Dataplane Test

Wed Feb 16 02:32:22 PST 2022

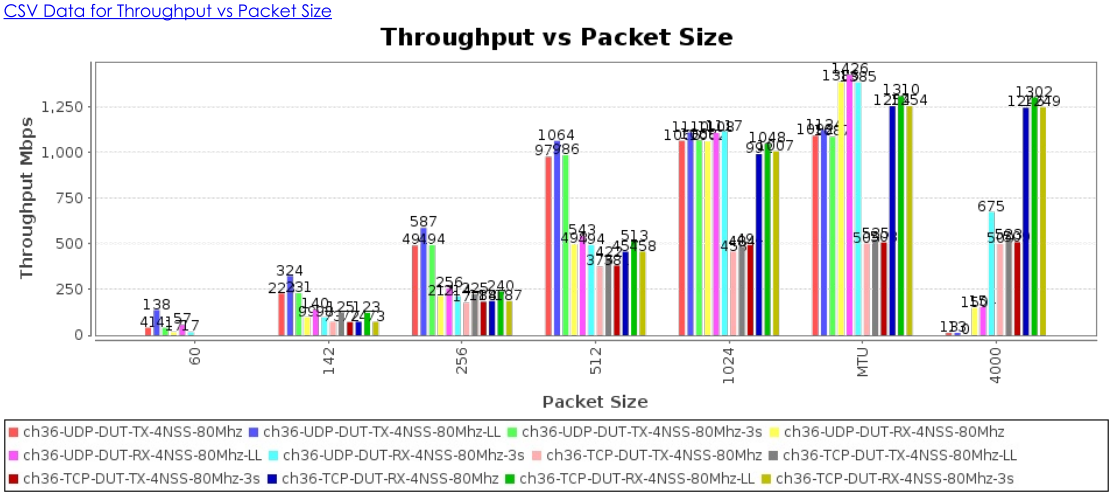
Test Setup Information				
Device Under Test	Name	cisco9130axe		
	Software Version	17.7.1.11	Hardware Version	cisco9130axe
	Model Number	cisco9130axe	Serial Number	FJC2428146G
	SSIDs			
	Passwords			
	BSSIDs			
	Notes	[BLANK]		

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.

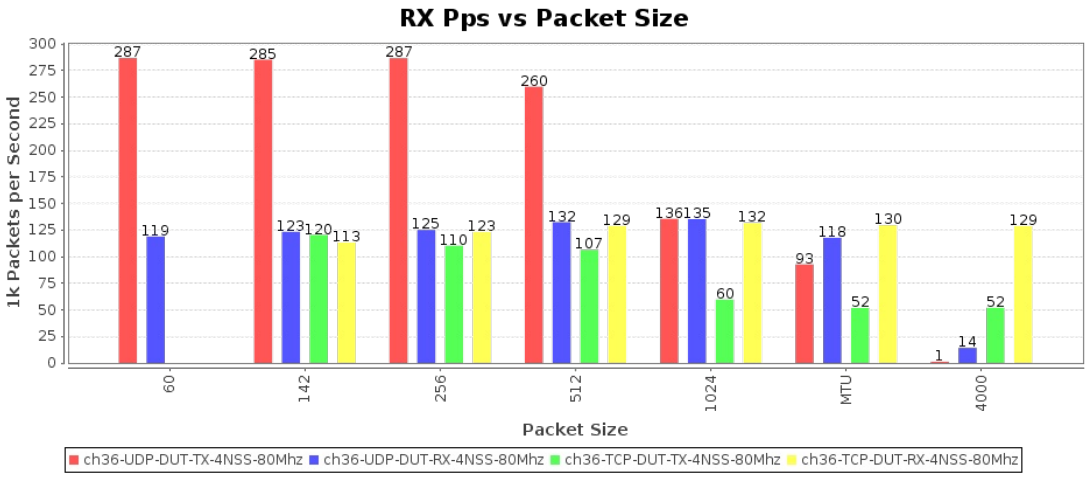
Throughput for each different traffic type. Datasets with names ending in '-LL' will include the IP, TCP, UDP and Ethernet header bytes in their calculation. For Armageddon traffic only, low-level throughput includes the Ethernet FCS and preamble. Other datasets report 'goodput' for the protocol.

