Dataplane Test

Tue Feb 15 05:59:52 PST 2022

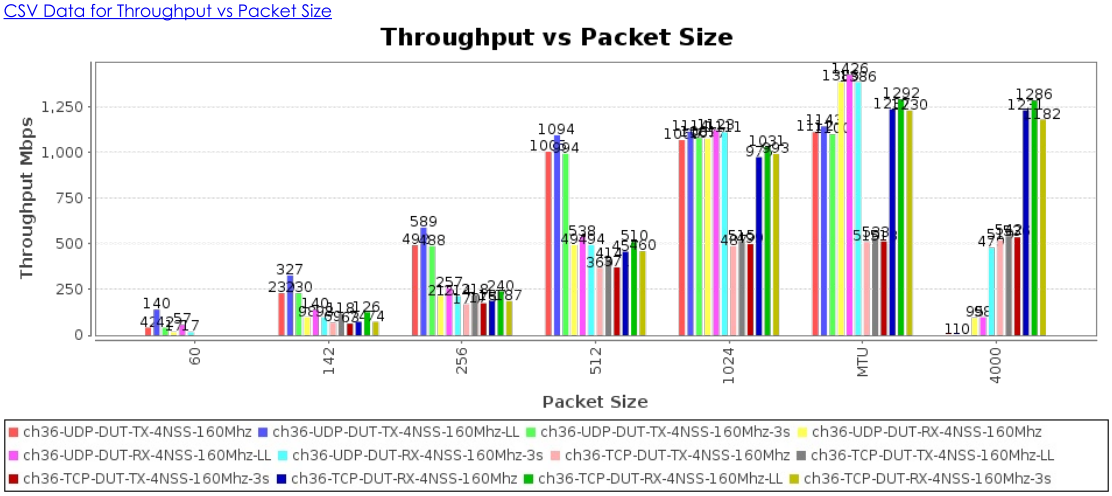
Test Setup Information				
Device Under Test	Name	cisco9130axe		
	Software Version	17.7.1.11	Hardware Version	cisco9130axe
	Model Number	cisco9130axe	Serial Number	FJC2428146G
	SSIDs			
	Passwords			
	BSSIDs			
	Notes	[BLANK]		

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.

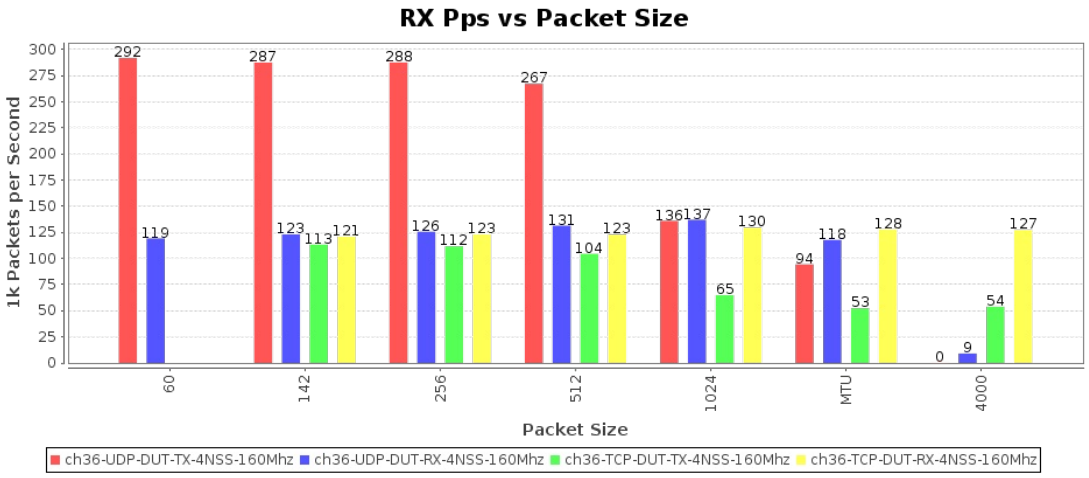
Throughput for each different traffic type. Datasets with names ending in '-LL' will include the IP, TCP, UDP and Ethernet header bytes in their calculation. For Armageddon traffic only, low-level throughput includes the Ethernet FCS and preamble. Other datasets report 'goodput' for the protocol.

