC Total					
	Pass	27		24		25
	Fail	3		6		5
	No Data	0		0		0
	Total	30		30		30
	Pass Percentage	90.00%		80.00%		83.33%
N						
201		F		F		F
202						
203						
204						
205		P		P		F

206		F		F		P
207						
208						
209						
210		F		F		F
211						
212		F		F		F
213						
214		P		P		F
215						
216						
217		P		F		F
218		F		F		F
219		P		P		F
220						
221						
222						
223		F		F		F
224						
225						
	N Total					
	Pass	4		3		1
	Fail	6		7		9
	No Data	0		0		0
	Total	10		10		10
	Pass Percentage	40.00%		30.00%		10.00%
	Total (AC+N)					
	Pass	31		27		26
	Fail	9		13		14
	No Data	0		0		0
	Total	40		40		40
	Pass Percentage	77.50%		67.50%		65.00%

Videostreaming_5GHz - Ubiquiti_70

IP Address		Video_2		Video_3		Video_4
AC		Final		Final		Final
101		F		F		F
102		P		P		P
103						
104		P		P		P
105		P		P		P
106						
107		F		F		P
108		P		F		P
109						
110		F		F		F
111		F		F		F
112						
113		P		P		P
114		P		P		P
115						
116		P		P		P
117		F		F		P
118						
119		F		F		P
120		P		P		P
121						
122		P		F		F
123		P		P		P
124						
125		P		P		F
126		P		P		P
127						
128		P		P		P
129		F		F		F
130						
131		F		F		F
132		P		P		P
133						
134		P		P		P
135		F		F		F
136						
137		P		P		P
138		P		P		P
139						
140		P		P		F
141		P		F		F
142						
143		P		F		F

144		P		P		P
145						
146		P		P		F
147		P		P		P
148						
149		F		F		F
150		P		P		P
151						
152		F		F		P
153		F		P		P
154						
155		F		F		P
156		P		F		F
157						
158						
159		P		P		P
160		F		P		F
161		P		F		F
162		F		F		F
163						
164		P		P		F
165		P		F		P
166						
167		P		P		P
168		P		P		P
169						
170						
171		P		P		P
172		F		P		P
173		P		P		P
174		P		F		P
175						
	AC Total					
	Pass	34		29		32
	Fail	16		21		18
	No Data	0		0		0
	Total	50		50		50
	Pass Percentage	68.00%		58.00%		64.00%
N						
201		F		F		F
202		P		P		P
203		F		P		P
204		P		P		P
205		P		F		F

206		P		P		F
207		P		P		P
208		F		F		F
209		F		F		F
210		P		P		P
211		P		P		P
212		F		P		F
213		F		P		P
214		F		F		F
215		F		P		P
216		F		F		F
217		P		P		P
218		P		P		P
219		P		F		P
220		F		P		F
221						
222						
223						
224						
225						
	N Total					
	Pass	10		13		11
	Fail	10		7		9
	No Data	0		0		0
	Total	20		20		20
	Pass Percentage	50.00%		65.00%		55.00%
	Total (AC+N)					
	Pass	44		42		43
	Fail	26		28		27
	No Data	0		0		0
	Total	70		70		70
	Pass Percentage	62.86%		60.00%		61.43%

Videostreaming_5GHz - Aruba_70

IP Address		Video_2		Video_3		Video_4
AC		Final		Final		Final
101		F		F		F
102		P		P		P
103						
104		P		P		P
105		P		P		P
106						
107		P		P		F
108		P		P		F
109						
110		P		P		F
111		P		P		F
112						
113		P		P		P
114		P		P		F
115						
116		P		P		P
117		P		P		P
118						
119		P		P		P
120		F		P		P
121						
122		P		P		F
123		P		F		F
124						
125		P		P		F
126		F		F		F
127						
128		F		P		F
129		F		P		F
130						
131		P		P		P
132		F		F		P
133						
134		P		P		F
135		P		P		P
136						
137		P		P		F
138		P		F		P
139						
140		P		P		F
141		P		F		F
142						
143		P		P		P

