Dataplane Test

Wed Feb 16 09:43:10 PST 2022

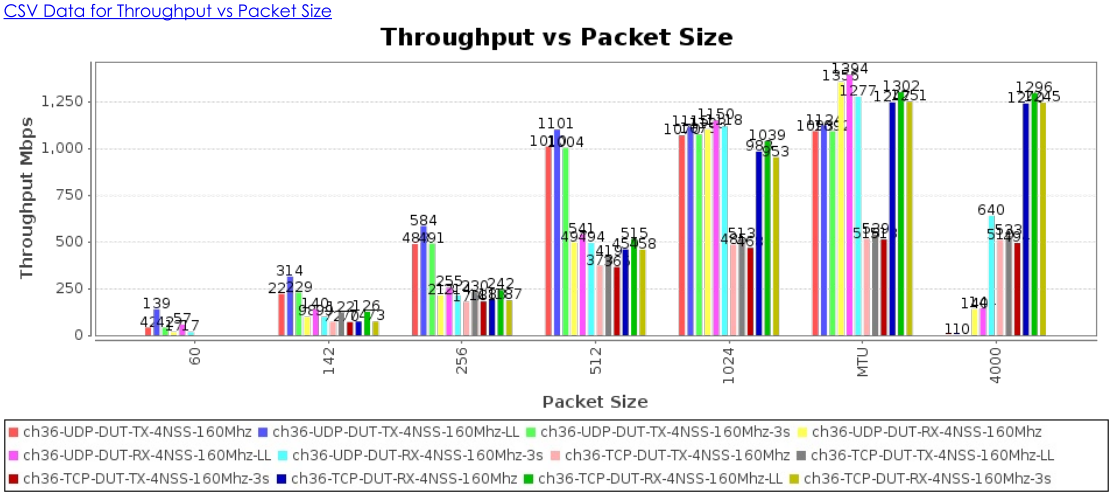
Test Setup Information				
Device Under Test	Name	cisco9130axe		
	Software Version	17.7.1.11	Hardware Version	cisco9130axe
	Model Number	cisco9130axe	Serial Number	FJC2428146G
	SSIDs			
	Passwords			
	BSSIDs			
	Notes	[BLANK]		

Objective

The Candela WiFi data plane test is designed to conduct an automatic testing of all combinations of station types, MIMO types, Channel Bandwidths, Traffic types, Traffic direction, Frame sizes etc... It will run a quick throughput test at every combination of these test variables and plot all the results in a set of charts to compare performance. The user is allowed to define an intended load as a percentage of the max theoretical PHY rate for every test combination. The expected behavior is that for every test combination the achieved throughput should be at least 70% of the theoretical max PHY rate under ideal test conditions. This test provides a way to go through hundreds of combinations in a fully automated fashion and very easily find patterns and problem areas which can be further debugged using more specific testing.

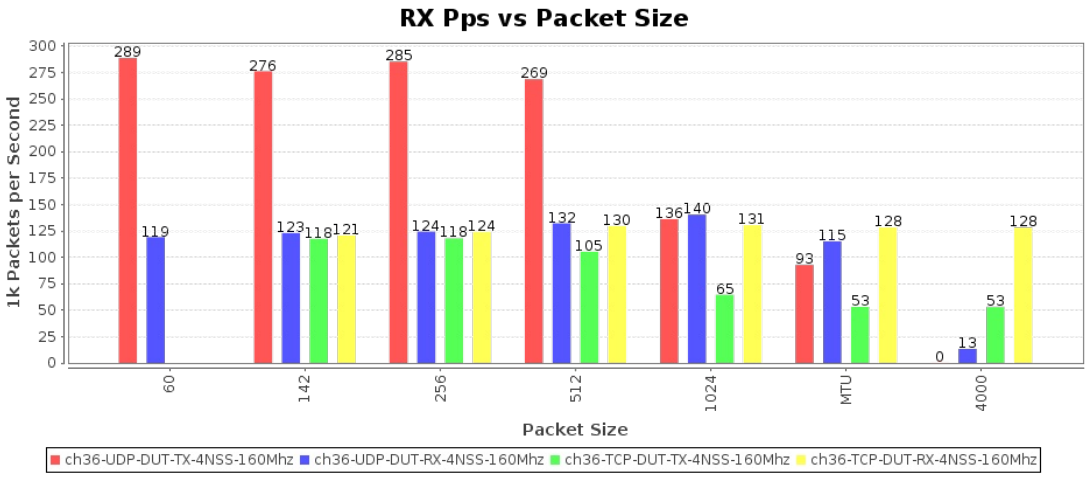
Throughput for each different traffic type. Datasets with names ending in '-LL' will include the IP, TCP, UDP and Ethernet header bytes in their calculation. For Armageddon traffic only, low-level throughput includes the Ethernet FCS and preamble. Other datasets report 'goodput' for the protocol.

