TR-398 Issue 4

WiFi Performance Test Plan

Sat Dec 16 06:34:20 PST 2023

Test Setup Information		
Device Under Test	Name	be800
	SSIDs	be800_2g be800_5g be800_6g TP-Link_F5F0_MLO
	Passwords	lanforge lanforge lanforge 91912022
	BSSIDs	40:ed:00:14:f5:f2 40:ed:00:14:f5:f3 52:ed:00:14:f5:f4
	Notes	[BLANK]
Operator	Ben Greear	
Estimated Run Time	25 m	
Actual Run Time	20.677 m	

Objective

The TR-398 Issue 4 WiFi Performance test plan by the Broadband forum provides a comprehensive set of tests to qualify the performance of WiFi access points (APs) designed for residential and small office environments. Radio performance, Throughput, Connection Stability, Airtime Fairness, AP Co-existence, Mu_MIMO Performance, Spatial Consistency, Long-term Stability and Mesh performance are some of the test areas covered in this test plan. The test plan is designed for service providers deploying in home WiFi APs to qualify the APs in the lab before deployment and for equipment makers to test during the development of the APs. Candela Technologies offers a fully automated TR-398 test system. The user can select from the list of tests available. Most tests can run fully automated, though some require user interaction. Measurements are made and compared to the specified PASS/FAIL criteria in the TR-398 test plan and this report will show the summary PASS/FAIL results followed by more detailed results for each test.

Summary Results

Test	Result	Candela Score	Elapsed	Info
6.2.2 Maximum TCP Throughput Test	2.4Ghz FAIL 5Ghz FAIL 6Ghz PASS	111	20.047 m	Throughput N 2.4Ghz UL 99.43% DL 104.75% Throughput AC 5Ghz UL 108.77% DL 77.78% Throughput AX 2.4Ghz UL 114.31% DL 114.61% Throughput AX 5Ghz UL 109.44% DL 95.00% Throughput AX 6Ghz-160 UL 133.13% DL 128.50% Throughput BE 2.4Ghz UL 99.48% DL 100.01% Throughput BE 5Ghz UL 112.43% DL 75.00% Throughput BE 6Ghz UL 161.38% DL 151.82%

6.2.2 Maximum TCP Throughput Test

Summary

The Maximum throughput test intends to measure the maximum throughput performance of the DUT with a single station active. The test uses TCP connections and the attenuation is adjusted to emulate a distance of 2 meters. The 2.4Ghz station is configured for 20Mhz bandwidth and the 5Ghz station is configured for 80Mhz bandwidth. In 6Ghz, the station is configured for 160Mhz bandwidth. In both cases the station is configured for a maximum of two spatial streams.

Test Procedure

These steps are done for 2.4Ghz and then for 5Ghz bands.

1. Establish the LAN connection, create 1 station and allow the station to associate with the DUT.
2. Measure the downlink TCP throughput, using a test time of 120 seconds.
3. Measure the uplink TCP throughput, using a test time of 120 seconds.

Pass/Fail Criteria

1. For N 2.4Ghz, upload rate must be at least 100.00 Mbps
2. For N 2.4Ghz, download rate must be at least 100.00 Mbps
3. For AC 5Ghz, upload rate must be at least 650.00 Mbps
4. For AC 5Ghz, download rate must be at least 650.00 Mbps
5. For AX 2.4Ghz, upload rate must be at least 180.00 Mbps
6. For AX 2.4Ghz, download rate must be at least 180.00 Mbps
7. For AX 5Ghz, upload rate must be at least 880.00 Mbps
8. For AX 5Ghz, download rate must be at least 880.00 Mbps
9. For AX 6Ghz, upload rate must be at least 1,500.00 Mbps
10. For AX 6Ghz, download rate must be at least 1,500.00 Mbps

Candela Score

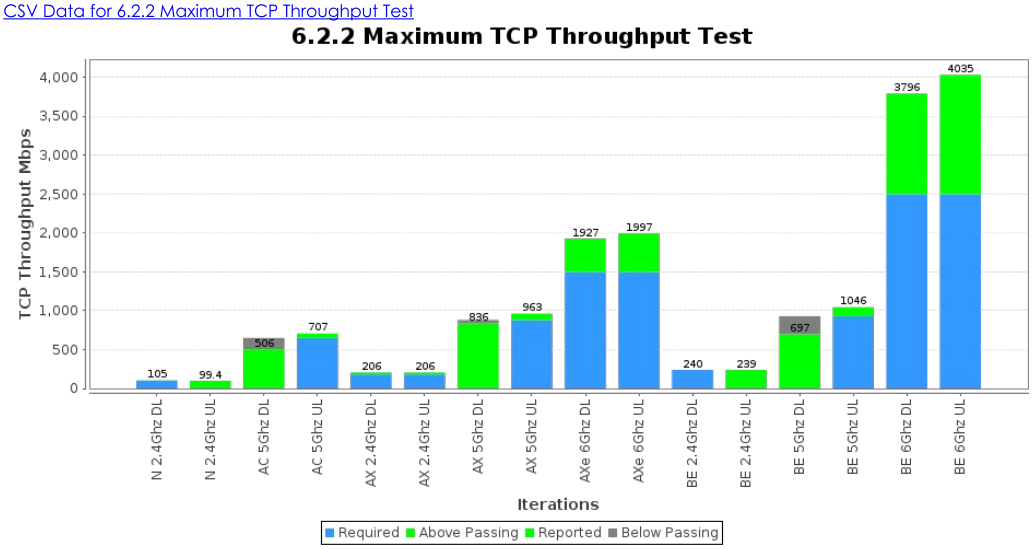
The Candela Score for Max Throughput Test is calculated as the percentage of the actual throughput vs the required throughput.

6.2.2 Maximum TCP Throughput Test Results

Type	Result	Value	P/F Value	Notes
Total N 2.4Ghz download throughput	PASS	105	100	Sum-total download: 104.75 Mbps Requires: 100.00 Mbps STA-RSSI Data/Beacon: -19/-16 Rx-Rate: 144.4M Tx-Rate: 144.4M 802.11bgn-20-2x2
Total N 2.4Ghz upload throughput	FAIL	99	100	Total N 2.4Ghz upload: 99.43 Mbps must be at least 100.00 Mbps STA-RSSI Data/Beacon: -19/-16 Rx-Rate: 144.4M Tx-Rate: 144.4M 802.11bgn-20-2x2
Total AC 5Ghz download throughput	FAIL	506	650	Total AC 5Ghz download: 505.59 Mbps must be at least 650.00 Mbps STA-RSSI Data/Beacon: -36/-35 Rx-Rate: 866.7M Tx-Rate: 866.7M 802.11an-AC-160-2x2
Total AC 5Ghz upload throughput	PASS	707	650	Sum-total upload: 707.03 Mbps Requires: 650.00 Mbps STA-RSSI Data/Beacon: -36/-34 Rx-Rate: 866.7M Tx-Rate: 866.7M 802.11an-AC-160-2x2
Total AX 2.4Ghz download throughput	PASS	206	180	Sum-total download: 206.29 Mbps Requires: 180.00 Mbps STA-RSSI Data/Beacon: -22/-16 Rx-Rate: 286.7M Tx-Rate: 286.7M 802.11bgn-AX-20-2x2