144		P		P		F
145						
146		F		P		P
147		P		P		F
148						
149		P		P		F
150		P		P		F
151						
152		F		P		P
153		P		F		F
154						
155		P		P		P
156		P		P		F
157						
158						
159		P		P		P
160		F		P		P
161		P		P		F
162		P		P		P
163						
164		P		P		P
165		P		F		F
166						
167		P		P		F
168		F		P		P
169						
170						
171		P		P		F
172		F		P		P
173		P		P		P
174		F		P		P
175						
	AC Total					
	Pass	38		42		24
	Fail	12		8		26
	No Data	0		0		0
	Total	50		50		50
	Pass Percentage	76.00%		84.00%		48.00%
N						
201		F		P		F
202		P		F		F
203		P		P		F
204		F		F		F
205		F		P		F

206		P		F		F
207		F		F		F
208		P		F		F
209		F		P		P
210		F		P		F
211		P		F		F
212		P		F		F
213		P		P		F
214		P		P		F
215		P		P		F
216		P		P		F
217		P		P		F
218		P		P		F
219		P		P		F
220		P		F		F
221						
222						
223						
224						
225						
	N Total					
	Pass	14		12		1
	Fail	6		8		19
	No Data	0		0		0
	Total	20		20		20
	Pass Percentage	70.00%		60.00%		5.00%
	Total (AC+N)					
	Pass	52		54		25
	Fail	18		16		45
	No Data	0		0		0
	Total	70		70		70
	Pass Percentage	74.29%		77.14%		35.71%

Videostreaming_5GHz - Meraki_70

IP Address		Video_2		Video_3		Video_4
AC		Final		Final		Final
101		F		P		F
102		P		P		P
103						
104		P		P		F
105		F		F		F
106						
107						
108		F		F		F
109		F		F		F
110		F		P		F
111		F		P		P
112						
113						
114		F		P		F
115		F		P		F
116		F		F		P
117		P		F		F
118						
119		F		P		P
120		P		P		P
121						
122						
123		F		F		F
124		F		F		F
125		P		P		P
126		F		F		F
127						
128		F		P		P
129						
130		F		P		P
131		P		F		P
132		P		F		F
133						
134		P		F		F
135		P		F		P
136						
137						
138		P		F		F
139		P		F		P
140		P		F		F
141		P		P		F
142						
143						

144		F		P		F
145		P		P		F
146		P		F		F
147		P		P		P
148						
149		P		F		F
150		P		F		F
151						
152						
153		F		P		F
154		P		P		F
155						
156		F		P		F
157		F		P		P
158						
159		F		F		F
160		P		F		F
161		F		F		F
162		F		P		F
163						
164		F		P		F
165		F		P		F
166						
167		P		P		P
168		F		F		F
169						
170		P		F		F
171		F		P		F
172						
173						
174		P		F		P
175		F		P		F
	AC Total					
	Pass	23		26		15
	Fail	27		24		35
	No Data	0		0		0
	Total	50		50		50
	Pass Percentage	46.00%		52.00%		30.00%
N						
201		P		P		F
202		P		F		P
203		P		P		P
204		P		P		P
205		F		F		F

206		P		F		F
207		F		P		P
208		F		F		F
209		F		P		F
210		F		P		P
211		P		F		F
212		P		P		F
213		P		P		F
214		F		P		F
215		P		P		F
216		P		P		P
217		F		P		F
218		F		F		P
219		P		F		F
220		P		P		P
221						
222						
223						
224						
225						
	N Total					
	Pass	12		13		8
	Fail	8		7		12
	No Data	0		0		0
	Total	20		20		20
	Pass Percentage	60.00%		65.00%		40.00%
	Total (AC+N)					
	Pass	35		39		23
	Fail	35		31		47
	No Data	0		0		0
	Total	70		70		70
	Pass Percentage	50.00%		55.71%		32.86%