CSV Data for Throughput vs Packet Size



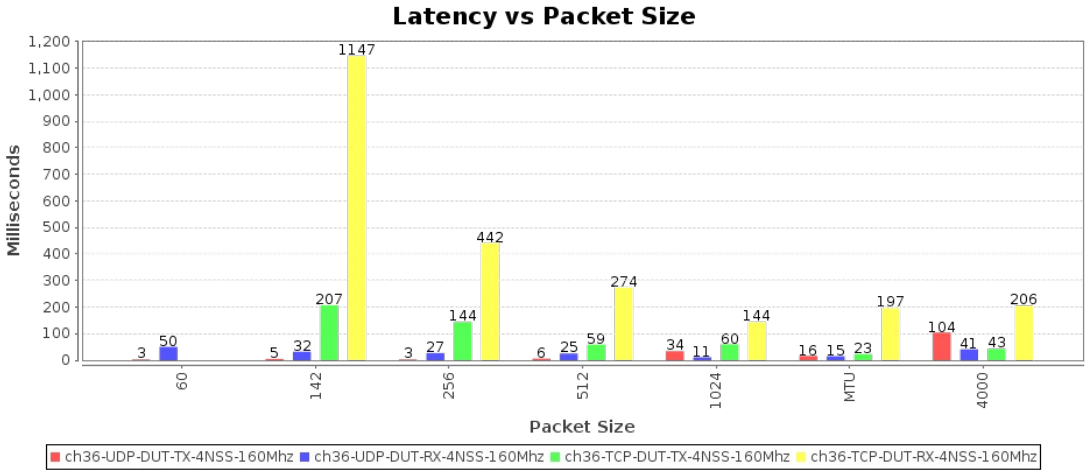
Pps throughput for each different traffic type. The values are estimated packets-per-second over the DUT, but some protocols such as TCP make this difficult to know for certain, so the value is extrapolated.

CSV Data for RX Pps vs Packet Size



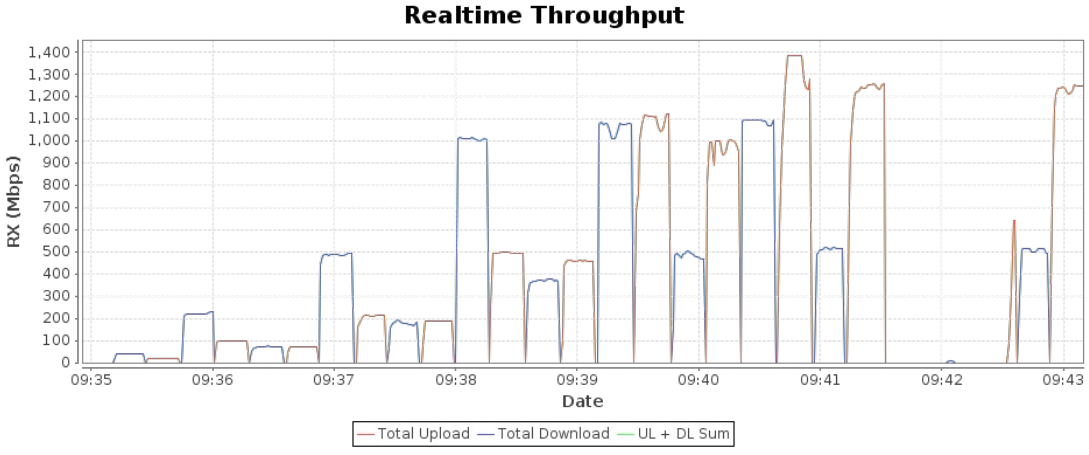
Latency for each different traffic type. If opposite-direction traffic is non-zero, then round-trip time will be reported. Otherwise, one-way latency will be reported.

CSV Data for Latency vs Packet Size



Realtime Graph shows summary download and upload RX Goodput rate of connections created by this test. Goodput does not include Ethernet, IP, UDP/TCP header overhead.