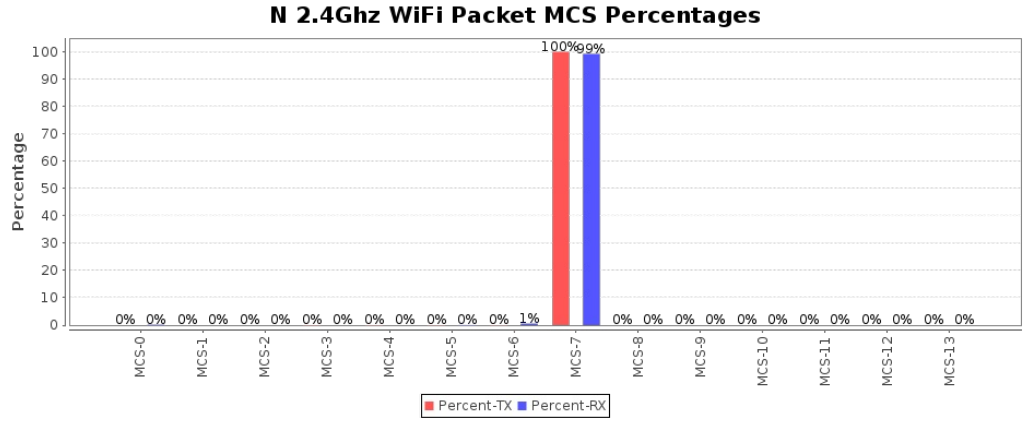
Total AX 2.4Ghz upload throughput	PASS	206	180	Sum-total upload: 205.75 Mbps Requires: 180.00 Mbps STA-RSSI Data/Beacon: -21/-15 Rx-Rate: 286.7M Tx-Rate: 286.7M 802.11bgn-AX-20-2x2
Total AX 5Ghz download throughput	FAIL	836	880	Total AX 5Ghz download: 836.00 Mbps must be at least 880.00 Mbps STA-RSSI Data/Beacon: -38/-34 Rx-Rate: 1.081G Tx-Rate: 245M 802.11an-AX-160-2x2
Total AX 5Ghz upload throughput	PASS	963	880	Sum-total upload: 963.11 Mbps Requires: 880.00 Mbps STA-RSSI Data/Beacon: -38/-35 Rx-Rate: 1.081G Tx-Rate: 1.201G 802.11an-AX-160-2x2
Total AX 6Ghz-160 download throughput	PASS	1,927	1,500	Sum-total download: 1,927.46 Mbps Requires: 1,500.00 Mbps STA-RSSI Data/Beacon: -35/-42 Rx-Rate: 2.402G Tx-Rate: 2.402G 802.11a-AX-160-2x2
Total AX 6Ghz-160 upload throughput	PASS	1,997	1,500	Sum-total upload: 1,996.99 Mbps Requires: 1,500.00 Mbps STA-RSSI Data/Beacon: -36/-42 Rx-Rate: 2.402G Tx-Rate: 2.402G 802.11a-AX-160-2x2
Total BE 2.4Ghz download throughput	PASS	240	240	Sum-total download: 240.04 Mbps Requires: 240.00 Mbps STA-RSSI Data/Beacon: -23/-16 Rx-Rate: 344.1M Tx-Rate: 344.1M 802.11bgn-BE-20-2x2
Total BE 2.4Ghz upload throughput	FAIL	239	240	Total BE 2.4Ghz upload: 238.75 Mbps must be at least 240.00 Mbps STA-RSSI Data/Beacon: -22/-15 Rx-Rate: 344.1M Tx-Rate: 344.1M 802.11bgn-BE-20-2x2
Total BE 5Ghz download throughput	FAIL	697	930	Total BE 5Ghz download: 697.48 Mbps must be at least 930.00 Mbps STA-RSSI Data/Beacon: -37/-34 Rx-Rate: 960.7M Tx-Rate: 1.441G 802.11an-BE-160-2x2
Total BE 5Ghz upload throughput	PASS	1,046	930	Sum-total upload: 1,045.64 Mbps Requires: 930.00 Mbps STA-RSSI Data/Beacon: -38/-34 Rx-Rate: 1.081G Tx-Rate: 1.441G 802.11an-BE-160-2x2
Total BE 6Ghz download throughput	PASS	3,796	2,500	Sum-total download: 3,795.60 Mbps Requires: 2,500.00 Mbps STA-RSSI Data/Beacon: -35/-42 Rx-Rate: 5.765G Tx-Rate: 5.765G 802.11a-BE-320-2x2
Total BE 6Ghz upload throughput	PASS	4,035	2,500	Sum-total upload: 4,034.57 Mbps Requires: 2,500.00 Mbps STA-RSSI Data/Beacon: -35/-42 Rx-Rate: 5.765G Tx-Rate: 5.187G 802.11a-BE-320-2x2

CSV Data for 6.2.2 Maximum TCP Throughput Test



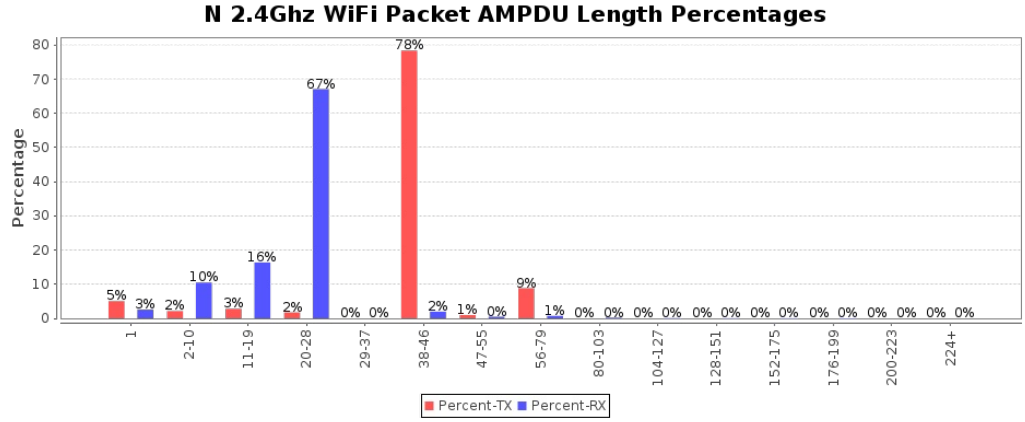
Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for N 2.4Ghz WiFi Packet MCS Percentages



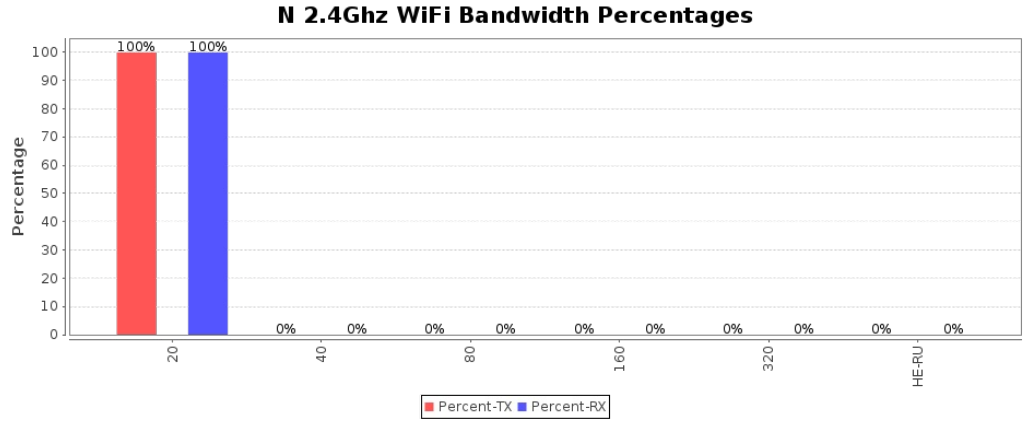
Block-Ack allows a series of frames to be sent in one transmit opportunity. This series of packets is known as a series of AMPDU frames. Having more frames in each AMPDU series normally improves throughput, but may increase latency or decrease airtime fairness. This histogram provides some visibility into the AMPDU chain length used in this test.

CSV Data for N 2.4Ghz WiFi Packet AMPDU Length Percentages



Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for N 2.4Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test N 2.4Ghz DL

Maximum-Throughput Snapshot N 2.4Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC

1.4.14 wlan0	1.123 Mbps	93.574 Mbps	0	144.4 Mbps	144.4 Mbps	802.11bgn 20 2x2	6	74	-19	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	60.461 Mbps	580.261 Kbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	79.069 Mbps	0	9147	6,157	6,157	2,653	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	79.199 Mbps	0 bps	9135	0	0	6,157	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	25.929 Mbps	0	2968	2,103	2,103	711	2.844	0
cv_tcp-3.2-4.wlan0--1.0.1-B	26.611 Mbps	0 bps	3024	0	0	2,103	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test N 2.4Ghz UL