Videostreaming_5GHz - Ruckus_70

IP Address		Video_2		Video_3		Video_4
AC		Final		Final		Final
101		F		F		F
102		P		P		P
103						
104		P		P		P
105		P		P		P
106						
107		P		P		F
108		P		P		P
109						
110		P		P		F
111		P		P		P
112						
113		P		P		P
114		F		P		P
115						
116		P		P		P
117		F		F		F
118						
119		P		P		F
120		P		P		F
121						
122		P		P		P
123		P		P		P
124						
125		P		P		F
126		P		P		P
127						
128		P		F		F
129		P		P		P
130						
131		F		F		F
132		P		P		F
133						
134		P		P		P
135		F		P		F
136						
137		P		P		P
138		P		P		P
139						
140		P		P		F
141		P		P		F
142						
143		P		F		P

144		P		P		F
145						
146		P		P		F
147		P		P		P
148						
149		P		P		F
150		P		P		F
151						
152		P		P		P
153		P		P		F
154						
155		P		P		F
156		P		P		F
157						
158		P		F		P
159		P		P		P
160						
161		P		P		F
162		P		F		F
163						
164		P		P		P
165		P		P		P
166						
167		P		P		P
168		P		P		P
169						
170		P		F		F
171		F		F		P
172						
173		P		P		P
174		P		P		P
175						
	AC Total					
	Pass	44		41		27
	Fail	6		9		23
	No Data	0		0		0
	Total	50		50		50
	Pass Percentage	88.00%		82.00%		54.00%
N						
201		F		F		F
202		F		F		F
203		P		P		F
204		P		P		F
205		P		P		F

206		P		P		F
207		P		P		F
208		P		P		F
209		P		F		F
210		F		P		F
211		F		F		F
212		F		F		F
213		F		F		F
214		F		F		F
215		P		P		F
216		P		P		F
217		F		F		F
218		F		F		F
219		P		P		F
220		P		P		F
221						
222						
223						
224						
225						
	N Total					
	Pass	11		11		0
	Fail	9		9		20
	No Data	0		0		0
	Total	20		20		20
	Pass Percentage	55.00%		55.00%		0.00%
	Total (AC+N)					
	Pass	55		52		27
	Fail	15		18		43
	No Data	0		0		0
	Total	70		70		70
	Pass Percentage	78.57%		74.29%		38.57%

Videostreaming_5GHz - Ubiquiti_100

IP Address		Video_1		Video_2		Video_3
AC		Final		Final		Final
101		P		P		P
102		P		F		F
103		F		F		F
104		F		P		F
105		P		F		P
106		P		P		P
107		F		F		F
108		P		F		P
109		P		F		F
110		P		P		F
111		P		P		F
112		P		F		P
113		F		F		P
114		P		P		P
115		F		P		F
116		P		P		P
117		P		F		P
118		P		P		F
119		P		F		P
120		P		F		P
121		F		F		F
122		P		P		P
123		F		F		F
124		F		F		F
125		F		P		P
126		P		P		F
127		P		P		P
128		F		F		F
129		F		F		F
130		F		P		F
131		P		F		P
132		F		F		P
133		P		F		F
134		F		F		F
135		P		F		F
136		F		P		F
137		F		P		P
138		P		F		F
139		P		P		F
140		P		F		F
141		P		F		F
142		F		F		P
143		P		F		P

144		P		P		F
145		P		P		P
146		P		F		F
147		P		F		F
148		F		P		F
149		P		F		F
150		P		F		F
151		P		P		P
152		F		F		P
153		P		F		F
154		P		P		P
155		P		P		P
156		F		F		F
157		F		F		F
158		P		F		F
159		F		F		P
160		F		P		F
161		F		P		F
162		P		P		F
163		F		P		F
164		F		P		P
165		F		P		F
166		P		P		F
167		P		F		F
168		P		P		P
169		F		F		F
170		P		F		P
171		P		F		F
172		P		P		F
173		P		F		F
174		F		F		F
175		F		P		F
	AC Total					
	Pass	45		33		28
	Fail	30		42		47
	No Data	0		0		0
	Total	75		75		75
	Pass Percentage	60.00%		44.00%		37.33%
N						
201		P		F		F
202		P		F		F
203		F		F		F
204		F		F		F
205		F		F		F

