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Candela
**T E C H N O L O G I E S**
Network Testing and Emulation Solutions

# Advanced configuration options for TR-398 Issue-2/3 and Mesh on a 4-Chamber Setup

Goal: Explore advanced configuration options for a TR398 issue-3 mesh testbed. The testbed in this example supports both 32 real tri-band radios as well as 6 virtual-station dual-band radios. See the TR398 testbed page for more information.

In this test scenario, a LANforge cluster (of three 523c and 3 521b systems) is used to emulate different station and AP scenarios and generate and receive traffic with a set of 3 meshed APs. This example assumes user has some experience with Chamber View and TR398, and has an appropriate LANforge TR398 testbed. Please contact *support@candelatech.com* for assistance in setting up the TR-398 testbed.
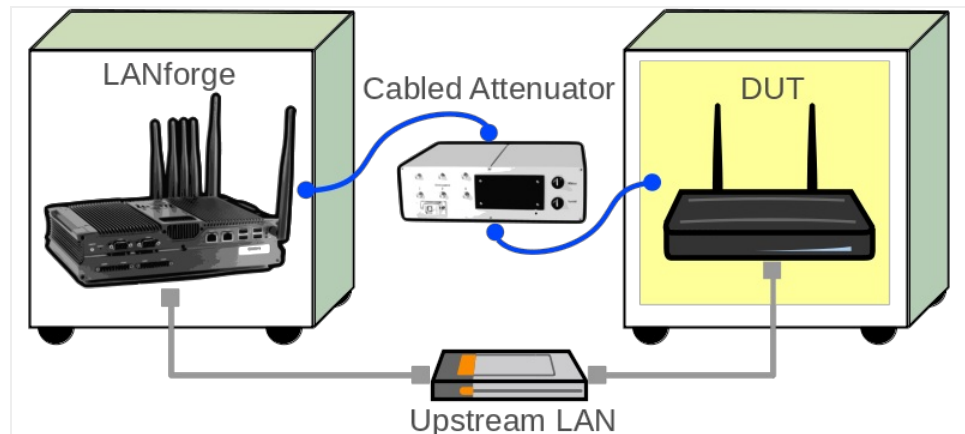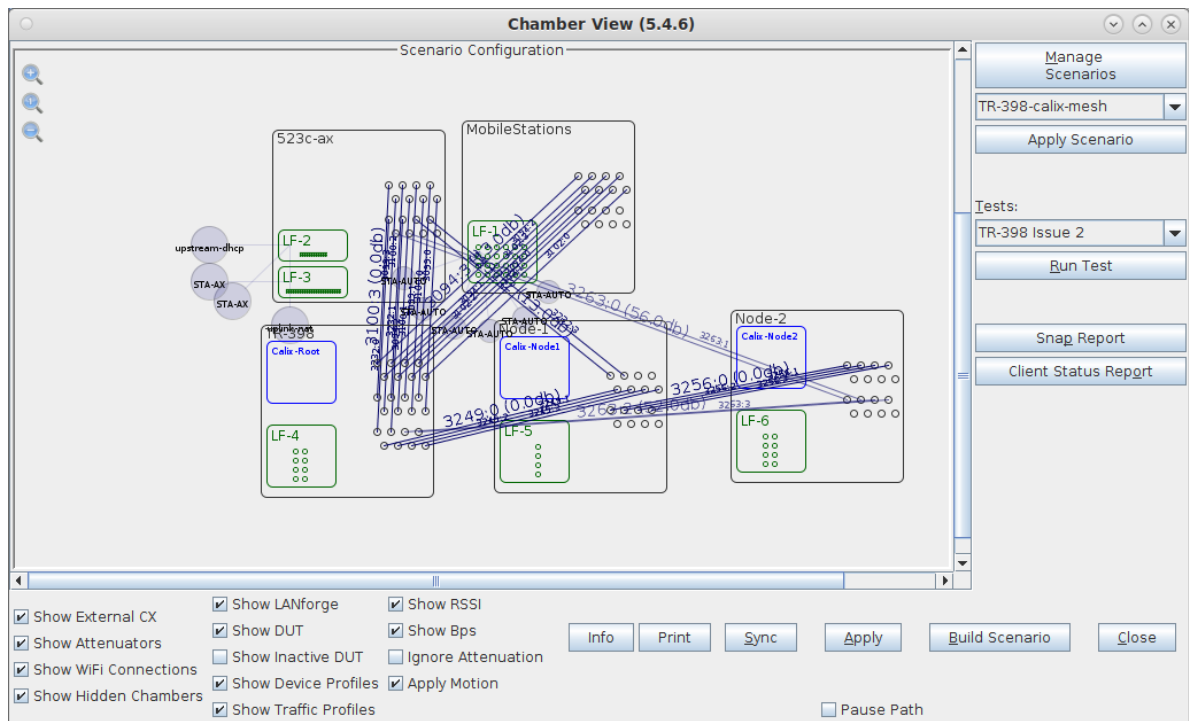