CSV Data for Throughput vs Packet Size



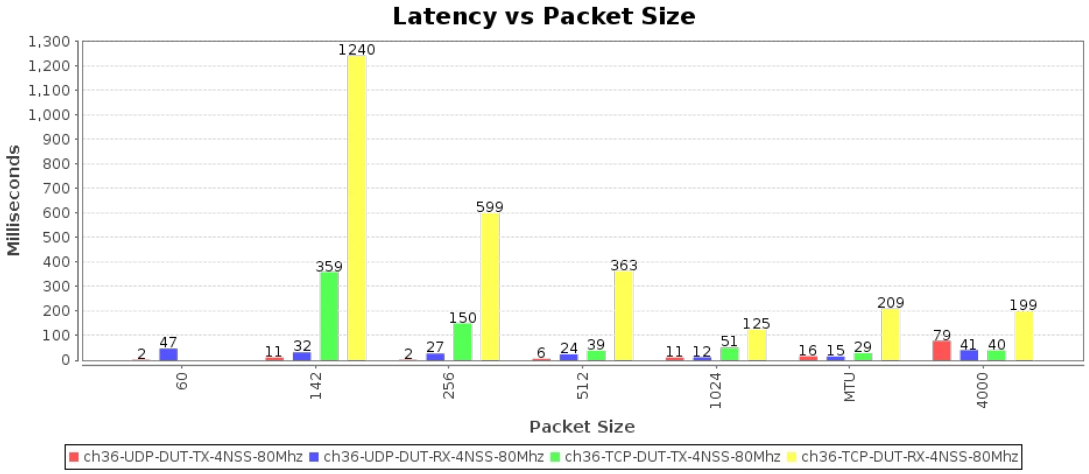
Pps throughput for each different traffic type. The values are estimated packets-per-second over the DUT, but some protocols such as TCP make this difficult to know for certain, so the value is extrapolated.

CSV Data for RX Pps vs Packet Size



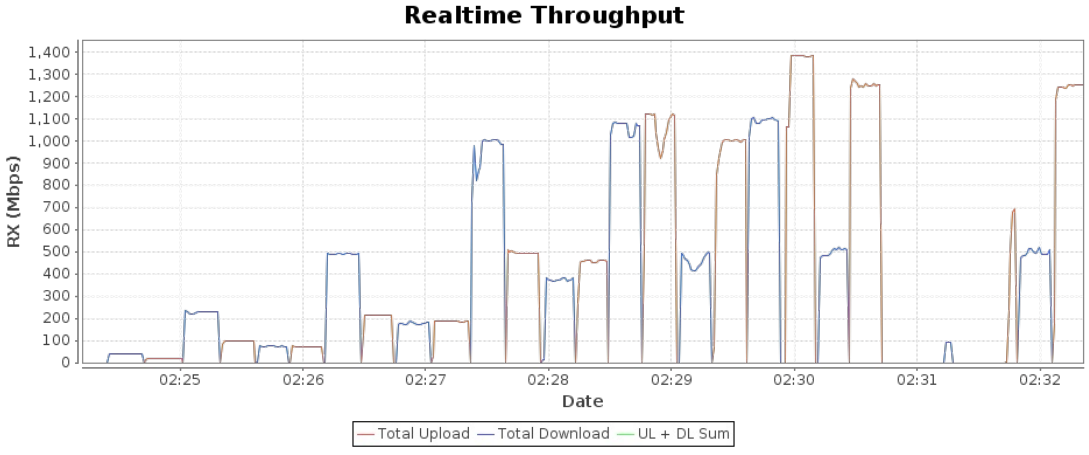
Latency for each different traffic type. If opposite-direction traffic is non-zero, then round-trip time will be reported. Otherwise, one-way latency will be reported.