206		P		P		P
207		P		F		F
208		F		P		P
209		F		F		P
210		F		F		F
211		F		F		F
212		P		P		P
213		P		P		P
214		P		F		P
215		P		F		F
216		F		F		F
217		P		F		F
218		F		F		F
219		F		F		F
220		F		F		F
221		P		P		F
222		F		P		P
223		P		F		F
224		P		F		F
225		P		F		F
	N Total					
	Pass	13		6		7
	Fail	12		19		18
	No Data	0		0		0
	Total	25		25		25
	Pass Percentage	52.00%		24.00%		28.00%
	Total (AC+N)					
	Pass	58		39		35
	Fail	42		61		65
	No Data	0		0		0
	Total	100		100		100
	Pass Percentage	58.00%		39.00%		35.00%

Videostreaming_5GHz - Aruba_100

IP Address		Video_1		Video_2		Video_3
AC		Final		Final		Final
101		F		P		F
102		P		F		P
103		F		F		F
104		P		P		F
105		F		F		F
106		F		F		F
107		F		P		P
108		F		F		F
109		P		P		P
110		P		F		F
111		P		P		P
112		F		F		F
113		F		P		F
114		P		P		F
115		F		F		F
116		F		F		F
117		F		P		F
118		P		F		F
119		P		P		P
120		P		P		P
121		F		F		F
122		P		F		F
123		P		F		P
124		F		F		F
125		P		P		P
126		F		F		F
127		F		P		P
128		F		F		F
129		F		P		F
130		F		F		F
131		P		P		F
132		P		P		F
133		P		F		F
134		F		F		F
135		P		P		P
136		F		F		F
137		F		F		F
138		P		F		F
139		F		F		P
140		P		F		F
141		P		P		F
142		F		F		F
143		P		P		P

144		F		F		F
145		F		P		P
146		F		F		F
147		F		F		P
148		F		F		F
149		F		F		F
150		F		F		F
151		F		F		F
152		P		P		F
153		F		F		P
154		P		P		P
155		P		P		P
156		P		P		P
157		P		F		P
158		P		P		P
159		F		F		P
160		P		P		P
161		P		F		F
162		P		P		P
163		P		F		F
164		F		P		P
165		P		P		P
166		P		F		P
167		P		P		F
168		P		F		P
169		P		P		P
170		F		F		P
171		P		F		P
172		P		P		P
173		F		P		P
174		P		P		P
175		F		P		F
	AC Total					
	Pass	38		34		33
	Fail	37		41		42
	No Data	0		0		0
	Total	75		75		75
	Pass Percentage	50.67%		45.33%		44.00%
N						
201		P		P		P
202		P		P		F
203		F		P		F
204		F		F		F
205		P		F		F

206		F		F		P
207		F		F		F
208		F		F		F
209		F		P		P
210		P		F		F
211		F		F		F
212		P		F		F
213		P		F		F
214		F		P		F
215		P		F		F
216		F		F		F
217		F		F		F
218		P		F		F
219		P		P		F
220		F		F		F
221		P		F		P
222		F		F		F
223		P		F		F
224		F		F		F
225		P		F		F
	N Total					
	Pass	12		6		4
	Fail	13		19		21
	No Data	0		0		0
	Total	25		25		25
	Pass Percentage	48.00%		24.00%		16.00%
	Total (AC+N)					
	Pass	50		40		37
	Fail	50		60		63
	No Data	0		0		0
	Total	100		100		100
	Pass Percentage	50.00%		40.00%		37.00%