1. System configuration overview.
   A. The status panel shows all 6 LANforge systems connected and available.
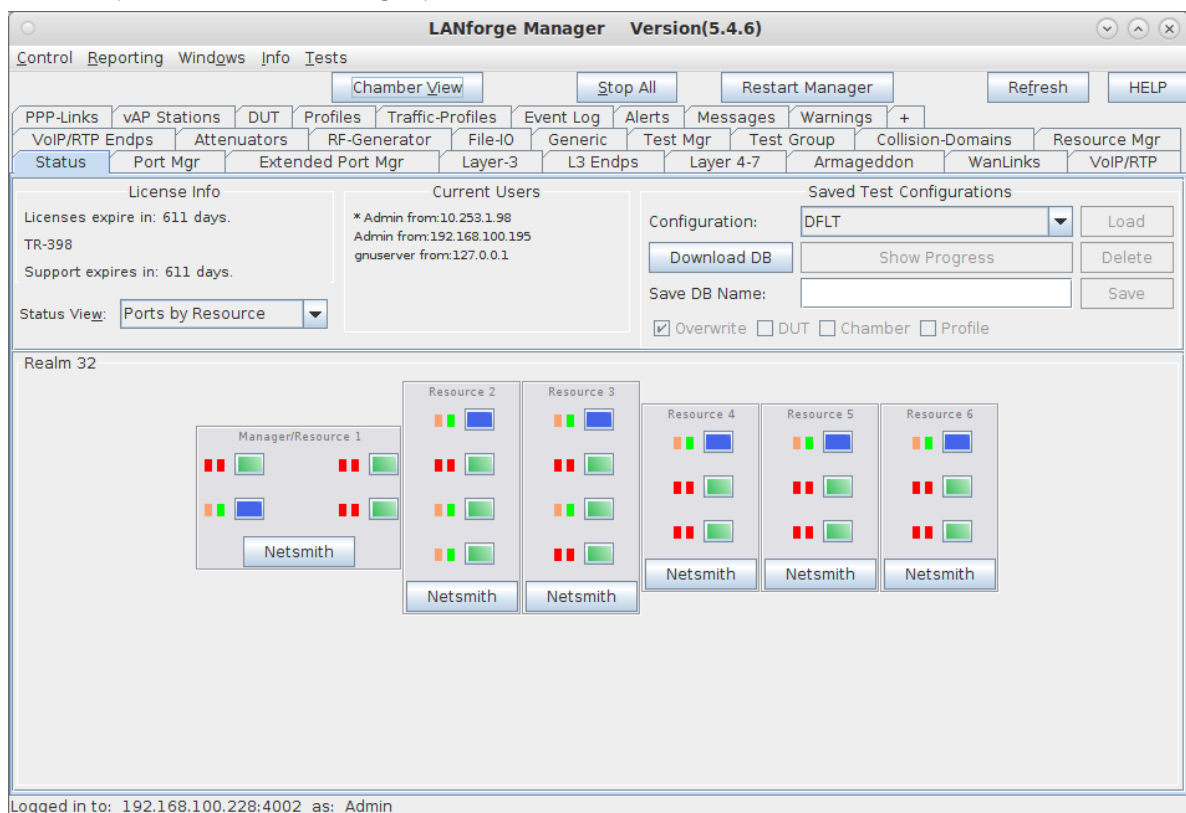
B. The Chamber View window shows the RF chambers, attenuated paths, APs, and LANforge systems.

