

## Testing Station Capacity and throughput for a WiFi Device

**Goal**: Setup and run a WiFi Capacity Test test for an AP using the LAN forge CT523c or similar system in order to test how well the AP can handle different amounts of active stations. This is a good test of the AP's scalability and stability.

In this test scenario, the LANforge CT523c is used to create 64 stations and aenerate packets on the Ethernet port towards the wired side of the AP. The AP will then transmit the frames to the LANforge WiFi stations. LANforge will bring up stations in configured amounts, run a throughput test, and then bring up the next set of stations and repeat until the test is complete. This example assumes you have some experience with Chamber View, and that you have a LANforge system and two isolation chambers like the CT820a. The AP should be in one chamber, the LANforge system is in the other chamber, and the Attenuator (if using one) is cabled between them. Set the Attenuator to desired state before starting the test. Chambers and attenuators are not required for this test, but running inside isolation chambers will usually give you better and more reliable test results. This feature is in LANforge version 5.3.9 and higher.



<sup>1.</sup> Configure Chamber View for WiFi Capacity Test and Similar Tests.

A. Open Chamber View by clicking on the 'Chamber View' button in the LANforge-GUI. If you have an appropriate scenario already created, then skip to the next section, otherwise you will need to build a scenario that matches your system. You can right-click in Chamber View to create various objects.



B. Create a Device Under Test (DUT) Profile that matches your AP. The BSSID is important to configured so that LANforge knows when it is connected to the correct AP.

Create/Modify DUT									
Name	APUT	Image file							
SW Info	v5.62.1	HW Info							
Model Number	AP640	Serial Number	234-23-sd-35						
Serial port		WAN							
LAN		API version	0						
SSID-1	labap	Password-1	Lanforge12345!						
SSID-2		Password-2							
SSID-3		Password-3							
Mgt IP	0.0.0.0	Ant-1	0						
Ant-2	0	Ant-3	0						
BSSID-1	78:d2:94:bf:16:43	BSSID-2	00:00:00:00:00:00						
BSSID-3	00:00:00:00:00	Active	AP DUT						
STA DUT	WEP	WPA	WPA2						
WPA3	✓ Provides DHCP on LAN	Provides DHCP on WAN							
Notes									
<u>Apply</u> <u>OK</u> <u>Cancel</u>									

C. Create a chamber object to hold the DUT, and add the DUT to that chamber. If you have no chambers, you can create a fake chamber, but your test will not be isolated and may have decreased performance due to outside RF interference.

•		c	reate/Modify Chan	nber		×
Name:	DUT	Width:	150	Height:	150	
Chamber Type	TOJOIN-MED (1)	Isolation	80			
		📃 Pha	antom 🗌 Virtual	Open 🗌 Open		
DUT-1	APUT 🔽	DUT-2	SurfacePro4	-		
DUT-3	<b>•</b>	DUT-4		-		
LANforge-1	None	LANforge-2	None	•		
LANforge-3	None	LANforge-4	None	•		
Int CX A	Int CX B	Int Atten	Ext CX A	Ext CX B	Ext Atten	Atten Floor
-		•	-		-	Long Cable (100) 🔻
-		•		•	-	Long Cable (100) 🔻
		-	•	•	-	- Long Cable (100) 🔻
		•	•		•	Long Cable (100) 🔻
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		-			-	Long Cable (100) 🔻
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<b>▼</b>						Long Cable (100)
			OK Cancel			

D. Create a chamber object to hold the LANforge system, and add the LANforge to it. Add connections from this chamber to the DUT chamber, specifying the proper Attenuator modules. Please view our other cookbook on setting up attenuator connections in LANforge.

Create/Modify Chamber     X										
Name:	Tester	Width:	150		Height:		150			
Chamber Type	TOJOIN-MED (1)	Isolation	80							
		🗌 Pha	ntom 🗌 Virtual		Open					
DUT-1	•	DUT-2		•						
DUT-3		DUT-4		-						
LANforge-1	1 (MobileStations) 👻	LANforge-2	None	•						
LANforge-3	None	LANforge-4	None	-						
Int CX A	Int CX B	Int Atten	Ext CX A		Ext CX B		Ext Atten		Atten Floor	
-		<b></b>	Chamber.Tester.0	•	Chamber.DUT.0	•	1.1.71.0	-	OTA (0)	-
<b>•</b>		•	Chamber.Tester.1	•	Chamber.DUT.1	•	1.1.71.1	•	OTA (0)	-
<b>•</b>	-	-	Chamber.Tester.2	•	Chamber.DUT.2	•	1.1.71.2	•	OTA (0)	-
			Chamber.Tester.3	•	Chamber.DUT.3	•	1.1.71.3	-	OTA (0)	-
<b>•</b>		<b>•</b>		-		•		-	Long Cable (100)	-
<b>•</b>	-	-		-		•		-	Long Cable (100)	-
		-		•		•		-	Long Cable (100)	-
	-	-		-		•		-	Long Cable (100)	-
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						•		-	Long cable (100)	
			OK Cancel							

E. Configure an Upstream profile using eth1 on the LANforge system. Notice the dhcp-server checkbox is selected, since in this test case our AP is not configured as a DHCP server.