Videostreaming_5GHz - Meraki_100

IP Address		Video_1		Video_2		Video_3
AC		Final		Final		Final
101		F		F		F
102		P		F		F
103		F		F		F
104		F		F		P
105		F		F		F
106		F		F		F
107		F		F		P
108		P		P		F
109		F		F		F
110		F		F		F
111		F		F		F
112		P		F		F
113		F		F		P
114		F		F		P
115		F		F		F
116		F		P		F
117		F		P		F
118		F		P		F
119		F		P		F
120		F		F		F
121		F		P		F
122		F		F		F
123		F		P		F
124		F		F		F
125		F		F		F
126		F		P		F
127		F		F		F
128		F		F		F
129		P		F		P
130		F		F		F
131		F		P		P
132		P		F		F
133		F		F		F
134		F		F		F
135		F		F		F
136		P		F		F
137		F		P		F
138		P		F		F
139		P		P		P
140		P		F		F
141		F		F		F
142		F		F		F
143		P		P		F

144		P		F		F
145		P		P		P
146		F		P		P
147		P		F		P
148		F		F		F
149		P		F		F
150		P		F		F
151		F		F		F
152		F		F		P
153		P		F		F
154		P		F		F
155		F		F		P
156		P		P		F
157		P		F		F
158		F		F		F
159		F		F		F
160		F		F		F
161		F		F		F
162		F		F		F
163		P		F		P
164		F		P		P
165		P		F		P
166		P		F		P
167		F		P		P
168		F		P		F
169		F		P		P
170		F		P		P
171		F		F		F
172		P		P		F
173		P		F		P
174		F		F		F
175		F		F		F
	AC Total					
	Pass	24		21		20
	Fail	51		54		55
	No Data	0		0		0
	Total	75		75		75
	Pass Percentage	32.00%		28.00%		26.67%
N						
201		F		P		F
202		F		F		P
203		F		F		F
204		F		P		P
205		P		F		F

206		F		F		P
207		F		F		F
208		F		F		F
209		P		P		F
210		F		F		F
211		F		F		F
212		P		F		F
213		F		P		F
214		P		F		F
215		F		F		F
216		P		P		P
217		P		F		F
218		P		P		P
219		P		F		F
220		P		P		P
221		P		P		P
222		P		F		F
223		P		P		P
224		P		P		P
225		F		P		F
	N Total					
	Pass	13		11		9
	Fail	12		14		16
	No Data	0		0		0
	Total	25		25		25
	Pass Percentage	52.00%		44.00%		36.00%
	Total (AC+N)					
	Pass	37		32		29
	Fail	63		68		71
	No Data	0		0		0
	Total	100		100		100
	Pass Percentage	37.00%		32.00%		29.00%

Videostreaming_5GHz - Ruckus_100

IP Address		Video_1		Video_2		Video_3
AC		Final		Final		Final
101		F		P		P
102		P		F		P
103		P		P		P
104		P		F		F
105		P		P		P
106		F		F		F
107		P		P		F
108		P		P		P
109		P		P		P
110		P		P		P
111		P		P		P
112		P		P		P
113		F		F		F
114		P		F		F
115		F		P		P
116		P		P		P
117		F		F		P
118		F		P		F
119		F		F		F
120		P		F		P
121		P		P		P
122		F		F		F
123		P		P		P
124		P		F		F
125		P		F		P
126		P		P		P
127		P		P		F
128		P		F		P
129		P		P		F
130		P		P		P
131		P		P		P
132		P		P		P
133		P		F		F
134		P		P		F
135		P		P		P
136		P		P		F
137		P		P		P
138		P		P		P
139		F		F		P
140		P		P		P
141		P		F		F
142		P		F		F
143		F		F		P

144		P		P		F
145		P		P		P
146		P		F		F
147		P		P		P
148		F		P		P
149		P		P		F
150		P		F		F
151		F		F		F
152		P		F		F
153		P		F		P
154		P		P		P
155		P		F		F
156		P		P		F
157		P		F		F
158		P		P		F
159		P		P		F
160		P		P		P
161		P		P		P
162		P		F		P
163		P		P		F
164		P		F		P
165		P		P		P
166		P		P		F
167		P		P		F
168		F		P		P
169		P		P		F
170		P		F		F
171		P		F		P
172		P		P		P
173		P		P		F
174		P		P		P
175		P		P		P
	AC Total					
	Pass	62		47		42
	Fail	13		28		33
	No Data	0		0		0
	Total	75		75		75
	Pass Percentage	82.67%		62.67%		56.00%
N						
201		F		F		F
202		P		F		P
203		P		F		P
204		P		F		P
205		P		P		P

