

Testing Mesh APs with automated Mesh scenario

Goal: Setup and run a series of tests in different mesh topologies using theLANforge CT523c or similar system..

In this test scenario, the LANforge CT523c is used to emulate a set of stations that move to different locations relative to a set of mesh APs. Throughput tests are run at each requested topology. A set of 4 chambers are used. One holds the station emulator, the other three hold the mesh APs. Programmable attenuators are used to adjust the signal strenght between APs and the station chamber to emulate different topologies. This example assumes you have some experience with Chamber View, and that you have an appropriate LANforge system, programmable attenuators like the CT714 and four isolation chambers like the CT820a. This feature requires LANforge version 5.4.1 or higher.



1. Configure Chamber View for Mesh 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. In this example, the 'Mobilestations' chamber holds the LANforge, and the other chambers hold mesh APs and additional LANforge traffic generating systems. In this example, the LANforge systems in the AP chambers are not used. Your configuration should look like this when these steps are complete.



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

•	Create	/Modify DUT	\odot \otimes \otimes
Name	RootAP		
Image file	NONE		Choose Image ×
SW Info		HW Info	
Model Number		Serial Number	
Serial port		WAN	
LAN		API version	0
SSID-1	orbimeshtest	Password-1	Lanforge12345!
SSID-2		Password-2	
SSID-3		Password-3	
Mgt IP	0.0.0.0	Num Ant Radio 1	0
Num Ant Radio 2	0	Num Ant Radio 3	0
BSSID-1	8c:3b:ad:2c:b3:4f	BSSID-2	00:00:00:00:00:00
BSSID-3	0:00:00:00:00:00	Active	AP DUT
STA DUT	WEP	WPA	WPA2
WPA3	🗌 802.11r	802.1x EAP-TTLS	Provides DHCP on LAN
Provides DHCP on WAN			
Notes			
1	Apply	<u>O</u> K <u>C</u> ancel	

- C. Create chamber objects to hold the mobile stations and DUTs, and add the LANforge and DUTs to the chambers. If you have no chambers, you can create a fake chamber, but your test will not be isolated and may not function as desired. Here is an example of the mobile stations chamber. Please note we will auto-calibrate the Zero-Attenuation values for the station chamber.
- D. Here is an example of the RootAP chamber

•	Create/Modify Chamber													×		
Name:	RootAP		Width:	[150		Height:		150							
Chamber Type	Medium (1)	•	Isolation		80		Speed (rpm)		0.0							
Turntable Type	CT850A (0)	-	Turntable				Position (deg)		0.0		Tilt (deg)		0.0			
Managed By:	None	-	Turntable Rpt: Posit	tio	on: 0.0 Tilt: 0.0 RPM: 0.	.0				virt	ual 🗌 Open					
DUT-1	RootAP	-	DUT-2			•										
DUT-3		-	DUT-4			-										
LANforge-1	2 (RootAP)	-	LANforge-2	ĺ	None	•										
LANforge-3	None	-	LANforge-4		None	Ŧ										
Int CX A	Int CX B		Int Atten	1	Ext CX A		Ext CX B		Ext Atten		Atten Floor		Zero-Atten RSSI 2.4Ghz		Zero-Atten RSSI 5Ghz	
		•	-	•	Chamber.RootAP.8	Ŧ	Chamber.Nodel.8	•	1.1.86.2	•	OTA (0 ddB)	•	None (0 ddB)	-	None (0 ddB)	•
	-	-		-	Chamber.RootAP.9	•	Chamber.Node1.9	•	1.1.86.3	•	OTA (0 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	-	-	•	Chamber.RootAP.10	•	Chamber.Node2.8	Ŧ	1.1.57.0	•	OTA (0 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•		•	Chamber.RootAP.11	Ŧ	Chamber.Node2.9	•	1.1.57.1	•	OTA (0 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•	-	·		•		▼		•	Cable (100 ddB)	•	None (0 ddB)	•	None (0 ddB)	-
	-	•	-	·		•		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•	-	•		•		•		-	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	-	-			Ŧ		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	-	-	•		•		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•	-	-		•		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•	-	•		•		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
	-	•	-			•		•		•	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	-
		-	-	•		•		•		-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	-
		-	-	-		•		-		-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	-
		-		-		•		-		•	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	-
		-		-		•		•		T	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	-
					Sync	[Apply OK Ca	inc	el							