Chamber View (5.4.6)

Scenario Configuration

523c-ax | MobileStations

LF-2
LF-3
upstream-dhcp
STA-AX
STA-AX
Calix-Root
Calix-Node1
Calix-Node2
Node-2
LF-1
LF-4
LF-5
LF-6

Manage Scenarios
TR-398-calix-mesh
Apply Scenario

Tests:
TR-398 Issue 2
Run Test

Snap Report
Client Status Report

☑ Show External CX   ☑ Show LANforge   ☑ Show RSSI
☑ Show Attenuators   ☑ Show DUT   ☑ Show Bps
☑ Show WiFi Connections   ☐ Show Inactive DUT   ☐ Ignore Attenuation
☑ Show Hidden Chambers   ☑ Show Device Profiles   ☑ Apply Motion
                          ☑ Show Traffic Profiles

Info   Print   Sync   Apply   Build Scenario   Close

☐ Pause Path

C. This setup uses LANforge as the upstream (WAN) port for the APs. This allows the testbed to be isolated from the lab network, and also facilitates running the APs in either bridge or routed mode.

Create/Modify Scenario

Scenario | Text Output

Scenario Name TR-398-calix-mesh   Delete Scenario   Create Profile   Create Traffic Profile   Add Row

Dup	Del	Resource	Profile	Amount	Uses-1	Uses-2	Frequency	VLAN-ID	Maps To	Traffic
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy0	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-1	NA
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy1	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-2	NA
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy2	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-1	NA
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy3	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-2	NA
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy4	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-1	NA
	✕	1.1	STA: STA-AUTO	1 (1)	wiphy5	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-2	NA
	✕	1.2	Upstream: upstream-dhcp	1 (1)	eth2	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root LAN	NA
	✕	1.2	STA: STA-AX	1 (1)	ALL-AX	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-2	NA
	✕	1.3	STA: STA-AX	1 (1)	ALL-AX	AUTO	AUTO (-1 Mhz)	NA	DUT: Calix-Root Radio-2	NA
	✕	1.2	Uplink: uplink-nat	1 (1)	eth3	eth2	AUTO (-1 Mhz)	NA	DUT: upstream LAN 192.168.100.1/24	NA

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

2. Launch the TR398 issue 2 test. Unless otherwise specified, this test is configured for TR398 issue3. The settings may be changed to run the TR398 issue 2 tests as user prefers.

3. The Virtual Sta Radio settings tab is for the radios supporting virtual stations (MTK7915 4x4 dual-band AX in this example). The zero-attenuation RSSI values are calibrated during testbed configuration. See TR398 calibration cookbook for instructions on how to do this.

4. The 802.11AX Settings tab is for configuring non-virtual-station radios, Intel AX210 in this case.

5. The 802.11AX Settings 2 tab is for configuring additional non-virtual-station radios, Intel AX210 in this case. Some testbeds will have different attenuators for groups 2-7. The testbed in this example uses splitter-combiners so that all radios in groups 2-7 go through the same attenuator, so there are no attenuators configured on this second AX settings tab.

6. The Mesh Settings tab has information needed to run the Mesh test cases. This includes the DUT information for the node-1 and node-2 mesh chambers, attenuator mappings between chambers, and some scanning configuration.

TR-398 Issue 2 Automated Test (cv-inst-0)

| Settings | Virtual Sta Radio Settings | 802.11AX Settings | 802.11AX Settings 2 | Mesh Settings | Mesh Settings 2 | Per-Test Config 1 |
| Per-Test Config 2 | Per-Test Config 3 | Per-Test Config 4 | Per-Test Config 5 | Advanced Configuration | Report Configuration | TR398-Issue3 |