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	80	60	UDP	DUT-TX	NA	NA	85.535 Mbps	41.125 Mbps	41.307 Mbps	137.69 Mbps	41.366 Mbps	-52	0 / 9061588	0	260 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	60	UDP	DUT-RX	NA	NA	17.235 Mbps	17.045 Mbps	17.125 Mbps	57.084 Mbps	17.091 Mbps	-48	189 / 2030331	0.009	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	142	UDP	DUT-TX	NA	NA	509.963 Mbps	228.113 Mbps	228.208 Mbps	324.056 Mbps	231.028 Mbps	-53	0 / 10072288	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	142	UDP	DUT-RX	NA	NA	98.644 Mbps	98.578 Mbps	98.72 Mbps	140.183 Mbps	98.298 Mbps	-48	0 / 1976434	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	142	TCP	DUT-TX	NA	NA	74.422 Mbps	72.928 Mbps	73.11 Mbps	125.142 Mbps	72.258 Mbps	-53	0 / 1751600	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	142	TCP	DUT-RX	NA	NA	79.567 Mbps	73.407 Mbps	73.665 Mbps	122.587 Mbps	73.454 Mbps	-53	0 / 1820786	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	256	UDP	DUT-TX	NA	NA	1.09 Gbps	489.423 Mbps	490.912 Mbps	587.259 Mbps	493.573 Mbps	-52	0 / 11058500	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	256	UDP	DUT-RX	NA	NA	214.242 Mbps	213.597 Mbps	214.269 Mbps	256.322 Mbps	213.78 Mbps	-49	0 / 1881768	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	256	TCP	DUT-TX	NA	NA	179.493 Mbps	177.004 Mbps	177.478 Mbps	225.164 Mbps	183.513 Mbps	-53	0 / 1721168	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	256	TCP	DUT-RX	NA	NA	190.644 Mbps	186.244 Mbps	187.02 Mbps	240.303 Mbps	187.171 Mbps	-53	0 / 2099423	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	512	UDP	DUT-TX	NA	NA	1.468 Gbps	971.573 Mbps	977.077 Mbps	1.064 Gbps	986.298 Mbps	-53	0 / 5751545	0	1300 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	512	UDP	DUT-RX	NA	NA	498.155 Mbps	494.46 Mbps	498.013 Mbps	542.516 Mbps	494.231 Mbps	-49	0 / 1983159	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	512	TCP	DUT-TX	NA	NA	377.278 Mbps	373.106 Mbps	376.197 Mbps	422.212 Mbps	381.002 Mbps	-53	0 / 1583655	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	512	TCP	DUT-RX	NA	NA	467.971 Mbps	456.57 Mbps	457.004 Mbps	512.698 Mbps	457.893 Mbps	-53	0 / 1937151	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	1024	UDP	DUT-TX	NA	NA	1.475 Gbps	1.063 Gbps	1.065 Gbps	1.11 Gbps	1.068 Gbps	-53	0 / 2905879	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	1024	UDP	DUT-RX	NA	NA	1.063 Gbps	1.061 Gbps	1.062 Gbps	1.108 Gbps	1.117 Gbps	-49	0 / 2038037	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	1024	TCP	DUT-TX	NA	NA	459.257 Mbps	457.347 Mbps	457.725 Mbps	483.507 Mbps	493.772 Mbps	-53	0 / 904952	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	1024	TCP	DUT-RX	NA	NA	999.9 Mbps	990.545 Mbps	991.553 Mbps	1.048 Gbps	1.007 Gbps	-53	0 / 1954686	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	MTU	UDP	DUT-TX	NA	NA	1.475 Gbps	1.091 Gbps	1.092 Gbps	1.124 Gbps	1.087 Gbps	-53	0 / 1877815	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	MTU	UDP	DUT-RX	NA	NA	1.386 Gbps	1.383 Gbps	1.386 Gbps	1.426 Gbps	1.385 Gbps	-49	0 / 1774125	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	MTU	TCP	DUT-TX	NA	NA	503.932 Mbps	501.253 Mbps	502.904 Mbps	525.277 Mbps	507.912 Mbps	-53	0 / 766031	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	MTU	TCP	DUT-RX	NA	NA	1.264 Gbps	1.251 Gbps	1.254 Gbps	1.31 Gbps	1.254 Gbps	-54	0 / 1919650	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	4000	UDP	DUT-TX	NA	NA	1.471 Gbps	12.647 Mbps	12.676 Mbps	13.079 Mbps	0 bps	-54	0 / 5927950	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	4000	UDP	DUT-RX	NA	NA	1.293 Gbps	149.428 Mbps	149.607 Mbps	154.37 Mbps	675.234 Mbps	-49	0 / 1971666	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	4000	TCP	DUT-TX	NA	NA	500.724 Mbps	499.376 Mbps	500.092 Mbps	522.525 Mbps	509.17 Mbps	-54	0 / 763410	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	80	4000	TCP	DUT-RX	NA	NA	1.263 Gbps	1.246 Gbps	1.246 Gbps	1.302 Gbps	1.249 Gbps	-54	0 / 1899628	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	80	60	UDP	DUT-TX	VHT	4	1	80	3	VHT	1	80	-53 [-57, -62, -53, -58]	260.0 MBit/s VHT-MCS 1 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	80	60	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-48 [-57, -62, -52, -57]	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	80	142	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-53 [-56, -62, -53, -57]	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	80	142	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-56, -62, -53, -57]	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	80	142	TCP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-53 [-57, -62, -53, -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	80	142	TCP	DUT-RX	VHT	4	8	80	3	VHT	8	80	-53 [-56, -62, -53, -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	80	256	UDP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-52 [-57, -62, -52, -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	80	256	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -62, -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	80	256	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-53 [-58, -62, -53, -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