E. Here is an example of the Node-1 chamber

0			c	reate/Modify Chamber				×
Name:	Nodel	Width:	150	Height:	150]		
Chamber Type	Medium (1)	Isolation	80	Speed (rpm)	0.0]		
Turntable Type	CT850A (0)	 Turntable 		Position (deg)	0.0	Tilt (deg)	0.0	
Managed By:	None	Turntable Rpt: Posit	ion: 0.0 Tilt: 0.0 RPM: 0.0		Vi	rtual 🗌 Open		
DUT-1	Nodel	DUT-2						
DUT-3		DUT-4						
LANforge-1	3 (Nodel)	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	Zero-Atten RSSI 2.4Ghz	Zero-Atten RSSI 5Ghz
-		· •	Chamber.Node1.10 🔻	Chamber.Node2.10	• 1.1.57.2 •	• OTA (0 ddB)	None (0 ddB) 🔻	None (0 ddB) 🔻
-		-	Chamber.Nodel.11 🔻	Chamber.Node2.11	• 1.1.75.0 •	• OTA (0 ddB)	None (0 ddB) 🔻	None (0 ddB) 👻
-		· 🗸	-	•	· 🖉	Cable (100 ddB) 🔻	None (0 ddB) 🗸 🗸	None (0 ddB) 🛛 👻
•		· 🗸	-		· 🖉	Cable (100 ddB)	None (0 ddB) 🛛 👻	None (0 ddB) 👻
•		· 🔽	-		·	Cable (100 ddB)	None (0 ddB) 🗸	None (0 ddB) 👻
•		· 🗸	~	-	·	Cable (100 ddB) 🔻	None (0 ddB) 🔻	None (0 ddB) 💌
•		· 🗸		-	·	Cable (100 ddB)	None (0 ddB) 🔻	None (0 ddB) 👻
•		· 🗸		·	· 💽 🗣	Cable (100 ddB) 🔻	None (0 ddB) 🔻	None (0 ddB) 👻
•		· 🗸	•	·	·	Cable (100 ddB) 🔻	None (0 ddB) 🔻	None (0 ddB) 🔻
•		· 🗸	•	·	•	Cable (100 ddB) 🔻	None (0 ddB) 🔻	None (0 ddB) 👻
•		· 🗸		•	·	Cable (100 ddB) 🔻	None (0 ddB) 🔻	None (0 ddB) 💌
•		· 🔍		•	·	Cable (100 ddB)	None (0 ddB) 🔻	None (0 ddB) 💌
-		· 🗸	-	•	· ·	Cable (100 ddB)	None (0 ddB) 👻	None (0 ddB) 👻
-		· 🔽	-	•	· ·	Cable (100 ddB)	None (0 ddB) 🔻	None (0 ddB) 💌
-		-	-		-	Cable (100 ddB)	None (0 ddB) 🔻	None (0 ddB) 👻
-		-	-	-	-	Cable (100 ddB)	None (0 ddB) 🔻	None (0 ddB) 👻
			Sync	Apply OK Can	cel			

F. Here is an example of the Node-2 chamber

•					Ci	reate/Modify Chamber								×
Name:		Node2	N	Width:	150	Height:	150	50						
Chamber Type		Medium (1)	-	Isolation	80	Speed (rpm)	0.0	0						
Turntable Type		CT850A (0)	- 1	Turntable		Position (deg)	0.0	0	Tilt (deg)		0.0			
Managed By:		None	- 1	Turntable Rpt: Positio	on: 0.0 Tilt: 0.0 RPM: 0.0			Virt	ual 📃 Open					
DUT-1		Node2	- 0	DUT-2										
DUT-3			- 0	DUT-4	•									
LANforge-1		4 (Node2)	- 1	LANforge-2	None									
LANforge-3		None	- 1	LANforge-4	None 💌									
Int CX A		Int CX B	l	Int Atten	Ext CX A	Ext CX B	Ext	t Atten	Atten Floor		Zero-Atten RSSI 2.4Ghz		Zero-Atten RSSI 5Ghz	
	-		-	-	•	·		-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	•
	-		-	-		·		-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	
	-		-			·		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	
	-		-					-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	
	-	•	-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	
	•		-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	
	•		-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	
	-	•	-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	•
	•	•	-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	•
	-		-	-		-		-	Cable (100 ddB)	-	None (0 ddB)	•	None (0 ddB)	•
	-		-	-		-		-	Cable (100 ddB)	•	None (0 ddB)	•	None (0 ddB)	
	-		-	-		-		-	Cable (100 ddB)	•	None (0 ddB)	•	None (0 ddB)	
	-	· · · · · · · · · · · · · · · · · · ·	-					-	Cable (100 ddB)	•	None (0 ddB)	-	None (0 ddB)	
	-		-	-				-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	•
	-		-	-				-	Cable (100 ddB)	-	None (0 ddB)	-	None (0 ddB)	•
	Ţ			-					Cable (100 ddB)	Ţ	None (0 ddB)	-	None (0 ddB)	Τ.