CSV Data for Realtime Throughput



Test Information

Message
Starting dataplane test with: 28 iterations.
Skipping packet size not supported by TCP: 60

Skipping packet size not supported by TCP: 60

Constant values related to the table below.

Iteration-Duration	15s

CSV data focussed on throughput. The values reported are gathered at the end of the test iteration before traffic is stopped. The test iterations consider 'Received' traffic to be received in the dominant direction. So, if the iteration is DUT-TX, then Received traffic is traffic received on the Station from the AP. If the iteration is DUT-RX, then Received traffic is received on Ethernet port from DUT and sent by the station. Columns starting with RSSI are from the perspective of the Station, so Tx-Rate is the Station transmit Phy Rate, and Rx-Rate is the Phy Rate received by the station. Rpt-Mode is negotiated mode, not necessarily Phy Rate mode.

Channel	Frequency	Security	NSS	Cfg-Mode	Bandwidth	Pkt	Traffic-Type	Direction	Atten	Rotation	Offered-1m	Rx-Bps	Rx-Bps-1m	Rx-Bps-LL	Rx-Bps-3s	RSSI	Tx-Failed	Tx-Failed%	Tx-Rate	Rx-Rate	Rpt-Mode	Rpt-Mode-Brief
36	5180	WPA2	4	AUTO	160	60	UDP	DUT-TX	NA	NA	92.188 Mbps	41.444 Mbps	41.577 Mbps	138.589 Mbps	41.511 Mbps	-52	0 / 10082214	0	28.9 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	60	UDP	DUT-RX	NA	NA	17.211 Mbps	17.078 Mbps	17.15 Mbps	57.168 Mbps	17.069 Mbps	-47	0 / 1906154	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-TX	NA	NA	292.565 Mbps	220.948 Mbps	220.951 Mbps	313.751 Mbps	229.427 Mbps	-53	0 / 5360018	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-RX	NA	NA	98.418 Mbps	98.332 Mbps	98.397 Mbps	139.724 Mbps	98.627 Mbps	-48	0 / 1857077	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-TX	NA	NA	72.577 Mbps	71.504 Mbps	71.593 Mbps	122.43 Mbps	70.387 Mbps	-53	0 / 1784027	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-RX	NA	NA	79.012 Mbps	73.351 Mbps	73.523 Mbps	125.654 Mbps	73.24 Mbps	-53	0 / 1821754	0	1300 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-TX	NA	NA	1.105 Gbps	486.731 Mbps	488.373 Mbps	584.222 Mbps	491.426 Mbps	-53	0 / 9913766	0	1300 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-RX	NA	NA	214.704 Mbps	212.047 Mbps	212.987 Mbps	254.789 Mbps	213.761 Mbps	-47	0 / 1881655	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-TX	NA	NA	180.616 Mbps	178.157 Mbps	179.037 Mbps	230.053 Mbps	180.896 Mbps	-53	0 / 1704750	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-RX	NA	NA	190.898 Mbps	187.23 Mbps	188.431 Mbps	242.098 Mbps	187.142 Mbps	-53	0 / 1857709	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-TX	NA	NA	2.281 Gbps	1.006 Gbps	1.01 Gbps	1.101 Gbps	1.004 Gbps	-53	0 / 9321088	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-RX	NA	NA	497.1 Mbps	494.858 Mbps	497.054 Mbps	541.471 Mbps	494.462 Mbps	-48	0 / 2113309	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-TX	NA	NA	372.922 Mbps	371.283 Mbps	373.012 Mbps	418.506 Mbps	365.089 Mbps	-53	0 / 1624293	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-RX	NA	NA	467.592 Mbps	456.558 Mbps	459.175 Mbps	515.187 Mbps	457.651 Mbps	-53	0 / 1935532	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-TX	NA	NA	2.961 Gbps	1.064 Gbps	1.07 Gbps	1.115 Gbps	1.075 Gbps	-54	0 / 6641517	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-RX	NA	NA	1.105 Gbps	1.096 Gbps	1.103 Gbps	1.15 Gbps	1.118 Gbps	-49	0 / 2107398	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-TX	NA	NA	486.696 Mbps	482.104 Mbps	484.778 Mbps	512.71 Mbps	467.973 Mbps	-53	0 / 930007	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-RX	NA	NA	984.914 Mbps	976.634 Mbps	982.711 Mbps	1.039 Gbps	953.098 Mbps	-54	0 / 1921751	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-TX	NA	NA	2.961 Gbps	1.087 Gbps	1.093 Gbps	1.124 Gbps	1.092 Gbps	-54	0 / 3935251	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-RX	NA	NA	1.356 Gbps	1.347 Gbps	1.356 Gbps	1.394 Gbps	1.277 Gbps	-49	0 / 1725360	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-TX	NA	NA	516.776 Mbps	513.189 Mbps	516.053 Mbps	539.003 Mbps	512.592 Mbps	-53	0 / 755770	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-RX	NA	NA	1.261 Gbps	1.238 Gbps	1.247 Gbps	1.302 Gbps	1.251 Gbps	-53	0 / 2142770	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-TX	NA	NA	2.939 Gbps	1.07 Mbps	1.073 Mbps	1.107 Mbps	0 bps	-54	0 / 11860456	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-RX	NA	NA	1.274 Gbps	139.363 Mbps	140.01 Mbps	144.467 Mbps	639.862 Mbps	-49	0 / 1812106	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-TX	NA	NA	511.192 Mbps	507.174 Mbps	509.945 Mbps	532.82 Mbps	493.96 Mbps	-53	0 / 776186	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-RX	NA	NA	1.258 Gbps	1.232 Gbps	1.24 Gbps	1.296 Gbps	1.245 Gbps	-54	0 / 1880118	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac

CSV data focussed on TX and RX Link Rate and RSSI reports. The values reported are gathered at the end of the test iteration before traffic is stopped. The Phy Rate and RSSI are from the perspective of the Station, so Tx-MCS is MCS at which station is sending to the AP, and Rx-MCS is MCS at which the AP is sending to the station.

Channel	Frequency	Security	NSS	Cfg-Mode	Bandwidth	Pkt	Traffic-Type	Direction	Tx-Mode-Rpt	Tx-NSS-Rpt	Tx-MCS	Tx-BW-Rpt	Rx-Mode-Rpt	Rx-NSS-Rpt	Rx-MCS	Rx-BW-Rpt	RSSI dBm	Tx-Phy-Rate	Rx-Phy-Rate
36	5180	WPA2	4	AUTO	160	60	UDP	DUT-TX	VHT	4	0	20	3	VHT	0	80	-53 [-57, -61, -53, -58]	28.9 MBit/s VHT-MCS 0 short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	60	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-47 [-57, -61, -53, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -63, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-RX	VHT	4	8	80	3	VHT	8	80	-48 [-57, -62, -54, -58]	1560.0 MBit/s VHT-MCS 8 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -54, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-RX	VHT	4	7	80	4	VHT	7	80	-54 [-57, -62, -55, -58]	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-TX	VHT	4	7	80	3	VHT	7	80	-54 [-57, -62, -54, -58]	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-47 [-57, -62, -54, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -54, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3

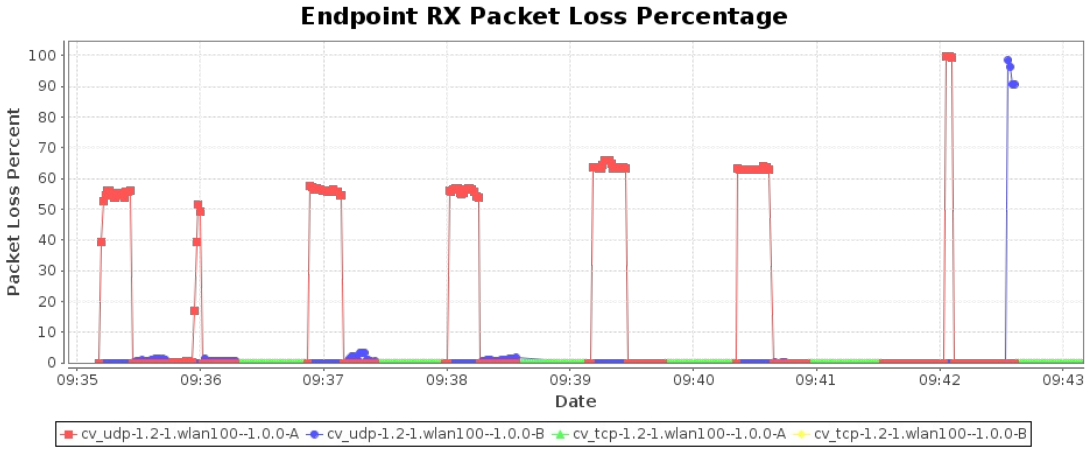
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -54, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-TX	VHT	4	9	80	4	VHT	9	80	-54 [-57, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-RX	VHT	4	9	80	4	VHT	9	80	-48 [-57, -62, -55, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-TX	VHT	4	8	80	4	VHT	8	80	-54 [-57, -62, -54, -59]	1560.0 MBit/s VHT-MCS 8 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-54 [-58, -62, -54, -59]	1560.0 MBit/s VHT-MCS 8 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-54 [-58, -62, -54, -58]	1560.0 MBit/s VHT-MCS 8 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-48 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-TX	VHT	4	9	80	4	VHT	9	80	-54 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-RX	VHT	4	9	80	4	VHT	9	80	-49 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-54 [-58, -62, -54, -59]	1560.0 MBit/s VHT-MCS 8 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -62, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3