206		P		P		P
207		P		P		P
208		P		P		F
209		P		P		P
210		P		P		P
211		F		F		F
212		F		F		F
213		F		F		F
214		P		F		P
215		P		F		P
216		F		F		P
217		P		P		F
218		F		F		F
219		P		F		F
220		P		P		P
221		P		P		P
222		F		P		P
223		F		F		F
224		P		P		P
225		F		F		F
	N Total					
	Pass	16		11		15
	Fail	9		14		10
	No Data	0		0		0
	Total	25		25		25
	Pass Percentage	64.00%		44.00%		60.00%
	Total (AC+N)					
	Pass	78		58		57
	Fail	22		42		43
	No Data	0		0		0
	Total	100		100		100
	Pass Percentage	78.00%		58.00%		57.00%

Throughput_5GHz - Ubiquiti

Clients	40_Clients	70_Clients	100_Clients
1	6.25	6.63	14.1
2	5.81	6.81	6.56
3	6.12	2.04	7.04
4	6.41	6	11.4
5	5.81	4.16	5.93
6	6.38	6.44	8.72
7	6.05	6.79	8.37
8	6.14	6.72	2.29
9	6.41	6.32	1.35
10	5.92	1.62	6.32
11	6.32	5.24	2.82
12	6.48	2.54	3.01
13	5.86	2.81	0.33
14	6.03	4.34	5.46
15	6.2	5.1	5.26
16	6.12	3.03	8.89
17	6.78	0.81	3.25
18	6.05	6.48	5.58
19	6.25	6.88	4.79
20	6.09	6.39	3.31
21	6.32	6.43	3.27
22	6.08	4.78	2.44
23	6.37	5.29	2.85
24	6.28	5.01	5.96
25	6.33	5.66	2.35
26	5.76	3.39	0
27	5.93	1.44	0.23
28	6.18	4.44	2.3
29	6.59	3.02	3.84
30	6.46	3.5	7.26
31	6.67	3.64	2.65
32	6.98	2.9	3.62
33	6.43	0.16	3.41
34	6.16	4	6.8
35	6.01	4.93	0.92
36	6.06	2.17	0
37	6.5	2.89	0.56
38	6.03	0.8	2.07
39	6.98	1.72	3.29
40	5.94	1.34	1.98
41		2.71	1.56
42		2.07	1.58
43		0.19	1.65
44		3.57	2.93

45		0	2.13
46		1.21	0.12
47		4.16	0.4
48		0.02	0.35
49		4.97	0.6
50		5.16	0.03
51		0.42	0.6
52		1.69	0.52
53		1.55	0.28
54		2.94	0.44
55		1.16	2.49
56		2.03	0.18
57		3.01	2.23
58		1.64	0.03
59		2.61	0
60		1.78	0.01
61		3.08	0.32
62		6.15	0.21
63		2.82	0.04
64		1.09	0
65		7.11	0.54
66		2.04	0.1
67		9.78	0.73
68		18.6	0.73
69		2.14	3.79
70		2.14	0.2
71			0.24
72			0
73			6.55
74			1.99
75			0.46
76			1.7
77			0
78			0.45
79			0
80			9.21
81			0.68
82			1.25
83			0
84			0
85			0.54
86			1.7
87			2.39
88			0.39
89			0
90			25.8

91			1.24
92			0.76
93			0.54
94			0
95			2.03
96			1.45
97			4.29
98			6.34
99			0.03
100			0
Mean	6.239	3.75	2.654
Total	249.54	262.5	265.4
Count	40	70	100
Standard Deviation	0.291	2.796	3.66