Maximum-Throughput Snapshot N 2.4Ghz upload

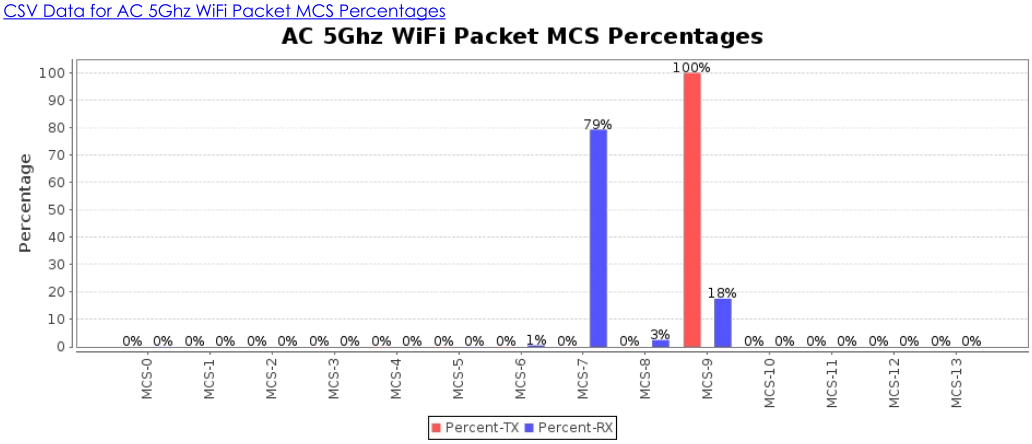
Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	85.553 Mbps	18.499 Mbps	0.03	144.4 Mbps	144.4 Mbps	802.11bgn 20 2x2	6	74	-19	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	54.637 Mbps	53.606 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	50.026 Mbps	0 bps	5770	0	0	2,148	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	50.279 Mbps	0	5731	2,148	2,148	255	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	49.745 Mbps	0 bps	5757	0	0	1,275	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	49.436 Mbps	0	5623	1,275	1,275	107	0	0

Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for AC 5Ghz WiFi Packet MCS Percentages



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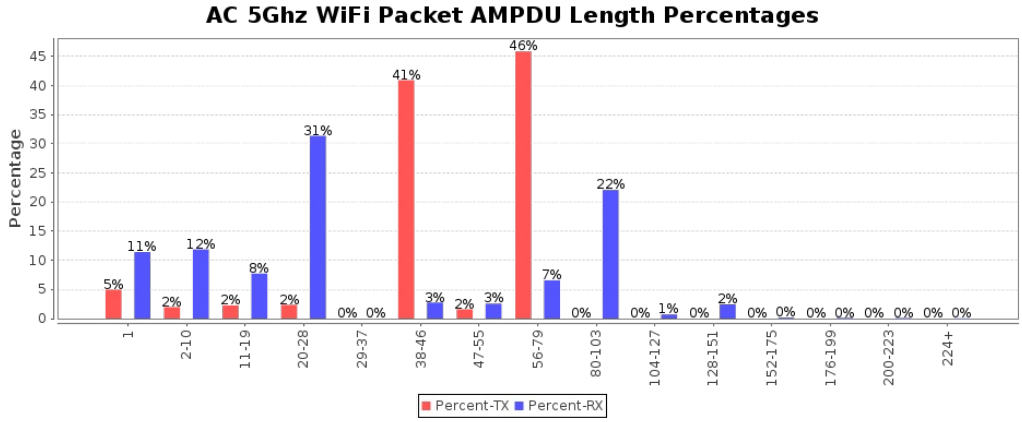
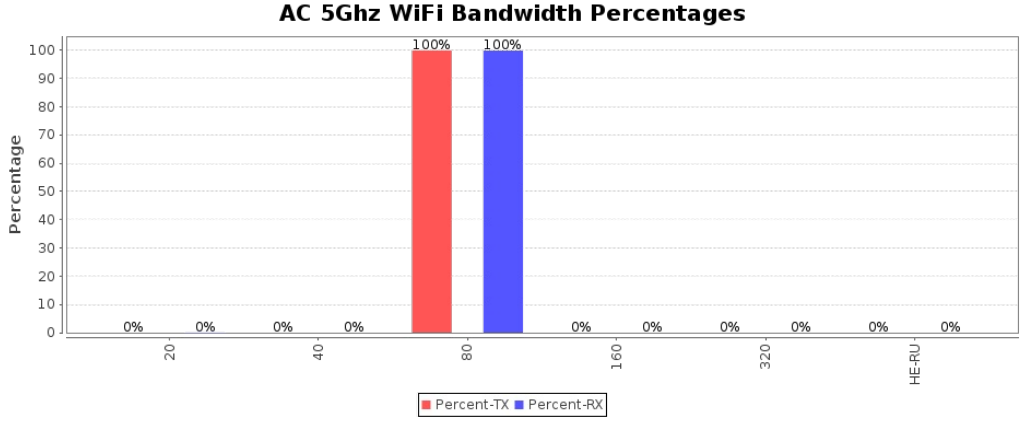


Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for AC 5Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AC 5Ghz DL

Maximum-Throughput Snapshot AC 5Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	2.473 Mbps	427.956 Mbps	0.542	866.7 Mbps	866.7 Mbps	802.11an-AC 160 2x2	36	76	-36	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	421.286 Mbps	3.274 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	228.851 Mbps	0	26379	2,574	2,574	3,758	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	225.915 Mbps	0 bps	25720	0	0	2,574	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	277.611 Mbps	0	32193	1,081	1,081	592	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	278.553 Mbps	0 bps	31856	0	0	1,081	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AC 5Ghz UL

Maximum-Throughput Snapshot AC 5Ghz upload

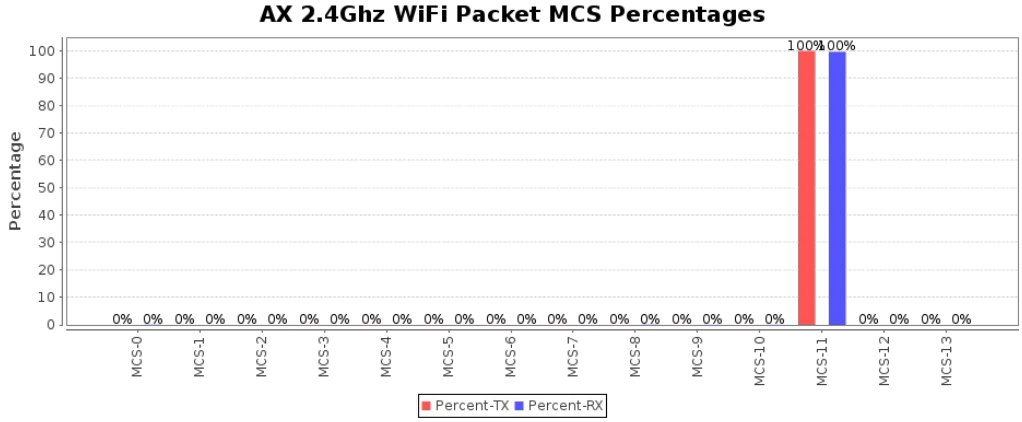
Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	550.829 Mbps	128.457 Mbps	1.567	866.7 Mbps	866.7 Mbps	802.11an-AC 160 2x2	36	76	-36	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	148.205 Mbps	547.432 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	354.076 Mbps	0 bps	40840	0	0	1,821	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	354.06 Mbps	0	40839	1,821	1,821	195	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	352.796 Mbps	0 bps	40850	0	0	810	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	353.9 Mbps	0	40201	810	810	57	0.010	0

Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for AX 2.4Ghz WiFi Packet MCS Percentages



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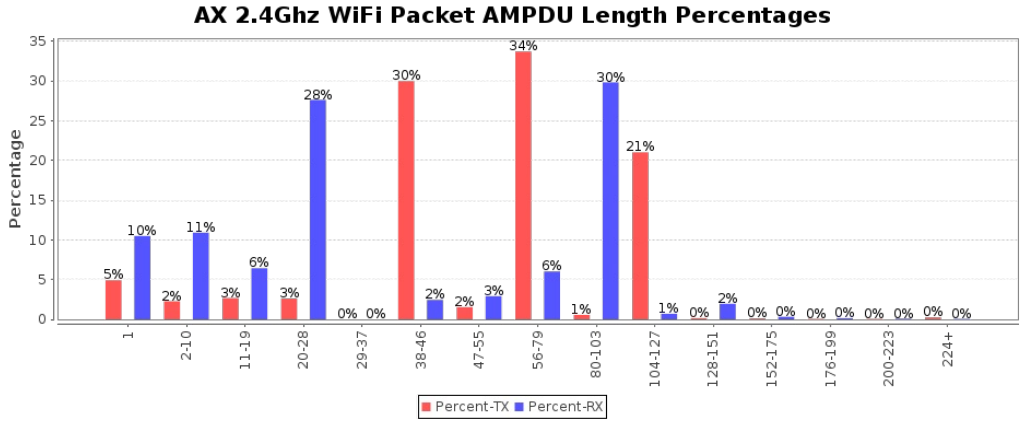