CSV Data for Throughput vs Packet Size



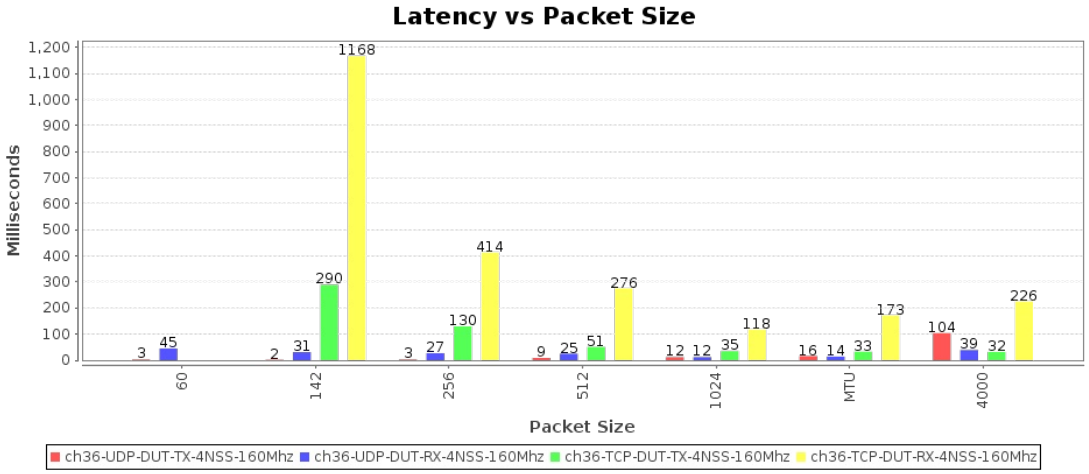
Pps throughput for each different traffic type. The values are estimated packets-per-second over the DUT, but some protocols such as TCP make this difficult to know for certain, so the value is extrapolated.

CSV Data for RX Pps vs Packet Size



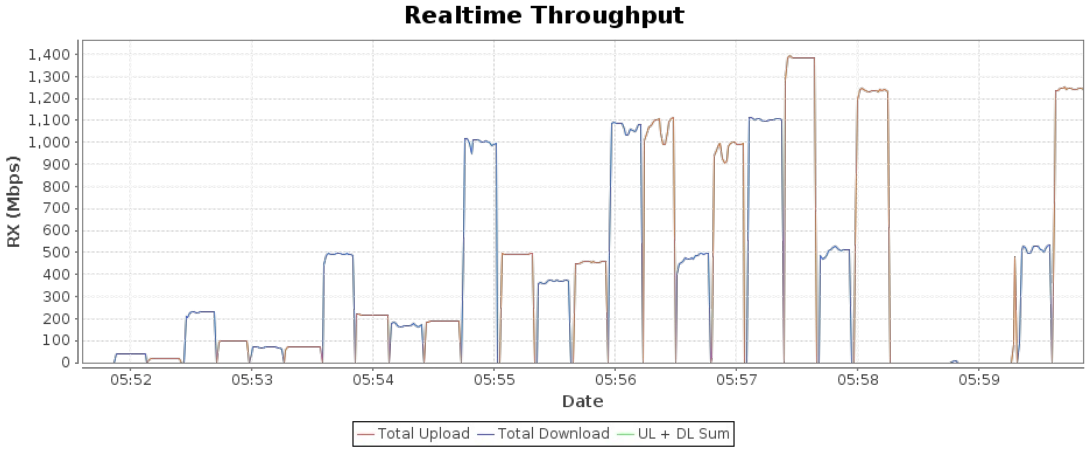
Latency for each different traffic type. If opposite-direction traffic is non-zero, then round-trip time will be reported. Otherwise, one-way latency will be reported.