Throughput_5GHz - Aruba

Clients	40_Clients	70_Clients	100_Clients
1	6.72	1.98	0.464
2	5.89	2.55	1.96
3	6.58	1.45	2.94
4	6.8	3.66	3.85
5	6.54	2.49	1.73
6	0	3.2	0.391
7	5.97	3.46	2.55
8	7.27	4	2.3
9	6.52	3.15	2.45
10	6.62	1.68	1.15
11	6.19	0.12	3.61
12	6.56	3.24	2.48
13	5.59	3.33	0.09
14	6.37	3.91	0.1
15	6.67	2.32	0.82
16	7.53	0	1.02
17	5.87	1.85	2.99
18	6.17	1.84	3.94
19	0	0.84	1.48
20	5.58	4.03	0.53
21	6.82	1.37	3.06
22	6.07	2.85	1.23
23	7.57	2.68	0.16
24	4.12	2.99	0
25	4.86	3.89	2.54
26	5.26	2.5	3.64
27	4.13	1.2	2
28	6.04	0.94	1.66
29	7.02	4.34	0.2
30	4.44	3.22	0
31	6.61	2.46	1.01
32	4.88	4.11	3.3
33	6.29	1.21	0.84
34	4.88	3.15	1.81
35	6.3	3.15	1.67
36	5.78	1.96	0
37	0.13	0	0.49
38	2.24	3.8	1.04
39	6.02	3.73	1.49
40	7.45	1.81	2.55
41		0	0.89
42		4.38	1.3
43		3.12	3.53
44		2.62	2.9

45		3.1	3.21
46		3.97	0.65
47		3.77	1.45
48		3.69	1.73
49		2.57	0.66
50		3.47	1.59
51		4.08	1.94
52		3.51	2.41
53		2.49	0.27
54		2.2	3.61
55		1.9	0.49
56		3.84	2.59
57		3.71	0.77
58		0	1.4
59		2.39	3.85
60		2.35	3.85
61		1.08	4.23
62		2.25	3.06
63		2.1	3.41
64		2.23	2.9
65		2.08	3.08
66		2.11	3.42
67		3.31	2
68		1.64	2.32
69		2.53	0
70		3.79	3.48
71			0.5
72			3.56
73			3.49
74			0.76
75			2.84
76			1.1
77			3.55
78			1.36
79			1.61
80			2.68
81			1
82			3.12
83			0.02
84			0.37
85			2.75
86			0
87			0.21
88			0.07
89			0.52
90			1.73

91			1.38
92			1.78
93			1.38
94			0.82
95			1.03
96			0
97			2.41
98			1.34
99			2.54
100			0.76
Mean	5.559	2.582	1.772
Total	222.35	180.74	177.205
Count	40	70	100
Standard Deviation	1.879	1.14	1.216

Throughput_5GHz - Meraki

Clients	40_Clients	70_Clients	100_Clients
1	8.93	4.78	3.82
2	2.06	2.16	4.03
3	6.76	0	12.8
4	3.64	2.43	0
5	2.93	3.99	0.52
6	0.93	1.79	0.84
7	4.58	6.91	3.02
8	4.23	3.42	0
9	5.02	1.93	4.36
10	11.7	9.23	3.53
11	3.35	1.94	0.49
12	2.02	5.1	0
13	3.12	5.42	2.72
14	2.32	4.22	0.33
15	3.02	1.76	0.27
16	7.01	3.17	3.62
17	3.64	0	0
18	3.73	3.13	2.35
19	6.27	1.56	0.18
20	0	6.76	0
21	1.79	5.68	6.13
22	2.38	3.64	8.74
23	13.4	7.4	3.4
24	4.62	2.81	0
25	4.13	3.39	5.03
26	6.15	0.48	0.5
27	9.21	0	0
28	9.19	3.44	3.68
29	3.22	0.77	1.61
30	1.81	5.77	2.58
31	1.98	0	0.17
32	11.2	5.79	0
33	2.88	0.46	0.82
34	8.33	1.54	3.71
35	6.27	0	0
36	0.65	6.8	3.24
37	6.91	6.29	0
38	1.86	3.66	5.25
39	34.7	0	1
40	16.1	1.12	0
41		11.2	8.27
42		2.97	0
43		4.33	1.46
44		0	0