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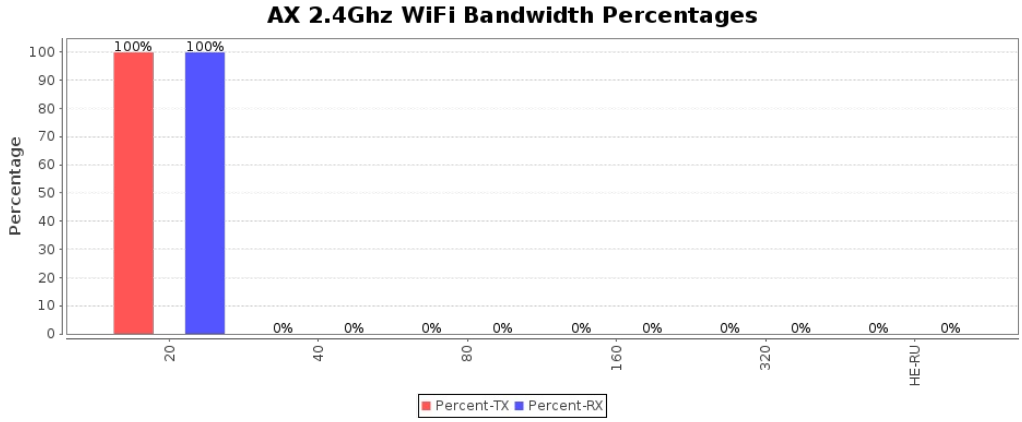

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AX 2.4Ghz DL

Maximum-Throughput Snapshot AX 2.4Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	1.197 Mbps	171.096 Mbps	0.001	286.7 Mbps	286.7 Mbps	802.11bgn-AX 20 2x2	6	93	-22	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	130.976 Mbps	184.694 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	107.339 Mbps	0	12586	3,963	3,963	1,458	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	105.214 Mbps	0 bps	11475	0	0	3,963	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	98.887 Mbps	0	11962	2,637	2,637	2,326	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	101.372 Mbps	0 bps	10953	0	0	2,637	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AX 2.4Ghz UL

Maximum-Throughput Snapshot AX 2.4Ghz upload

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	155.503 Mbps	53.671 Mbps	0	286.7 Mbps	286.7 Mbps	802.11bgn-AX 20 2x2	6	93	-21	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	94.268 Mbps	121.279 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	103.181 Mbps	0 bps	11880	0	0	2,778	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	103.126 Mbps	0	11761	2,778	2,778	724	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	103.199 Mbps	0 bps	11965	0	0	1,640	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	103.322 Mbps	0	11946	1,640	1,640	331	0	0

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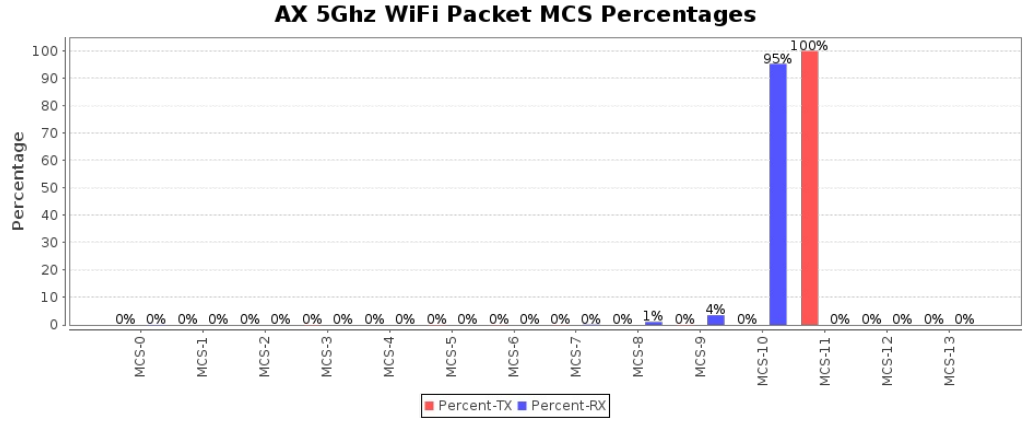
CSV Data for AX 5Ghz WiFi Packet MCS Percentages



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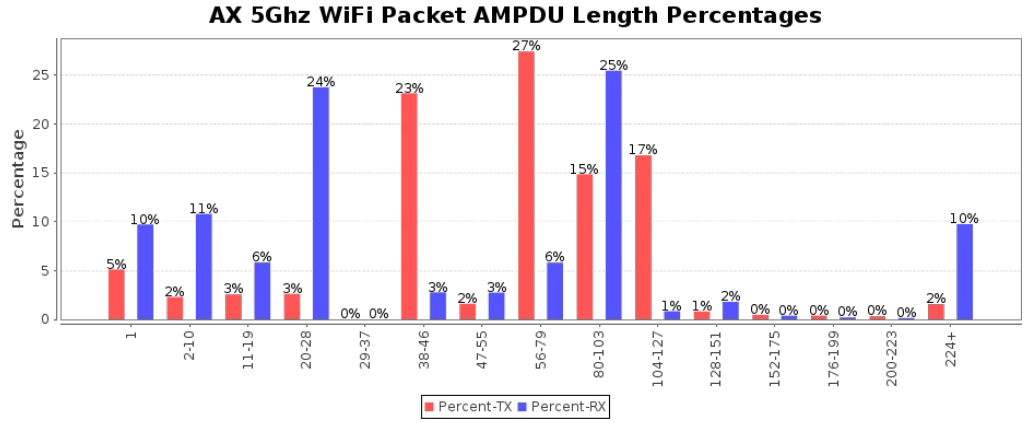
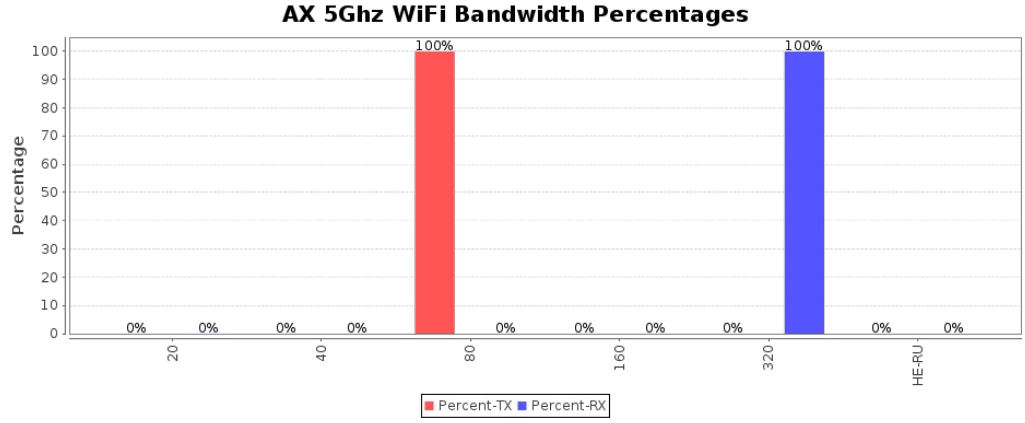


Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for AX 5Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AX 5Ghz DL

Maximum-Throughput Snapshot AX 5Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	4.307 Mbps	781.502 Mbps	6.111	245 Mbps	1.081 Gbps	802.11an-AX 160 2x2	36	86	-38	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	842.467 Mbps	3.757 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	455.606 Mbps	0	52351	1,271	1,271	492	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	455.583 Mbps	0 bps	52465	0	0	1,271	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	380.383 Mbps	0	43990	926	926	567	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	382.484 Mbps	0 bps	43571	0	0	926	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AX 5Ghz UL

