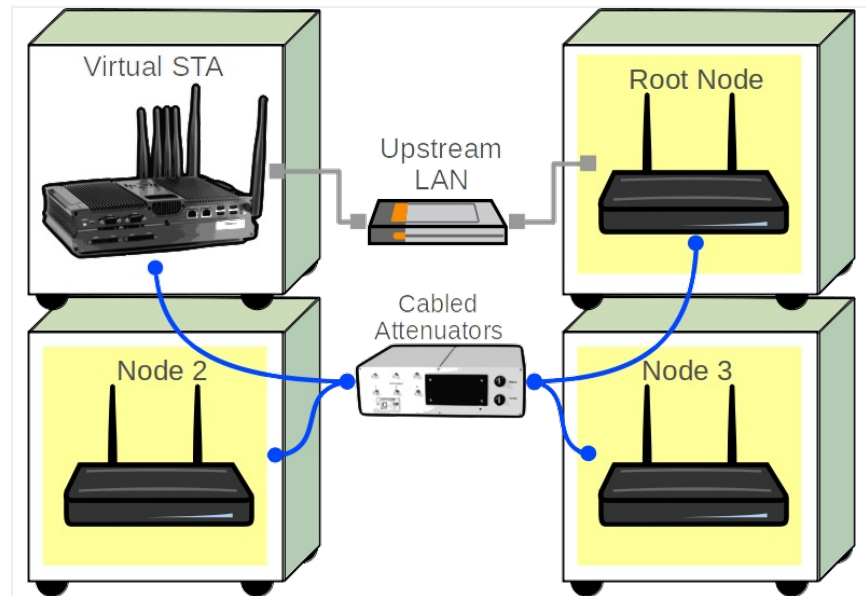


Testing Mesh APs with automated Mesh scenario

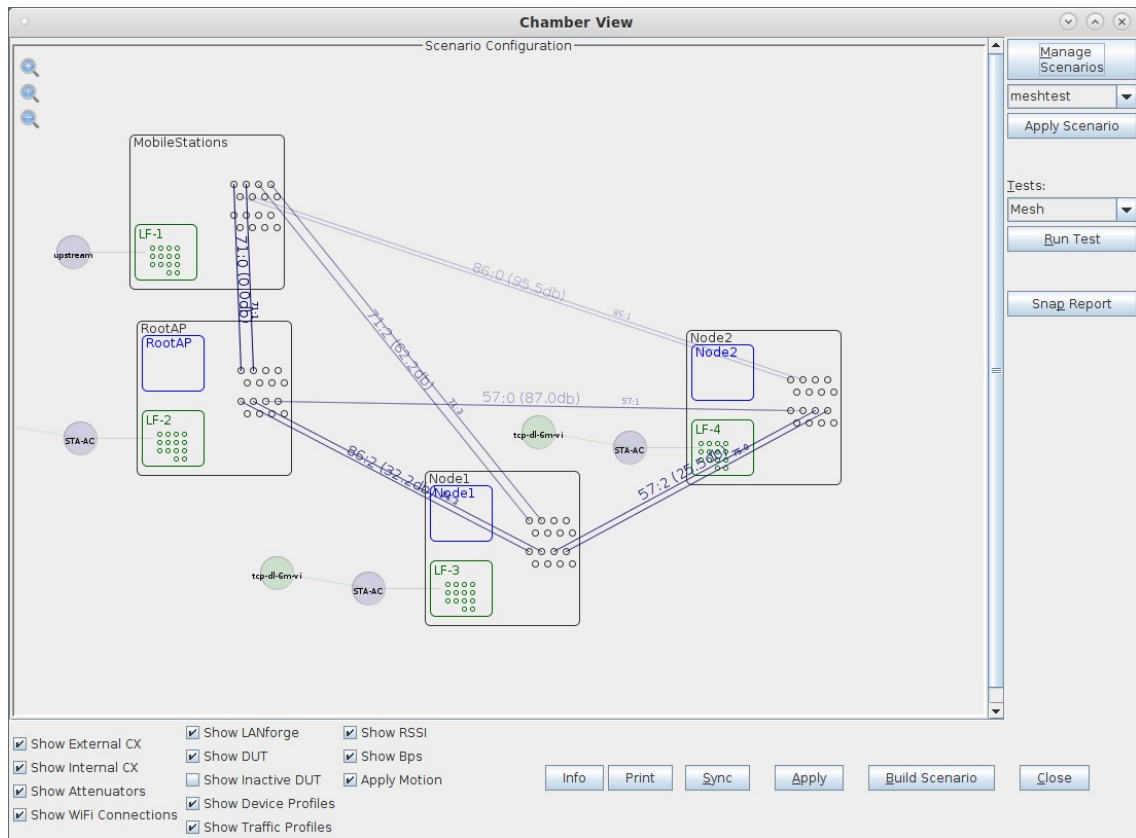
Goal: Setup and run a series of tests in different mesh topologies using the LANforge CT523c or similar system..