45		1.92	0.93
46		4.6	0
47		0.48	5.83
48		3.4	0.07
49		0	0
50		11.2	8.89
51		0.03	8.07
52		14.7	8.24
53		0	0
54		10.1	4.11
55		11.4	0
56		35.4	0.2
57		0	14
58		22.4	0
59		0	5.49
60		0	13.2
61		7.64	4.45
62		0	0
63		0	11.5
64		1.75	0
65		4.98	10.3
66		0.3	2.67
67		1.29	0
68		1.18	0
69		1.97	19.3
70		5.76	1.6
71			7.12
72			0
73			1.24
74			0.57
75			0
76			6.07
77			0
78			2.08
79			8.12
80			0
81			0
82			3.16
83			0
84			2.16
85			0
86			1.49
87			0
88			5.85
89			0
90			1.47

91			4.31
92			0
93			0
94			1.07
95			0
96			0
97			4.23
98			7.79
99			0.84
100			8.06
Mean	5.801	4.111	2.830
Total	232.04	287.74	282.95
Count	40	70	100
Standard Deviation	5.855	5.493	3.796

Throughput_5GHz - Ruckus

Clients	40_Clients	70_Clients	100_Clients
1	3.79	2.7	3.5
2	10.8	2.85	3.84
3	7.98	3.7	3.89
4	10.8	3.45	1.56
5	6.42	3.85	1.06
6	8.13	1.79	1.5
7	6.19	2.1	0.521
8	7.36	4.17	2.9
9	10.3	4.35	1.74
10	10.4	4.87	1.65
11	9.52	2.36	1.51
12	8.22	2.7	2.5
13	9.97	3.9	2.88
14	9.43	4.98	0.563
15	7.32	3.37	1.43
16	8.54	3.8	2.31
17	9.95	2.35	0.260
18	8.81	3.6	2.3
19	10.2	2.43	2.61
20	6.12	3.26	3.29
21	6.74	4.27	1.94
22	6.86	4.18	2.4
23	8.43	4.1	0.254
24	5.52	3.56	2.92
25	5.75	3.69	3.9
26	6.4	1.18	2.35
27	6.76	4.26	0.578
28	9.23	4.26	1.27
29	10.1	3.64	3.27
30	9.64	3.04	3.35
31	5.39	3.71	3.26
32	5.64	2.6	2.38
33	4.35	3.42	2.39
34	3.67	4.33	2.45
35	5.14	3.58	2.86
36	3.55	4.74	3.44
37	5.57	3.67	3.07
38	4.77	4.08	2.72
39	4.78	4.48	0.180
40	4.21	4.63	3.03
41		4.91	0.734
42		5.14	2.3
43		4.79	2.77
44		4	0.808

45		3.55	3.4
46		4.58	1.14
47		4.77	1.57
48		4.83	2.45
49		2.74	2.77
50		1.62	2.03
51		2.88	2.3
52		3.09	2.33
53		2.42	1.2
54		3.31	1.23
55		3.34	2.54
56		3.1	1.72
57		2.94	3.28
58		2.64	1.68
59		2.54	0.886
60		2.75	2.97
61		2.98	2.2
62		3.11	2.58
63		2.12	0.481
64		2.44	0.261
65		2.74	2.09
66		3.01	0.790
67		2.97	4.11
68		2.15	1.55
69		3.15	0.613
70		2.98	1.97
71			2.25
72			2.17
73			0.816
74			2.48
75			2.43
76			2.49
77			2.53
78			1.85
79			2.47
80			2.13
81			2.72
82			2.4
83			2.45
84			2.42
85			1.86
86			2.61
87			1.78
88			1.71
89			0.709
90			1.98

91			1.97
92			2.89
93			2.41
94			1.68
95			2.87
96			1.42
97			1.32
98			2.22
99			1.9
100			1.88
Mean	7.319	3.423	2.094
Total	292.75	239.59	209.395
Count	40	70	100
Standard Deviation	2.205	0.895	0.905