Maximum-Throughput Snapshot AX 5Ghz upload

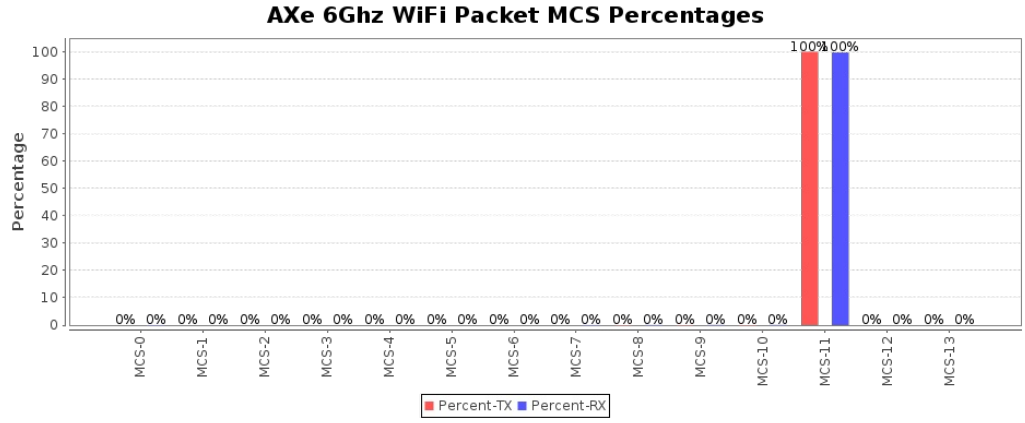
Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	825.586 Mbps	124.93 Mbps	5.724	1200.9 Mbps	1.081 Gbps	802.11an-AX 160 2x2	36	86	-38	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	89.434 Mbps	903.099 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	480.538 Mbps	0 bps	55260	0	0	2,216	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	480.53 Mbps	0	55011	2,216	2,216	395	0.451	0
cv_tcp-3.2-4.wlan0--1.0.1-A	486.848 Mbps	0 bps	56445	0	0	1,139	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	487.615 Mbps	0	55538	1,139	1,139	289	0	0

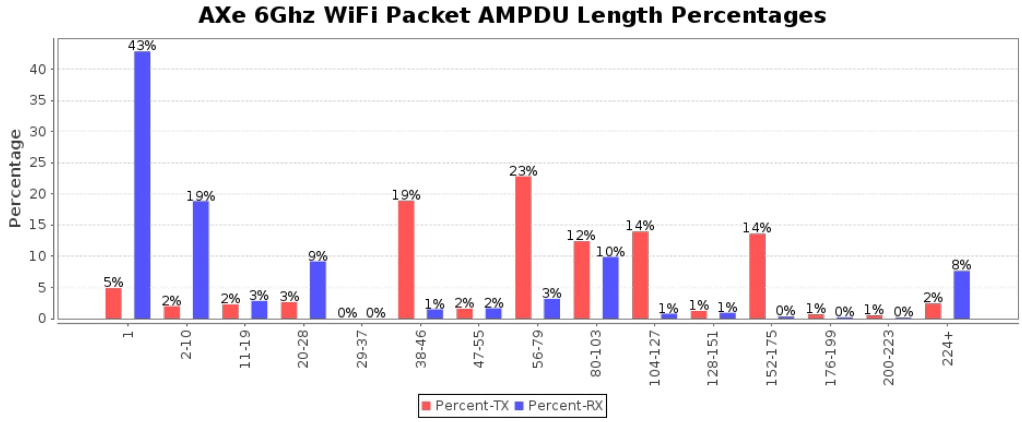
Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for AXe 6Ghz WiFi Packet MCS Percentages



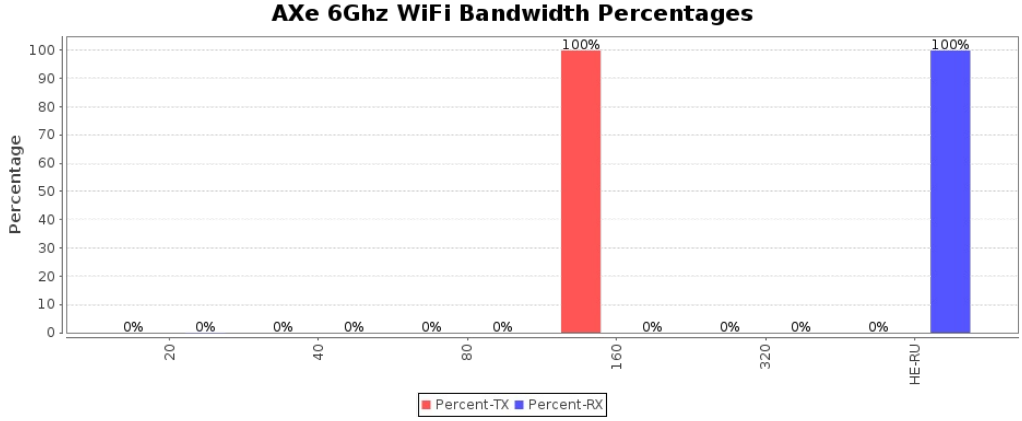
Block-Ack allows a series of frames to be sent in one transmit opportunity. This series of packets is known as a series of AMPDU frames. Having more frames in each AMPDU series normally improves throughput, but may increase latency or decrease airtime fairness. This histogram provides some visibility into the AMPDU chain length used in this test.

CSV Data for AXe 6Ghz WiFi Packet AMPDU Length Percentages



Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for AXe 6Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AXe 6Ghz DL

Maximum-Throughput Snapshot AXe 6Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	4.058 Mbps	1.528 Gbps	0	2401.9 Mbps	2.402 Gbps	802.11a-AX 160 2x2	259	91	-35	52:ED:00:14:F5:F4	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	1.311 Gbps	127.781 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	834.091 Mbps	0	96200	781	781	421	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	834.753 Mbps	0 bps	95075	0	0	781	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	1.094 Gbps	0	126398	384	384	190	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	1.095 Gbps	0 bps	125510	0	0	384	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test AXe 6Ghz UL

Maximum-Throughput Snapshot AXe 6Ghz upload

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
						802.11a-						

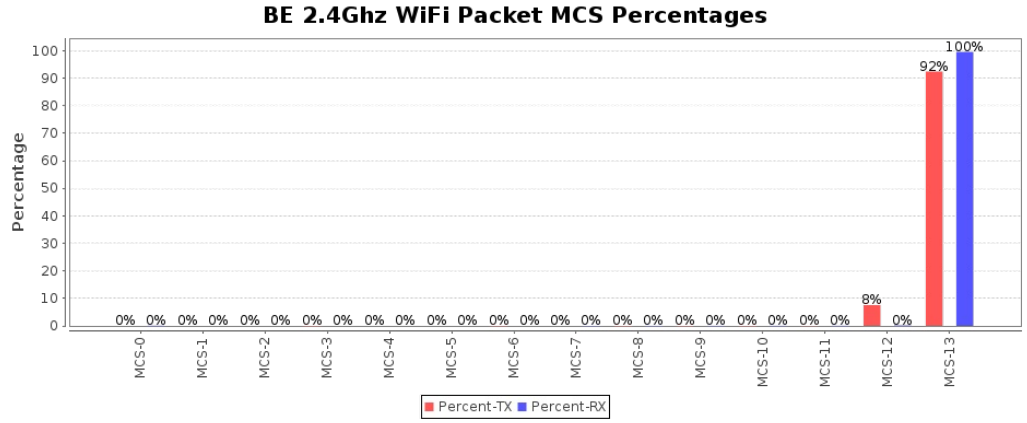
1.4.14 wlan0	1.423 Gbps	574.68 Mbps	0.001	2401.9 Mbps	2.402 Gbps	AX 160 2x2	259	91	-36	52:ED:00:14:F5:F4	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	746.335 Mbps	1.312 Gbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	1.001 Gbps	0 bps	115225	0	0	1,674	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	1.001 Gbps	0	114403	1,674	1,674	252	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	998.489 Mbps	0 bps	115400	0	0	809	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	998.399 Mbps	0	114808	809	809	118	0	0

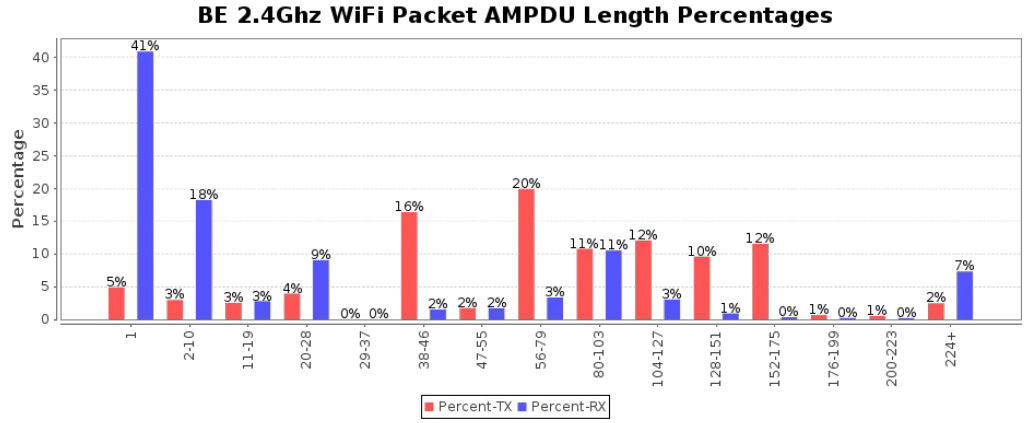
Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for BE 2.4Ghz WiFi Packet MCS Percentages