Brief csv report, may be imported into third-party tools.

Step Index	Position [Deg]	Attenuation [dB]	Throughput [Mbps]	Beacon RSSI [dBm]	Data RSSI [dBm]
0	NA	0	41.44	-47	-52
1	NA	0	17.08	-47	-47
2	NA	0	220.95	-47	-53
3	NA	0	98.33	-47	-48
4	NA	0	71.50	-47	-53
5	NA	0	73.35	-47	-53
6	NA	0	486.73	-48	-53
7	NA	0	212.05	-47	-47
8	NA	0	178.16	-47	-53
9	NA	0	187.23	-47	-53
10	NA	0	1,006.47	-48	-53
11	NA	0	494.86	-48	-48
12	NA	0	371.28	-48	-53
13	NA	0	456.56	-47	-53
14	NA	0	1,064.31	-49	-54
15	NA	0	1,096.25	-49	-49
16	NA	0	482.10	-48	-53
17	NA	0	976.63	-48	-54
18	NA	0	1,087.36	-48	-54
19	NA	0	1,347.46	-49	-49
20	NA	0	513.19	-48	-53
21	NA	0	1,238.49	-48	-53
22	NA	0	1.07	-48	-54
23	NA	0	139.36	-49	-49
24	NA	0	507.17	-49	-53
25	NA	0	1,232.47	-49	-54

Packet Loss Percentage graph shows the percentage of lost packets as detected by the receiving endpoint due to packet gaps. If there is full packet loss, then this will not report any loss since there will be no gap to detect. TCP protocol tests will never show drops since the TCP protcol will retransmit any lost frames.

CSV Data for Endpoint RX Packet Loss Percentage



Test configuration and LANforge software version	
AP Tx Power:	0
Path Loss	10
Requested Speed	85%
Requested Opposite Speed	0
Multi-Conn	1
Armageddon Multi-Pkt	1000
ToS	0
Station Bringup Wait:	30 sec (30 s)
First Byte Wait:	30 sec (30 s)
Duration:	15 sec (15 s)
Settle Time:	1 sec (1 s)
Send Buffer Size:	OS Default
Receive Buffer Size:	OS Default
RvR Helper Script:	
Channels	AUTO
Spatial Streams	AUTO
Bandwidth	No-Change
Attenuator-1	0
Attenuation-1	0..+50..950
Attenuator-2	0
Attenuation-2	0..+50..950
Turntable Chamber	0
Turntable Angles	0..+45..359
Modes	Auto
Packet Size	60, 142, 256, 512, 1024, MTU, 4000
Security	AUTO
Traffic Type	UDP, TCP
Direction	DUT Transmit, DUT Receive
Upstream Port	1.1.eth2 Firmware: 0x80000aef, 1.1876.0 Resource: ct523c-3011
WiFi Port	1.1.wlan100 Firmware: 10.4b-ct-9984-xtH-13-b1b524c8e5 Resource: ct523c-3011
Outer Loop is Attenuation	false
Show Events	true
Auto Save Report	true
Pass-Fail Tput Criteria	
Build Date	Thu 13 Jan 2022 01:27:32 PM PST
Build Version	5.4.4
Git Version	c419229103db6f1917b40d5169b2c9926b273e51

Key Performance Indicators CSV

META Information for Dataplane Test