Create/Modify Profile										
Name:	upstream-dhcp	Туре:	Upstream (4)	-						
Mode:	Auto (0) 💌	Antennas:	Default (0)	-						
Instances:	1 (1) 🗸	Frequency:	AUTO (-1 Mhz)	-						
SSID:		Password:								
Pattern:		DHCP Server	WEP							
U WPA	WPA2	WPA3	802.11r							
802.1x EAP-TTLS	Restart DHCP on Connect	Notes:								
Apply <u>O</u> K <u>C</u> ancel										

F. Configure an STA profile on the LANforge system.

Create/Modify Profile									
Name:	STA-AC	Туре:	STA (1)	•					
Mode:	Auto (0) 👻	Antennas:	Default (0)						
Instances:	1 (1) 🗸	Frequency:	AUTO (-1 Mhz)	•					
SSID:		Password:							
Pattern:		DHCP Server	WEP						
WPA	WPA2	WPA3	🗌 802.11r						
802.1x EAP-TTLS	Restart DHCP on Connect	Notes:							
<u>Apply</u> <u>O</u> K <u>Cancel</u>									

G. Configure a Chamber View Scenario and add the STA profile (mapped to desired wiphyX radio and DUT). Add an upstream profile mapped to DUT LAN side (or possibly WAN side if that is more appropriate for your DUT). Choose the appropriate quantity of stations for your test case.

0							Create/Mo	dify	/ Scena	rio						$\odot$	×
S	Scenario Text Output																
	Scenario Name APThputTest   Delete Scenario Create Profile Create Traffic Profile Add Row																
De	l Re	esour	ce l	Profile		Mod	Amount		Uses-1		Uses-2	2	Frequency		Maps To		
×	1.	.1	•	STA: STA-AC	•	0	64 (64)	-	wiphy0	•	AUTO	•	157 (5785 Mhz)	•	DUT: APUT Radio-1	-	•
×	1.	.1	•	Upstream: upstream	•	0	1 (1)	-	ethl	•	AUTO	•	AUTO (-1 Mhz)	•	DUT: APUT LAN	-	-]
-																	
	Build New         Load         Update and         Apply and         Cancel           Build New         Scenario         Save Scenario         Save Scenario         Cancel																

2. Use Chamber View to run a WiFi Capacity Test.

A. Open Chamber View by clicking on the 'Chamber View' button in the LANforge-GUI. Load appropriate scenario or create a new scenario as needed. Apply the Scenario, then Build the scenario.



B. Select the **WiFi Capacity** test and click **Run Test**. You should see the WiFi Capcity Test configuration window pop up. The Ports are normally selected properly based on the Scenario, but you may need to adjust them depending on your goals and scenario. Select the desired throughput and any other configuration changes from the defaults:

WiFi Capacity Test									
Settings	Select Ports Test Groups PDU Mix Se	ettings Advanced Settings Select Output Notes							
	Station Increment: 1,2,5,10,20	▼ [?] Loop Iterations: Single (1)	-						
	Duration: 15s	Use Test Groups 🗌 Subset of Test Group	2						
	Protocol: UDP-IPv4	Layer-4 Endpoint: NONE	•						
	Payload Size: AUTO	MSS: AUTO							
	Total Download Rate:	▼ lgbps	-						
	Total Upload Rate:	Zero (0 bps)	-						
	Percentage TCP Rate:	10% (10%)	•						
	Sa <u>v</u> e	DEFAULT							
	Lo <u>a</u> d	DEFAULT	•						
	Delete	DEFAULT	-						
		<u>S</u> tart <u>C</u> lose							

C. When the configuration is complete, click the **Start** button (which will change to 'Stop' once start is clicked) to start the test. An interactive report window will be created and will be updated as the test runs. In this particular test, the results are a it unexpected. Normally rate starts off high and slowly decreases after 5 or 10 stations are active. In this case, we see a falloff after 10, but then it recovers at 60.



D. When the test is complete, click the **Save HTML** button to save an HTML report and generate the PDF. The PDF file will be linked from the HTML page. You can also click 'Save PDF' and the browser will be directed to open the pdf file directly. Please see this example WiFi Capacity Test Report.

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