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	92.706 Mbps	41.689 Mbps	42.026 Mbps	140.086 Mbps	41.915 Mbps	-53	0 / 9745000	0	260 Mbps	1.17 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	60	UDP	DUT-RX	NA	NA	17.254 Mbps	17.059 Mbps	17.167 Mbps	57.224 Mbps	17.154 Mbps	-47	190 / 1791497	0.011	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-TX	NA	NA	492.797 Mbps	229.868 Mbps	229.968 Mbps	326.554 Mbps	230.001 Mbps	-53	0 / 9238750	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	UDP	DUT-RX	NA	NA	98.497 Mbps	98.35 Mbps	98.44 Mbps	139.785 Mbps	98.313 Mbps	-47	191 / 1856476	0.01	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-TX	NA	NA	70.253 Mbps	68.96 Mbps	69.06 Mbps	118.018 Mbps	63.417 Mbps	-53	0 / 1653389	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	142	TCP	DUT-RX	NA	NA	75.29 Mbps	73.367 Mbps	73.542 Mbps	125.781 Mbps	73.508 Mbps	-53	0 / 2063492	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-TX	NA	NA	983.249 Mbps	491.778 Mbps	492.237 Mbps	588.845 Mbps	487.694 Mbps	-53	0 / 8890294	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-RX	NA	NA	215.121 Mbps	214.753 Mbps	215.09 Mbps	257.304 Mbps	213.796 Mbps	-48	0 / 1891112	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-TX	NA	NA	171.259 Mbps	169.546 Mbps	169.555 Mbps	217.779 Mbps	174.94 Mbps	-54	0 / 1688155	0	1560 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-RX	NA	NA	188.61 Mbps	187.048 Mbps	187.174 Mbps	240.333 Mbps	186.983 Mbps	-54	0 / 2101932	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-TX	NA	NA	2.115 Gbps	1.004 Gbps	1.005 Gbps	1.094 Gbps	993.565 Mbps	-53	0 / 8768523	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-RX	NA	NA	494.808 Mbps	493.117 Mbps	493.973 Mbps	538.115 Mbps	494.094 Mbps	-48	0 / 2242465	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-TX	NA	NA	369.569 Mbps	368.556 Mbps	368.845 Mbps	413.964 Mbps	371.402 Mbps	-53	0 / 1783185	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	512	TCP	DUT-RX	NA	NA	464.724 Mbps	456.694 Mbps	457.067 Mbps	510.184 Mbps	460.023 Mbps	-54	0 / 1933969	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-TX	NA	NA	2.949 Gbps	1.068 Gbps	1.069 Gbps	1.114 Gbps	1.081 Gbps	-54	0 / 5882126	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	UDP	DUT-RX	NA	NA	1.077 Gbps	1.075 Gbps	1.077 Gbps	1.123 Gbps	1.111 Gbps	-49	0 / 2180903	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-TX	NA	NA	487.102 Mbps	482.993 Mbps	486.962 Mbps	515.026 Mbps	499.341 Mbps	-53	0 / 967904	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	1024	TCP	DUT-RX	NA	NA	982.799 Mbps	974.47 Mbps	974.876 Mbps	1.031 Gbps	992.505 Mbps	-54	0 / 1920428	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-TX	NA	NA	2.97 Gbps	1.103 Gbps	1.112 Gbps	1.143 Gbps	1.1 Gbps	-54	0 / 4289737	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	UDP	DUT-RX	NA	NA	1.386 Gbps	1.385 Gbps	1.386 Gbps	1.426 Gbps	1.386 Gbps	-49	0 / 1888056	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-TX	NA	NA	511.121 Mbps	509.737 Mbps	510.214 Mbps	532.9 Mbps	513.413 Mbps	-54	0 / 783125	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	MTU	TCP	DUT-RX	NA	NA	1.249 Gbps	1.234 Gbps	1.237 Gbps	1.292 Gbps	1.23 Gbps	-54	0 / 2130240	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-TX	NA	NA	2.959 Gbps	781.047 Kbps	787.24 Kbps	812.301 Kbps	0 bps	-53	0 / 11879208	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	UDP	DUT-RX	NA	NA	1.355 Gbps	95.32 Mbps	95.37 Mbps	98.407 Mbps	479.396 Mbps	-49	0 / 1935583	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-TX	NA	NA	520.152 Mbps	518.594 Mbps	518.81 Mbps	542.094 Mbps	536.148 Mbps	-53	0 / 796006	0	1733.3 Mbps	1.3 Gbps	802.11an-AC	802.11ac
36	5180	WPA2	4	AUTO	160	4000	TCP	DUT-RX	NA	NA	1.239 Gbps	1.229 Gbps	1.231 Gbps	1.286 Gbps	1.182 Gbps	-54	0 / 1873566	0	1300 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	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	160	60	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-48 [-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	UDP	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	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-48 [-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-TX	VHT	4	8	80	3	VHT	8	80	-54 [-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-RX	VHT	4	9	80	4	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 7 80MHz short GI VHT-NSS 4
36	5180	WPA2	4	AUTO	160	256	UDP	DUT-TX	VHT	4	8	80	3	VHT	8	80	-54 [-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	256	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	256	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