G. Configure a Chamber View Scenario. This is somewhat optional since the mesh automation logic will create it's own temporary scenario to run the automation tests.

0	Create/Modify Scenario													\odot \land \times											
Scenario Text Output																									
Scenario Name meshtest 💌 Delete Scenario Crgate Profile Create Traffic Profile Add Bow																									
	Del Resource Profile Amount Uses-1 Uses-2 Frequency Maps To Traffic-1 Traffic-2 Traffic-3 Traffic-4 Traffic-5																								
	×	1.2	•	STA: STA-AC	•	1 (1)	•	wiphy0	•	AUTO	•	AUTO (-1 Mhz)	•	DUT: RootAP Radio-1	•	tcp-dl-6m-vi	•	NA	•	NA	-	NA	•	NA	-
	×	1.3	•	STA: STA-AC	-	1 (1)	•	wiphy0	•	AUTO	•	AUTO (-1 Mhz)	-	DUT: Nodel Radio-1	•	tcp-dl-6m-vi	Ŧ	NA	1	NA	-	NA	•	NA	-
	×	1.4	•	STA: STA-AC	-	1 (1)	•	wiphy0	•	AUTO	•	AUTO (-1 Mhz)	-	DUT: Node2 Radio-1	•	tcp-dl-6m-vi	Ŧ	NA	•	NA	-	NA	•	NA	-
	×	1.1	-	Upstream: upstream	-	1 (1)	•	eth1	•	AUTO	•	AUTO (-1 Mhz)	-	DUT: RootAP LAN	•	NA	Ŧ	NA	•	NA	-	NA	•	NA	-
Bu	Build New Scenario					Update and Apply and Save Scenario Save Scenario											<u>C</u> ancel								

2. Use Chamber View to start the Mesh test.

- **Chamber View** Scenario Configuration <u>M</u>anage Scenarios 0 ٩ meshtest -Q Apply Scenario MobileStations Tests: Mesh -LF-1 Run Test 26:0 (95,5db) Sna<u>p</u> Report 믱 RootAP Node2 Node2 0000 0000 0000 0000 1 E-4 tcp-dl-6m-vi STA-AC Nodel Nodel 5000 STA-AC 0000 0000 tcp-dl-6m-v STA-AC Show LANforge Show RSSI Show External CX Show DUT Show Bps ✓ Show Internal CX <u>B</u>uild Scenario <u>C</u>lose Show Inactive DUT Apply Motion Info Print <u>S</u>ync Apply Show WiFi Connections ☑ Show Traffic Profiles
- A. Open Chamber View by clicking on the 'Chamber View' button in the LANforge-GUI. Load appropriate scenario. Apply the Scenario, then Build the scenario.