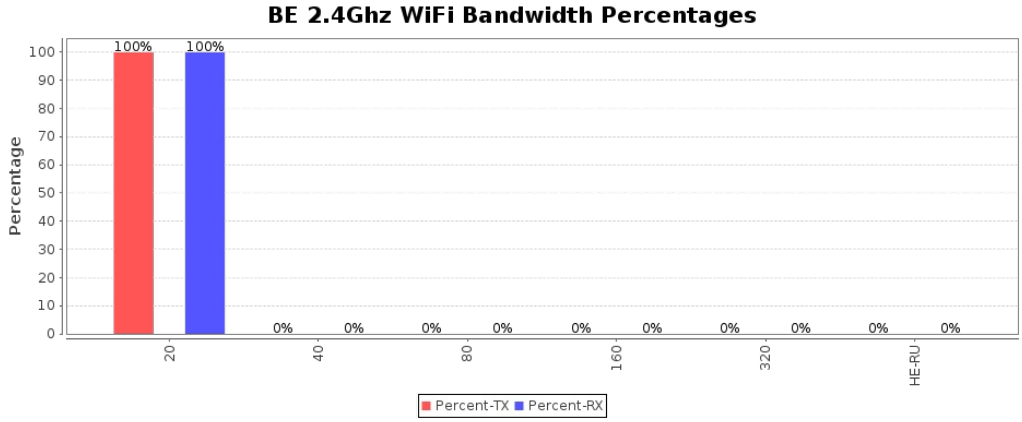
Block-Ack allows a series of frames to be sent in one transmit opportunity. This series of packets is known as a series of AMPDU frames. Having more frames in each AMPDU series normally improves throughput, but may increase latency or decrease airtime fairness. This histogram provides some visibility into the AMPDU chain length used in this test.

CSV Data for BE 2.4Ghz WiFi Packet AMPDU Length Percentages



Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for BE 2.4Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 2.4Ghz DL

Maximum-Throughput Snapshot BE 2.4Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	1.697 Mbps	205.266 Mbps	2.844	344.1 Mbps	344.1 Mbps	802.11bgn-BE 20 2x2	6	82	-23	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	132.239 Mbps	754.208 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	199.661 Mbps	0	23003	5,213	5,213	882	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	199.67 Mbps	0 bps	22870	0	0	5,213	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	40.399 Mbps	0	4637	1,928	1,928	236	1.800	0
cv_tcp-3.2-4.wlan0--1.0.1-B	41.291 Mbps	0 bps	4722	0	0	1,928	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 2.4Ghz UL

Maximum-Throughput Snapshot BE 2.4Ghz upload

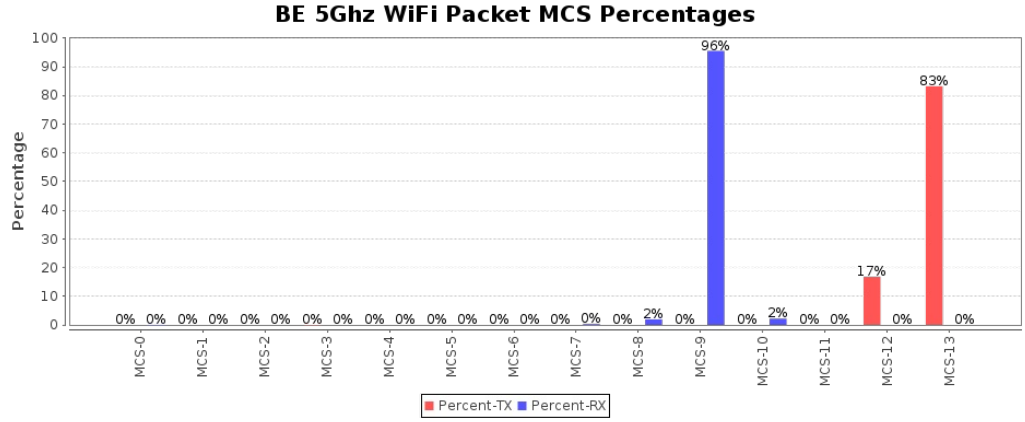
Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	187.616 Mbps	57.76 Mbps	7.336	344.1 Mbps	344.1 Mbps	802.11bgn-BE 20 2x2	6	82	-22	40:ED:00:14:F5:F2	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	8.149 Mbps	243.317 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	119.081 Mbps	0 bps	13805	0	0	3,143	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	119.343 Mbps	0	14074	3,143	3,143	1,098	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	120.209 Mbps	0 bps	13995	0	0	1,309	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	120.199 Mbps	0	13780	1,309	1,309	330	0	0

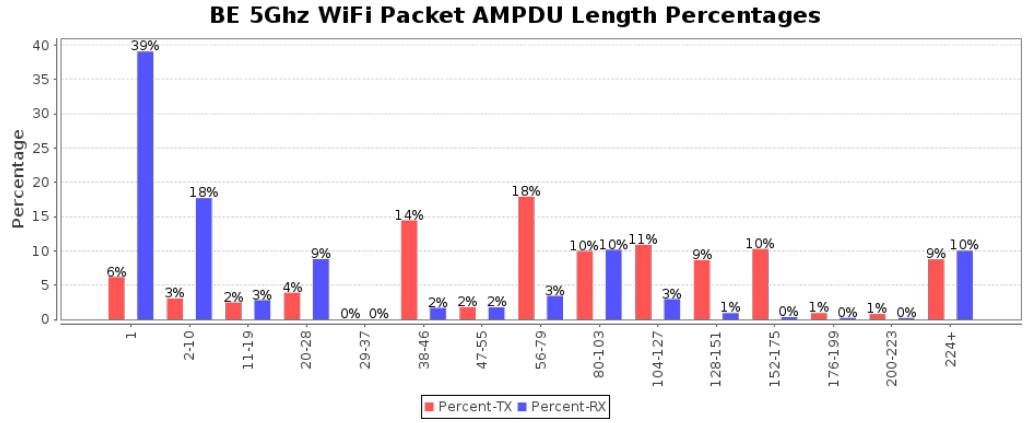
Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for BE 5Ghz WiFi Packet MCS Percentages



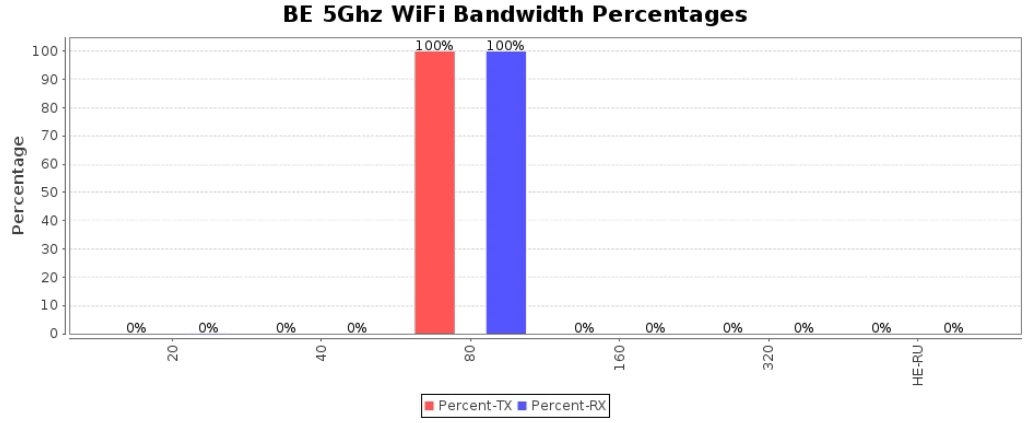
Block-Ack allows a series of frames to be sent in one transmit opportunity. This series of packets is known as a series of AMPDU frames. Having more frames in each AMPDU series normally improves throughput, but may increase latency or decrease airtime fairness. This histogram provides some visibility into the AMPDU chain length used in this test.