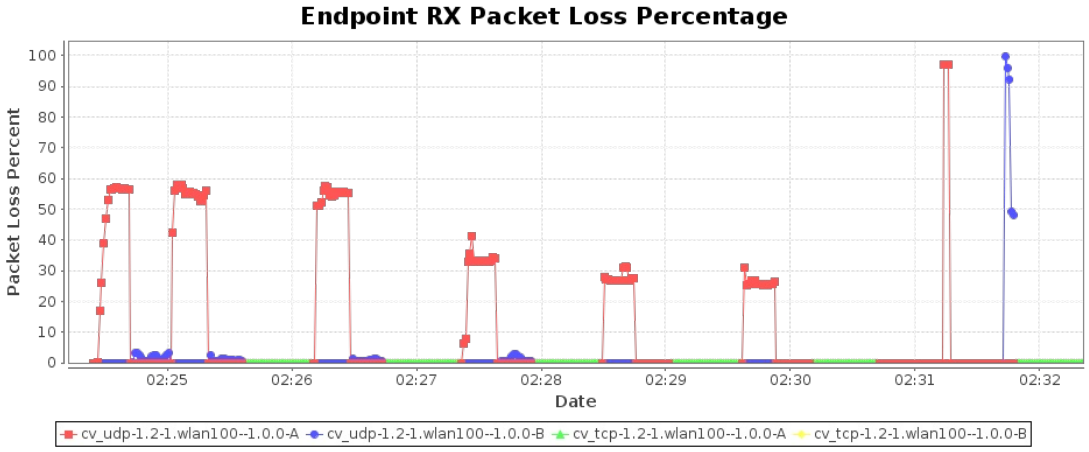
36	5180	WPA2	4	AUTO	80	256	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-59, -63, -54, -59]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	80	512	UDP	DUT-TX	VHT	4	7	80	3	VHT	7	80	-54 [-59, -64, -54, -59]	1300.0 MBit/s VHT-MCS 7 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	80	512	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -62, -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	80	512	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -64, -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	80	512	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	80	1024	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	80	1024	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-50 [-57, -62, -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	80	1024	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-59, -64, -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	80	1024	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-53 [-58, -62, -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	80	MTU	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	80	MTU	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -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	80	MTU	TCP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-59, -64, -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	80	MTU	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-55 [-59, -64, -55, -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	80	4000	UDP	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	80	4000	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -63, -56, -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	80	4000	TCP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-55 [-58, -63, -55, -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	80	4000	TCP	DUT-RX	VHT	4	9	80	4	VHT	9	80	-55 [-58, -63, -55, -58]	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

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	41.12	-48	-52
1	NA	0	17.05	-48	-48
2	NA	0	228.11	-48	-53
3	NA	0	98.58	-48	-48
4	NA	0	72.93	-48	-53
5	NA	0	73.41	-48	-53
6	NA	0	489.42	-49	-52
7	NA	0	213.60	-49	-49
8	NA	0	177.00	-49	-53
9	NA	0	186.24	-49	-53
10	NA	0	971.57	-49	-53
11	NA	0	494.46	-48	-49
12	NA	0	373.11	-48	-53
13	NA	0	456.57	-48	-53
14	NA	0	1,063.25	-48	-53
15	NA	0	1,061.43	-49	-49
16	NA	0	457.35	-49	-53
17	NA	0	990.54	-49	-53
18	NA	0	1,090.58	-49	-53
19	NA	0	1,383.36	-49	-49
20	NA	0	501.25	-49	-53
21	NA	0	1,250.89	-49	-54
22	NA	0	12.65	-49	-54
23	NA	0	149.43	-49	-49
24	NA	0	499.38	-48	-54
25	NA	0	1,245.84	-48	-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