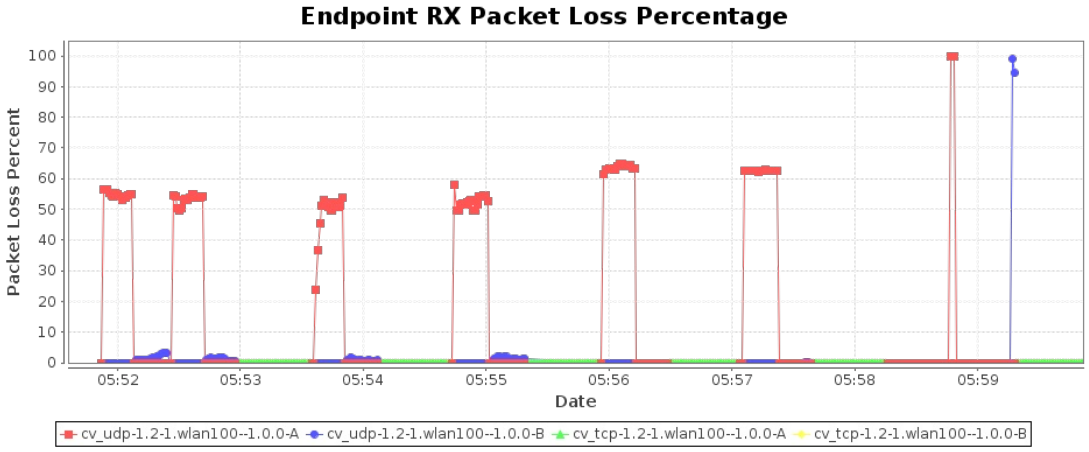
36	5180	WPA2	4	AUTO	160	256	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -62, -54, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 4	1300.0 MBit/s VHT-MCS 9 80MHz short GI VHT-NSS 3
36	5180	WPA2	4	AUTO	160	512	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-57, -62, -55, -58]	1733.3 MBit/s VHT-MCS 9 80MHz short 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-RX	VHT	4	9	80	3	VHT	9	80	-47 [-57, -62, -55, -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	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	512	TCP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	1024	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	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	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	1024	TCP	DUT-RX	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	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, -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	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	-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	4000	UDP	DUT-TX	VHT	4	9	80	3	VHT	9	80	-54 [-58, -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	4000	UDP	DUT-RX	VHT	4	9	80	3	VHT	9	80	-49 [-58, -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	4000	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	4000	TCP	DUT-RX	VHT	4	8	80	3	VHT	8	80	-55 [-58, -62, -55, -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

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	41.69	-48	-53
1	NA	0	17.06	-47	-47
2	NA	0	229.87	-47	-53
3	NA	0	98.35	-47	-47
4	NA	0	68.96	-47	-53
5	NA	0	73.37	-47	-53
6	NA	0	491.78	-47	-53
7	NA	0	214.75	-47	-48
8	NA	0	169.55	-48	-54
9	NA	0	187.05	-49	-54
10	NA	0	1,003.99	-47	-53
11	NA	0	493.12	-48	-48
12	NA	0	368.56	-47	-53
13	NA	0	456.69	-49	-54
14	NA	0	1,067.67	-48	-54
15	NA	0	1,074.66	-48	-49
16	NA	0	482.99	-49	-53
17	NA	0	974.47	-48	-54
18	NA	0	1,102.56	-48	-54
19	NA	0	1,385.07	-48	-49
20	NA	0	509.74	-49	-54
21	NA	0	1,234.24	-49	-54
22	NA	0	0.78	-48	-53
23	NA	0	95.32	-48	-49
24	NA	0	518.59	-48	-53
25	NA	0	1,229.03	-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