CSV Data for BE 5Ghz WiFi Packet AMPDU Length Percentages



Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for BE 5Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 5Ghz DL

Maximum-Throughput Snapshot BE 5Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	2.569 Mbps	645.07 Mbps	5.603	1441.1 Mbps	960.7 Mbps	802.11an-BE 160 2x2	36	93	-37	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	571.198 Mbps	26.176 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	286.103 Mbps	0	32886	3,386	3,386	1,536	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	284.301 Mbps	0 bps	32015	0	0	3,386	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	410.901 Mbps	0	47826	2,286	2,286	1,132	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	413.37 Mbps	0 bps	47334	0	0	2,286	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 5Ghz UL

Maximum-Throughput Snapshot BE 5Ghz upload

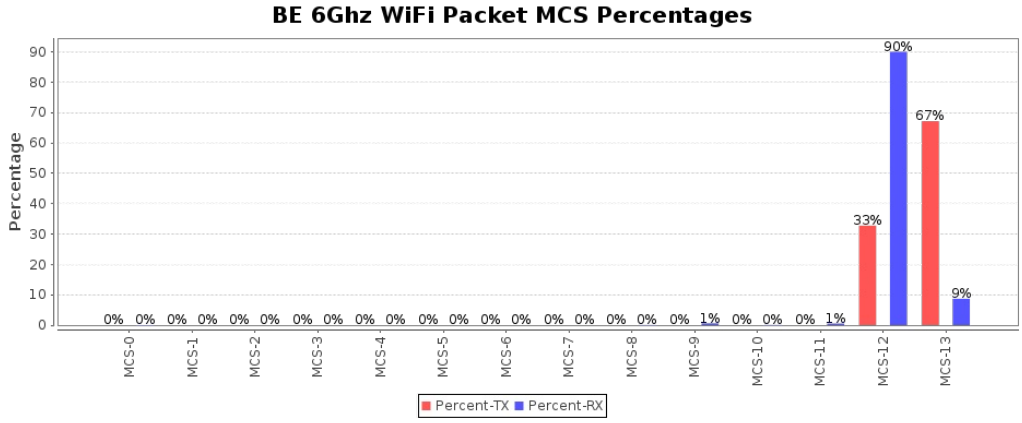
Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	839.654 Mbps	141.866 Mbps	49.745	1441.1 Mbps	1.081 Gbps	802.11an-BE 160 2x2	36	93	-38	40:ED:00:14:F5:F3	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	205.31 Mbps	782.362 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	527.266 Mbps	0 bps	60720	0	0	1,454	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	527.084 Mbps	0	60451	1,454	1,454	204	0.130	0
cv_tcp-3.2-4.wlan0--1.0.1-A	520.372 Mbps	0 bps	60185	0	0	967	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	520.178 Mbps	0	60389	967	967	178	0	0

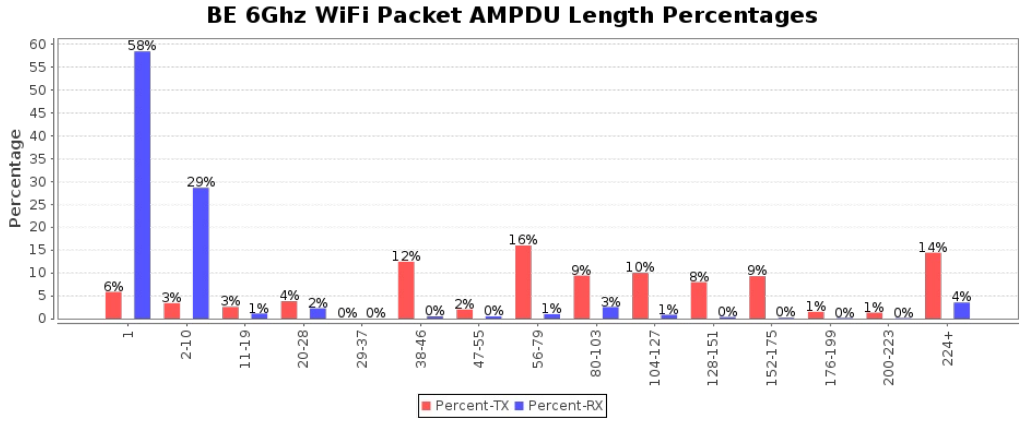
Histogram for WiFi MCS for packets sent and received by the wifi radios in the test.

CSV Data for BE 6Ghz WiFi Packet MCS Percentages



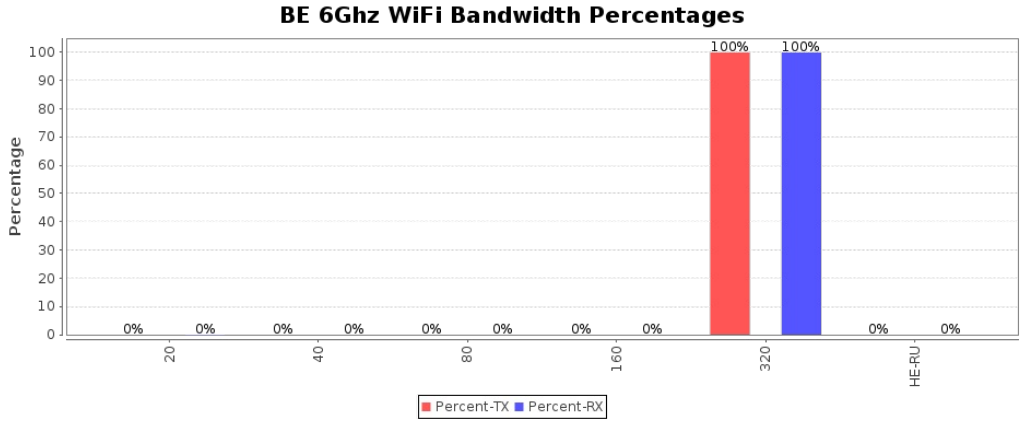
Block-Ack allows a series of frames to be sent in one transmit opportunity. This series of packets is known as a series of AMPDU frames. Having more frames in each AMPDU series normally improves throughput, but may increase latency or decrease airtime fairness. This histogram provides some visibility into the AMPDU chain length used in this test.

CSV Data for BE 6Ghz WiFi Packet AMPDU Length Percentages



Histogram for WiFi bandwidths for packets sent and received by the wifi radios in the test.

CSV Data for BE 6Ghz WiFi Bandwidth Percentages



Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 6Ghz DL

Maximum-Throughput Snapshot BE 6Ghz download

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	4.886 Mbps	2.878 Gbps	0.287	5764.6 Mbps	5.765 Gbps	802.11a-BE 320 2x2	259	62	-35	52:ED:00:14:F5:F4	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	3.977 Gbps	5.454 Mbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	0 bps	1.671 Gbps	0	192055	825	825	268	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	1.659 Gbps	0 bps	189145	0	0	825	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	0 bps	2.13 Gbps	0	248956	458	458	221	0.052	0
cv_tcp-3.2-4.wlan0--1.0.1-B	2.131 Gbps	0 bps	249085	0	0	458	0	0	0

Collected CSV Data: CSV: 6.2.2 Maximum TCP Throughput Test BE 6Ghz UL

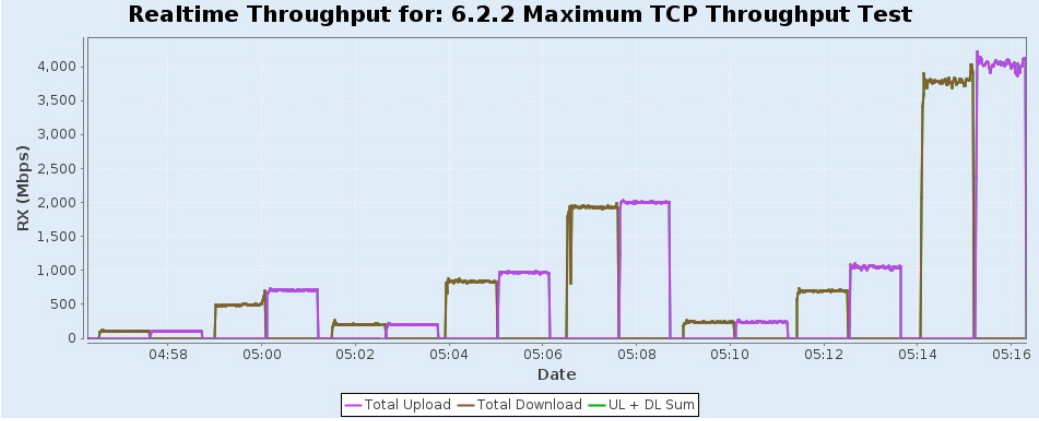
Maximum-Throughput Snapshot BE 6Ghz upload