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 strength 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.

The screenshot shows the 'Create/Modify DUT' dialog box. The 'Name' field is set to 'RootAP'. The 'Image file' is set to 'NONE'. The 'SSID-1' is 'orbimeshtest' and 'Password-1' is 'Lanforge12345!'. The 'BSSID-1' is '8c:3b:ad:2c:b3:4f'. The 'BSSID-3' is '00:00:00:00:00:00'. The 'Active' checkbox is checked, and the 'AP DUT' checkbox is also checked. Other checkboxes include 'STA DUT', 'WEP', 'WPA', 'WPA2', 'WPA3', '802.11r', '802.1x EAP-TTLS', and 'Provides DHCP on WAN'. The 'Mgt IP' is '0.0.0.0'. The 'Num Ant Radio 1' and 'Num Ant Radio 3' are both set to '0'. The 'Notes' field is empty. The bottom of the dialog has 'Apply', 'OK', and 'Cancel' buttons.

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: Position:	0.0 Tilt: 0.0 RPM: 0.0			<input type="checkbox"/> Virtual	<input type="checkbox"/> Open	
DUT-1:	RootAP	DUT-2:						
DUT-3:		DUT-4:						
LANforge-1:	2 (RootAP)	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.RootAP.8	Chamber.Node1.8	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	1.1.57.0	OTA (0 ddB)	None (0 ddB)	None (0 ddB)
			Chamber.RootAP.11	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)
						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)

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

Create/Modify Chamber

Name:	Node1	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: Position:	0.0 Tilt: 0.0 RPM: 0.0			<input type="checkbox"/> Virtual	<input type="checkbox"/> Open	
DUT-1:	Node1	DUT-2:						
DUT-3:		DUT-4:						
LANforge-1:	3 (Node1)	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.Node1.11	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)
						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)

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

Create/Modify Chamber

Name: Node2 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: Position: 0.0 Tilt: 0.0 RPM: 0.0 Virtual Open
 DUT-1: Node2 DUT-2: DUT-3: DUT-4:
 LANforge-1: 4 (Node2) LANforge-2: None LANforge-3: LANforge-4:
 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

							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)
							Cable (1.00 ddb)	None (0 ddb)	None (0 ddb)

Sync Apply OK Cancel

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.