B. Select the **Mesh** test and click **Run Test**. You should see the Mesh Test configuration window pop up. It will remember the last configuration for most fields. Select the resources, topologies and other test config to be used for this test. If you have not run the calibration step previously, run that test first:

0		М	esh Automated	Te	st	\odot \otimes \otimes
Settings Advance	d Configuration Repo	ort (Configuration			
Upstream Port:	1.1.1 eth1	•				
Selected DUT 2G:	RootAP orbimeshtest	•	Selected DUT 5G		RootAP orbimeshtest	
AP Root Chamber	Node 1 Chamber		Node 2 Chamber		STA Chamber	
RootAP 👻	Nodel	•	Node2	•	MobileStations 🗸	,
STA Count	STA Count		STA Count		STA Count	
1 🗸	1	•	1	•	20 💌	•
2.4Ghz Radios	2.4Ghz Radios		2.4Ghz Radios		2.4Ghz Radios	
_		•		•		,
•		•		-		
		-		-		
5Gbz Badios	5Gbz Badios		5Gbz Badios		5Gbz Badios	
		-		-	1.1.2 wiphy0	
		-				
		•		•	•	·
AP Chamber Position	STA Chamber Position	_			Select Tests	Traffic Combination
Current Position	Current Position		Traffic Type		Calibrate	Add STA Traffic
ABC A-BC	Close Boot AP		UDP		Inroughput	
AB-C	Close Node 1		TCP			STA
A-B-C	Close Node 2					ROOT
AB-C	Medium Root AP					NI
A-BC	Medium Node 1					NZ Dalah (NI)
ABC	Medium Node 2		Traffic Directio	n		ROOL+NI Dest: ND
Random	Far Root AP		Download			
	Far Node 1		Upload			
	Far Node 2		Both			NUUL+INI+INZ
	<u>S</u>	tar	t 🗌 Anot	her	Iteration Pause	<u>C</u> ancel

C. Once the calibration step is complete, reconfigure to run the throughput tests. In this case, we are using the ABC topology where all three nodes are close to each other. The stations will do throughput tests at each of three positions: Close to Root AP, Close to Node 1, and Close to Node 2. We will generate UDP download traffic. No stations will be created on the LANforge systems inside the AP chambers in this test.:

0	M	lesh Automated Te	est	$\odot \odot \odot$
Settings Advance	ed Configuration Report	Configuration		
Upstream Port:	1.1.1 eth1 🔽			
Selected DUT 2G:	RootAP orbimeshtest 👻	Selected DUT 5G:	RootAP orbimeshtest 💌	
AP Root Chamber	Node 1 Chamber	Node 2 Chamber	STA Chamber	
RootAP 💌	Nodel 🔻	Node2 🗸	MobileStations 🗸	
STA Count	STA Count	STA Count	STA Count	
1 🗸	1 💌	1 🔹	20 💌	
2.4Ghz Radios	2.4Ghz Radios	2.4Ghz Radios	2.4Ghz Radios	
-		•	-	
_	•	-	-	
-		-		
5 Gbz Padios	5 Chz Padias	5 Gbz Padios	5 Gbz Padios	
			1.1.2 wipityo	1
•	▼	•	▼	
-		-	-	
AP Chamber Position	STA Chamber Position		Select Tests	Traffic Combination
Current Position	Current Position	Traffic Type	Calibrate	
ABC	Random	UDP	Throughput	Add STA Traffic
A-BC	Close Root AP	TCP		STA
AB-C	Close Node 1			Root
A-B-C	Close Node 2			Nl
AB-C	Medium Root AP			N2
A-BC	Medium Node 1	Traffia Direction		Root+N1
ABC	Medium Node 2	Traffic Direction		Root+N2
Random	Far Root AP	Download		N1+N2
	Far Node 1	Upload		Root+N1+N2
	Far Node 2	Both		
	Sta	rt 🗌 Another	Iteration Pause	<u>C</u> ancel

D. Configure the appropriate settings on the Advanced tab. In this case, I am disbling 2.4Ghz and doing a 5Ghz only test.

•		Mesh Automated	Test	\odot \otimes \otimes
Settir	ngs Advanced Confi	guration Report Config	uration	
	Save	DEFAULT		
	Load	DEFAULT		
	Delete	DEFAULT		
	IP ToS:	Best Effort (0) 🗖	Multi-Conn: 5 (5)	-
	🖌 Skip 2.4Ghz Tests	Skip 5Ghz Tests		
	Duration:	1-min (1 min)		
	Tx Rate:	65%		
	<u>S</u> tart	Another Iteratio	n 🗌 Pause	<u>C</u> ancel

E. 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 tab will be created and will be updated as the test runs. For each topology, throughput graphs and topology snapshot will be generated.



F. 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 Mesh Test Report.

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