Port	Tx-Bps 1m	Rx-Bps 1m	Tx-Fail %	Tx Link-Rate	Rx Link-Rate	Mode	Channel	Last CX-Time (ms)	RSSI (dBm)	AP	IP	MAC
1.4.14 wlan0	2.752 Gbps	1.253 Gbps	11.447	5187.1 Mbps	5.765 Gbps	802.11a-BE 320 2x2	259	62	-35	52:ED:00:14:F5:F4	192.168.0.104	e4:60:17:65:83:8f

Port	Tx-Bps 1m	Rx-Bps 1m	Link-Rate	IP	MAC
1.3.2 eth2	125.65 Mbps	4.068 Gbps	10 Gbps	192.168.0.56	9c:69:b4:63:76:c4

Endpoint	Tx-Bps 1m	Rx-Bps 1m	TxPkts	RxPkts	RX Latency (ms)	Round-Trip Latency (ms)	Jitter	Rx Packet Loss %	Rx OOO %
cv_tcp-3.2-4.wlan0--1.0.0-A	2.024 Gbps	0 bps	233380	0	0	915	0	0	0
cv_tcp-3.2-4.wlan0--1.0.0-B	0 bps	2.017 Gbps	0	231464	915	915	85	0	0
cv_tcp-3.2-4.wlan0--1.0.1-A	2.022 Gbps	0 bps	233240	0	0	847	0	0	0
cv_tcp-3.2-4.wlan0--1.0.1-B	0 bps	2.017 Gbps	0	231067	847	847	5	0.010	0

Realtime Throughput for: 6.2.2 Maximum TCP Throughput Test



Key Performance Indicators CSV

Test configuration and LANforge software version	
Auto-Helper	true
Allow-11w (MFP/PMF)	false
SAE-PWE	2
Disable-MLO	true
Extra TxStatus	false
Extra RxStatus	false
TXS All	false
Skip 2.4Ghz Tests	false
Skip 5Ghz Tests	false
Duration-120	20
Duration-60	20
Channel 2Ghz	6
Channel 5Ghz	36
Calibrate against LANforge AP	true
Adjust UL Atten with DUT TxPower	false
Adjust UL Atten with STA TxPower	false
Attenuation Adjustment	0
Extra Download Path-loss	0
TX Power	20
DUT TX Power 2.4G	30

DUT TX Power 5G	30
LANforge Calibration TxPower-2.4G	20
LANforge Calibration TxPower-5G	20
Multi-Conn	10
UDP-Burst	false
UDP-GRO	true
Multiple Endpoints:	2
ToS	0
Pld Pattern	RANDOM_FIXED
UDP Send Buffer Size:	0
UDP Receive Buffer Size:	0
TCP Send Buffer Size:	0
TCP Receive Buffer Size:	0
Upstream Port	1.3.2 eth2 Firmware: 0x80000aef, 1.1876.0 Resource: ct523c-2103
Alien Upstream Port	1.1.2 eth2 Firmware: 0x80000c67, 1.1276.0 Resource: ct523c-0b0b
Turn-Table Chamber	840B-Default-Chamber
Configured 2m 2.4Ghz RSSI	-25
Configured 2m 5Ghz RSSI	-30
Use Virtual AX Stations	false
Use AX Radios for AC tests	true
Virt-Sta Rotation 2.4Ghz	0
Virt-Sta Rotation 5Ghz	0
AX Rotation 2.4Ghz	125
AX Rotation 5Ghz	125
Opposite-Speed:	20000
1Gbps Throughput Limit:	925000000
Throughput N 2Ghz rate:	100000000
Throughput AC 5Ghz rate:	560000000
Throughput AX 2Ghz rate:	200000000
Throughput AX 5Ghz rate:	720000000
Throughput AX 6Ghz rate:	1440000000
Background Scan Module	simple
Background Short Interval	30
Background Long Interval	300
Background RSSI Threshold	-65
Mesh Settle Time:	60
Starting Low Atten:	30
Starting Max Atten:	70
Virt-Sta Radio 1	1.4.wiphy0 Firmware: 86.fb5c9aeb.0 gl-c0-fm-c0-86.uc Resource: ct523c-ccbc
	1.4.wiphy0 Firmware: 86.fb5c9aeb.0 gl-c0-fm-c0-86.uc Resource:

AX Radio 0	ct523c-ccbc
Attenuator 0	rssi-0-2.4Ghz: -26 rssi-0-5Ghz: -47 atten: 1.2.3343.0
Attenuator 1	rssi-0-2.4Ghz: -26 rssi-0-5Ghz: -47 atten: 1.2.3343.1
Attenuator 4	rssi-0-2.4Ghz: -19 rssi-0-5Ghz: -36 atten: 1.2.3342.0
Attenuator 5	rssi-0-2.4Ghz: -19 rssi-0-5Ghz: -36 atten: 1.2.3342.1
Attenuator 8	rssi-0-2.4Ghz: -23 rssi-0-5Ghz: -33 atten: 1.2.3340.0
Attenuator 9	rssi-0-2.4Ghz: -23 rssi-0-5Ghz: -33 atten: 1.2.3340.1
AX Attenuator 0	AX rssi-0-2.4Ghz: -29 rssi-0-5Ghz: -36 atten: 1.2.7.2
AX Attenuator 1	AX rssi-0-2.4Ghz: -29 rssi-0-5Ghz: -36 atten: 1.2.7.3
AX Attenuator 4	AX rssi-0-2.4Ghz: -31 rssi-0-5Ghz: -37 atten: 1.2.3300.2
AX Attenuator 5	AX rssi-0-2.4Ghz: -31 rssi-0-5Ghz: -37 atten: 1.2.3300.3
AX Attenuator 8	AX rssi-0-2.4Ghz: -29 rssi-0-5Ghz: -38 atten: 1.2.7.0
AX Attenuator 9	AX rssi-0-2.4Ghz: -29 rssi-0-5Ghz: -38 atten: 1.2.7.1
AX Attenuator 12	AX rssi-0-2.4Ghz: -35 rssi-0-5Ghz: -46 atten: 1.2.3300.0
AX Attenuator 14	AX rssi-0-2.4Ghz: -35 rssi-0-5Ghz: -46 atten: 1.2.3300.1
AX Attenuator 16	AX rssi-0-2.4Ghz: -35 rssi-0-5Ghz: -46 atten: 1.2.3300.0
AX Attenuator 18	AX rssi-0-2.4Ghz: 5 rssi-0-5Ghz: -46 atten: 1.2.3300.1
AX Attenuator 20	AX rssi-0-2.4Ghz: -35 rssi-0-5Ghz: -46 atten: 1.2.3300.0
AX Attenuator 22	AX rssi-0-2.4Ghz: -35 rssi-0-5Ghz: -46 atten: 1.2.3300.1
AX Attenuator 24	AX rssi-0-2.4Ghz: -31 rssi-0-5Ghz: -43 atten: 1.2.3348.0
AX Attenuator 26	AX rssi-0-2.4Ghz: -31 rssi-0-5Ghz: -43 atten: 1.2.3348.1
AX Attenuator 28	AX rssi-0-2.4Ghz: -26 rssi-0-5Ghz: -27 atten: 1.2.3348.2
AX Attenuator 30	AX rssi-0-2.4Ghz: -26 rssi-0-5Ghz: -27 atten: 1.2.3348.2
Mesh Attenuator 0	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten: 1.2.3340.0
Mesh Attenuator 1	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten: 1.2.3340.1
Mesh Attenuator 2	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten: 1.2.3340.2
Mesh Attenuator 3	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten: 1.2.3340.3
Mesh Attenuator 4	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 5	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 6	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 7	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 8	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 9	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 10	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 11	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 12	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 13	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 14	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 15	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 16	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 17	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:

Mesh Attenuator 18	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 19	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 20	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 21	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 22	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Mesh Attenuator 23	Mesh rssi-0-2.4Ghz: -25 rssi-0-5Ghz: -30 atten:
Details for Resource: 1.1	Hostname: ct523c-0b0b LANforge ver: 5.4.7 64bit Kernel-Version: 6.7.0-rc1+
Details for Resource: 1.3	Hostname: ct523c-2103 LANforge ver: 5.4.7 64bit Kernel-Version: 6.7.0-rc5+
Details for Resource: 1.4	Hostname: ct523c-ccbc LANforge ver: 5.4.7 64bit Kernel-Version: 6.7.0-rc5+
Show Events	true
Build Date	Sat Dec 16 04:47:16 AM PST 2023
Git Version	b14b1210bc2979cf69ed9d255172b6c04815c26f

CSV Data

META Information for TR-398 Issue 4