Create/Modify Scenario

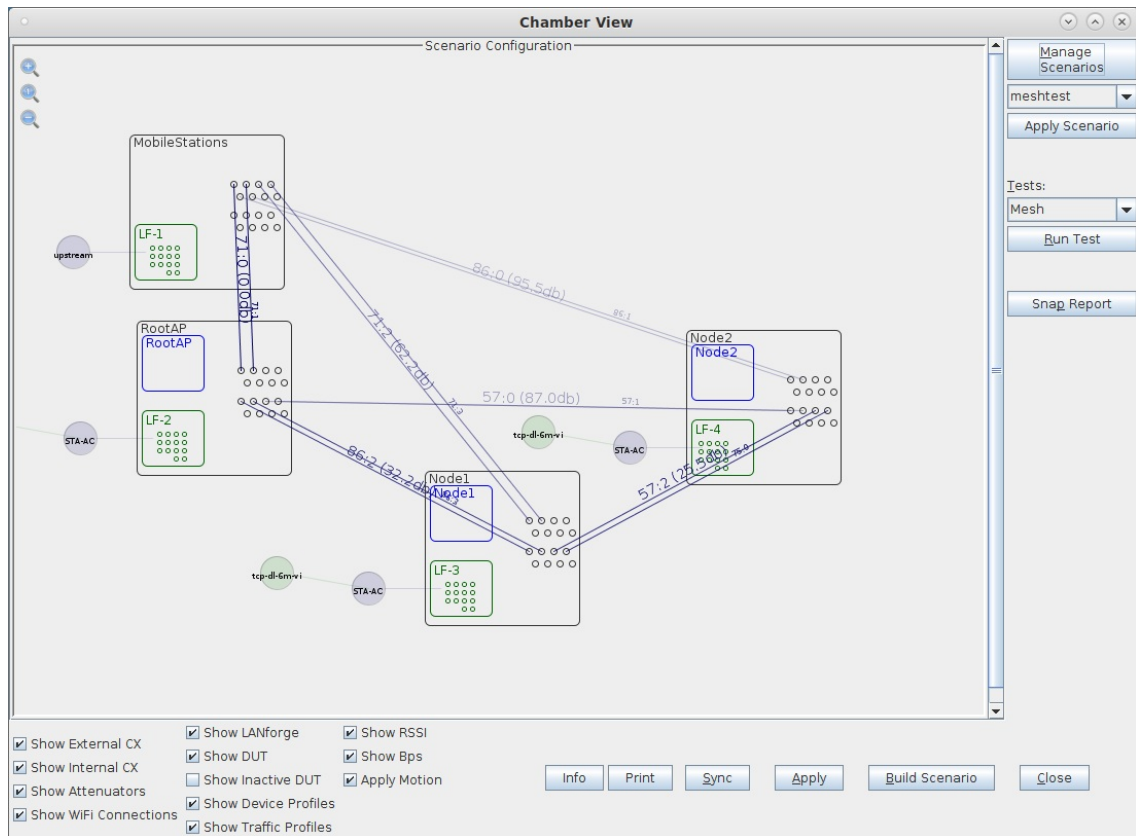
Scenario Name: meshstest

Del	Resource Profile	Amount	Uses-1	Uses-2	Frequency	Maps To	Traffic-1	Traffic-2	Traffic-3	Traffic-4	Traffic-5
X	1.2 STA: STA-AC	1 (1)	wiphy0	AUTO	AUTO (-1 Mhz)	DUT: RootAP Radio-1	tcp-di-6m-vi	NA	NA	NA	NA
X	1.3 STA: STA-AC	1 (1)	wiphy0	AUTO	AUTO (-1 Mhz)	DUT: Node1 Radio-1	tcp-di-6m-vi	NA	NA	NA	NA
X	1.4 STA: STA-AC	1 (1)	wiphy0	AUTO	AUTO (-1 Mhz)	DUT: Node2 Radio-1	tcp-di-6m-vi	NA	NA	NA	NA
X	1.1 Upstream: upstream	1 (1)	eth1	AUTO	AUTO (-1 Mhz)	DUT: RootAP LAN	NA	NA	NA	NA	NA

Build New Load Scenario Update and Save Scenario Apply and Save Scenario Cancel

2. Use Chamber View to start the Mesh test.

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:

Mesh Automated Test

Settings
Advanced Configuration
Report Configuration

Upstream Port: <input type="text" value="1.1.1 eth1"/>		Selected DUT 2G: <input type="text" value="RootAP orbimeshtest"/>		Selected DUT 5G: <input type="text" value="RootAP orbimeshtest"/>	
AP Root Chamber	Node 1 Chamber	Node 2 Chamber	STA Chamber		
<input type="text" value="RootAP"/>	<input type="text" value="Node1"/>	<input type="text" value="Node2"/>	<input type="text" value="MobileStations"/>		
STA Count	STA Count	STA Count	STA Count		
<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="20"/>		
2.4Ghz Radios	2.4Ghz Radios	2.4Ghz Radios	2.4Ghz Radios		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
5Ghz Radios	5Ghz Radios	5Ghz Radios	5Ghz Radios		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="1.1.2 wiphy0"/>		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		
AP Chamber Position	STA Chamber Position	Traffic Type	Select Tests	Traffic Combination	
<input type="text" value="Current Position"/>	<input type="text" value="Current Position"/>	<input type="text" value="UDP"/>	<input type="text" value="Calibrate"/>	<input type="checkbox"/> Add STA Traffic	
ABC	Random	<input type="text" value="TCP"/>	<input type="text" value="Throughput"/>	<input type="text" value="STA"/>	
A-BC	Close Root AP			<input type="text" value="Root"/>	
AB-C	Close Node 1			<input type="text" value="N1"/>	
A-B-C	Close Node 2			<input type="text" value="N2"/>	
A--B-C	Medium Root AP			<input type="text" value="Root+N1"/>	
A-B--C	Medium Node 1			<input type="text" value="Root+N2"/>	
A--B--C	Medium Node 2			<input type="text" value="N1+N2"/>	
Random	Far Root AP	Traffic Direction		<input type="text" value="Root+N1+N2"/>	
	Far Node 1	<input type="text" value="Download"/>			
	Far Node 2	<input type="text" value="Upload"/>			
		<input type="text" value="Both"/>			