Node-1 DUT 5G: `:94:70:29:9a:d1 (2)` ▼

Node-1 DUT 2G: `:94:70:29:9a:d0 (1)` ▼

Node-2 DUT 5G: `:94:70:29:99:8d (2)` ▼

Node-2 DUT 2G: `:94:70:29:99:8c (1)` ▼

☐ Use 2-band pass/fail

Background Scan Module: `simple` ▼ RSSI Threshold: `-65` ▼

Short Interval: `30` ▼ Long Interval: `300` ▼

	Radio	2.4Ghz RSSI 0 Atten	5Ghz RSSI 0 Atten	Attenuator Modules
Group 0: Root to Node-1				
		-43	-63	1.1.3249.0 ▼
		-43	-63	1.1.3249.1 ▼
		-43	-63	1.1.3249.2 ▼
		-43	-63	1.1.3249.3 ▼
Group 1: Mobile Station to Root				
5Ghz	1.3.18 wiphy21 ▼	-34	-60	1.1.3232.0 ▼
2.4Ghz	1.3.18 wiphy21 ▼	-34	-60	1.1.3232.1 ▼
		-34	-60	▼
		-34	-60	▼
Group 2: Mobile Station to Node-1				
		-33	-41	1.1.3232.2 ▼
		-33	-41	1.1.3232.3 ▼
		-33	-41	▼
		-33	-41	▼

[Start] [Skip] ☐ Another Iteration ☐ Pause [Cancel]

7. The Mesh Settings 2 tab has additional mapping information needed for a 3-node mesh testbed.

TR-398 Issue 2 Automated Test (cv-inst-0)

| Settings | Virtual Sta Radio Settings | 802.11AX Settings | 802.11AX Settings 2 | Mesh Settings | Mesh Settings 2 | Per-Test Config 1 |
| Per-Test Config 2 | Per-Test Config 3 | Per-Test Config 4 | Per-Test Config 5 | Advanced Configuration | Report Configuration | TR398-Issue3 |

2.4Ghz RSSI 0 Atten	5Ghz RSSI 0 Atten	Attenuator Modules
Group 3: Mobile Station to Node-2		
-34	-46	1.1.3263.0 ▼
-34	-46	1.1.3263.1 ▼
-34	-46	▼
-34	-46	▼
Group 4: Node-1 to Node-2		
-52	-59	1.1.3256.0 ▼
-52	-59	1.1.3256.1 ▼
-52	-59	1.1.3256.2 ▼
-52	-59	1.1.3256.3 ▼
Group 5: Root to Node-2		
-38	-59	1.1.3263.2 ▼
-38	-59	1.1.3263.3 ▼
-38	-59	▼
-38	-59	▼

[Start] [Skip] ☐ Another Iteration ☐ Pause [Cancel]

8. The Per-Test Config tabs provide tunable settings for individual test cases. Each entry field will have a tool-tip to explain what it does in more detail. The sections will only be active if the respective test case is selected on the Settings tab.

9. The Per-Test Config 2 tab.

10. The Per-Test Config 3 tab allows setting specific attenuations and pass/fail for the RvR and spatial consistency tests.

| Per-Test Config 2 | Per-Test Config 3 | Per-Test Config 4 | Per-Test Config 5 | Advanced Configuration | Report Configuration | TR398-Issue3 |
| Settings | Virtual Sta Radio Settings | 802.11AX Settings | 802.11AX Settings 2 | Mesh Settings | Mesh Settings 2 | Per-Test Config 1 |

6.3.1 Range Versus Rate Test

☑ RvR issue 3   ☑ Enable Custom Config   ☐ Enable 5g-160   ☐ Enable 6g-20

Attenuations 2.4Ghz	0, 9, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, 56 (default-i3) ▼
P/F 2.4Ghz DL /n	100, 100, 100, 100, 95, 80, 75, 50, 45, 35, 25, 14, 9, 8, 3 (default-i3) ▼
P/F 2.4Ghz UL /n	100, 100, 100, 100, 95, 80, 75, 50, 31, 24, 17, 12, 7, 4, 3 (default-i3) ▼
P/F 2.4Ghz DL /ax	200, 200, 180, 170, 150, 120, 90, 85, 65, 55, 30, 25, 15, 10, 4 (default-i3) ▼
P/F 2.4Ghz UL /ax	200, 200, 180, 170, 150, 120, 90, 85, 65, 50, 25, 20, 10, 5, 4 (default-i3) ▼
Attenuations 5Ghz	0, 9, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, 56 (default-i3) ▼
P/F 5Ghz DL /ac	560, 560, 530, 420, 400, 360, 300, 220, 150, 125, 100, 45, 25, 5, 1 (default-i3) ▼
P/F 5Ghz UL /ac	560, 560, 530, 420, 400, 360, 300, 220, 150, 125, 100, 45, 25, 5, 1 (default-i3) ▼
P/F 5Ghz DL /ax	720, 720, 680, 540, 515, 465, 400, 350, 300, 200, 175, 150, 50, 7, 2 (default-i3) ▼
P/F 5Ghz UL /ax	720, 720, 680, 540, 515, 465, 400, 300, 225, 175, 150, 50, 25, 5, 2 (default-i3) ▼
P/F 5Ghz 160Mhz DL /ax	1440, 1440, 1440, 1080, 1025, 700, 400, 350, 300, 200, 175, 150, 50, 7, 2 (default-i3) ▼
P/F 5Ghz 160Mhz UL /ax	1440, 1440, 1440, 1080, 1025, 700, 400, 300, 225, 175, 150, 50, 25, 5, 2 (default-i3) ▼
Attenuations 6Ghz	0, 10, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48 (default-i3) ▼
P/F 6Ghz DL /ax	1440, 1080, 1025, 700, 400, 350, 300, 200, 175, 150, 50, 7 (default-i3) ▼
P/F 6Ghz UL /ax	1440, 1080, 1025, 700, 400, 300, 225, 175, 150, 50, 25, 5 (default-i3) ▼
P/F 6Ghz 20Mhz DL /ax	200, 160, 140, 100, 80, 60, 40, 30, 20, 10, 5, 2 (default-i3) ▼
P/F 6Ghz 20Mhz UL /ax	200, 160, 140, 100, 80, 60, 40, 30, 20, 10, 5, 2 (default-i3 ▼

6.3.2 Spatial Consistency Test

☑ Spatial issue 3   ☐ Skip First Attenuation Step   ☐ Skip Second Attenuation Step   ☐ Skip Third Attenuation Step

Spatial Rotation Degrees: 30 ▼   ☐ Pause on zero throughput

[Start]   [Skip]   ☐ Another Iteration   ☐ Pause   [Cancel]

11. The Per-Test Config 4 tab allows tuning the peak-performanc tests and others.

6.3.3 AX Peak Performance TCP Throughput Test

☑ Skip 4x4 5Ghz test   ☑ Skip 2.4g-40   ☑ Skip 5g-160   ☐ Skip 6g-160

Throughput AX 2Ghz rate: 300Mbps - Default (300 Mbps) ▼   Throughput AX 2x2 5Ghz rate: 1.1Gbps - Default (1.1 Gbps) ▼

Throughput AX 4x4 5Ghz rate: 1.1Gbps - Default (1.1 Gbps) ▼   ☐ Enable 2.4g-20   ☐ Enable 5g-20   ☐ Enable 5g-40

☑ Enable 5g-80   ☐ Enable 6g-20   ☐ Enable 6g-40   ☐ Enable 6g-80

6.4.1 Multiple STAs Performance Test

☑ Multiple STA issue 3

6.4.2 Multiple Association / Disassociation Stability Test

Assoc/Disassoc Traffic %: 99 ▼

6.4.3 Downlink MU-MIMO Performance Test

☑ User Interaction   Multiplier 45% (default) (45%) ▼

[Start]   [Skip]   ☐ Another Iteration   ☐ Pause   [Cancel]

12. The Per-Test Config 5 tab.

13. The Advanced Configuration tab has settings that apply to many tests. The top section is for saving and loading test configurations. The Import Config window will let one paste in a full or partial test configuration file to apply those changes easily. The Rotation fiels at the bottom allow the user to specify optimal rotations to run tests which do not explicitly control the turntable. Use the Rate vs Orientation test to find optimal rotations.

14. The Report Configuration tab allows customizing the report generated by the TR398 test cases..

15. The Issue-3 page is for experimental test cases. At time of writing, this tab is not needed. The ATF test case will be executed if the 'Use Issue-3 Behaviour' checkbox is selected on the Settings page.