Another Iteration
 Pause

- 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.:

The screenshot shows the 'Mesh Automated Test' window with the 'Settings' tab selected. The configuration is as follows:

- Upstream Port: 1.1.1 eth1
- Selected DUT 2G: RootAP orbimeshtest
- Selected DUT 5G: RootAP orbimeshtest
- AP Root Chamber: RootAP
- Node 1 Chamber: Node1
- Node 2 Chamber: Node2
- STA Chamber: MobileStations
- STA Count (Root): 1
- STA Count (Node1): 1
- STA Count (Node2): 1
- STA Count (MobileStations): 20
- 2.4Ghz Radios: All four are empty.
- 5Ghz Radios: The first three are empty, the fourth is 1.1.2 wiphy0.
- AP Chamber Position: ABC
- STA Chamber Position: Close Root AP
- Traffic Type: UDP
- Traffic Direction: Download
- Select Tests: Calibrate, Throughput
- Traffic Combination: STA, Root, N1, N2, Root+N1, Root+N2, N1+N2, Root+N1+N2

Buttons at the bottom: Start, Another Iteration, Pause, Cancel.

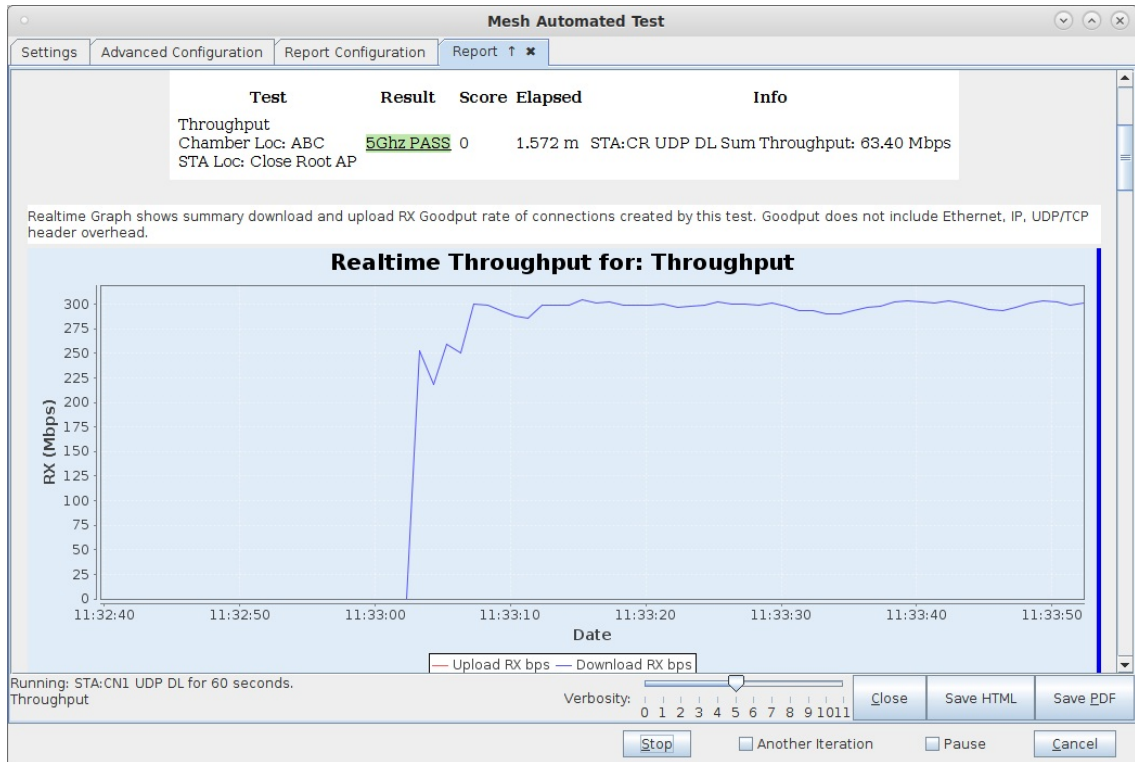
- D. Configure the appropriate settings on the Advanced tab. In this case, I am disabling 2.4Ghz and doing a 5Ghz only test.

The screenshot shows the 'Mesh Automated Test' window with the 'Advanced Configuration' tab selected. The configuration is as follows:

- 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%

Buttons at the bottom: Start, Another Iteration, Pause, Cancel.

- 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](#).