

Comparing performance of different AP configurations

Goal: Compare dataplane throughput for several different APs set up in a similar manner. This allows comparing different hardware performance, and a similar test case can compare different firmware/software versions or other configuration changes.

In this test scenario, the LANforge CT522 is used to create a station and generate packets at different packet sizes to and from a series of APs. We will run one set of iterations of the dataplane test, pause it, make changes to use a different SSID, and then restart the test. The result is a report showing the differences in performance of the different APs under test. This specific test case is run over-the-air in an office. It would perform better and be more repeatable if RF chambers like the CT820a were used.



- 1. Configure Chamber View for DUT testing.
 - 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 additional DUTs as needed.

| • | Create/Mo | dify DUT | \odot \otimes \otimes |
|--------------|----------------------|---------------------------|-----------------------------|
| Name | jw3 | | |
| Image file | NONE | | Choose Image |
| SW Info | | HW Info | compex 3x3, 2x2, wavel |
| Model Number | | Serial Number | |
| Serial port | | WAN | |
| LAN | | API version | 0 |
| SSID-1 | jw3-0 | Password-1 | |
| SSID-2 | jw3-1 | Password-2 | |
| SSID-3 | | Password-3 | |
| Mgt IP | 0.0.0.0 | Ant-1 | 0 |
| Ant-2 | 0 | Ant-3 | 0 |
| BSSID-1 | 04:f0:21:7b:37:2a | BSSID-2 | 04:f0:21:f2:ea:bd |
| 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 | | | |
| | | | |
| | Apply | <u>O</u> K <u>C</u> ancel | |

C. This example uses a second DUT as well.

| • | Create/Mo | dify DUT | × × | | | | | |
|--------------|---------------------------------|----------------------|----------------------------------|--|--|--|--|--|
| Name | jw4 | | | | | | | |
| Image file | NONE | | Choose Image | | | | | |
| SW Info | | HW Info | dr900vx, compex 9984 | | | | | |
| Model Number | | Serial Number | | | | | | |
| Serial port | | WAN | | | | | | |
| LAN | | API version | 0 | | | | | |
| SSID-1 | jw3-2 | Password-1 | | | | | | |
| SSID-2 | jw3-3 | Password-2 | | | | | | |
| SSID-3 | | Password-3 | | | | | | |
| Mgt IP | 0.0.0.0 | Ant-1 | 0 | | | | | |
| Ant-2 | 0 | Ant-3 | 0 | | | | | |
| BSSID-1 | c4:4b:d1:25:e0:47 | BSSID-2 | 04:f0:21:a3:6e:cf | | | | | |
| 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 | | | | | | | | |
| | | | | | | | | |
| | Apply <u>O</u> K <u>C</u> ancel | | | | | | | |

D. Configure an Upstream profile using eth1 on the LANforge system.

| | Create/Modify F | Profile | | \odot |
|------------|-------------------------|-------------|---------------|---------|
| 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 | |
| WPA | WPA2 | WPA3 | 802.11r | |
| | Restart DHCP on Connect | Notes: | | |

E. Configure an STA profile on the LANforge system.

| • | Create/Modify P | rofile | | \sim \times |
|-----------------|-------------------------|----------------|---------------|-----------------|
| 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>C</u> ancel | | |

F. 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). Please note that we will manually configure the station to connect to the second DUT as part of the test steps below.

| • | Create/Modify Scenario | | | | | | | | | | \odot \otimes \otimes | | | | | |
|-----|--|----|--|--|-------------------------|---|---|-------|---|--------|-----------------------------|------|---|---------------|---|--------------------|
| S | Scenario Text Output | | | | | | | | | | | | | | | |
| | Scenario Name dut-lf-br-ap 👻 Delete Scenario Create Profile Create Traffic Profile Add Row | | | | | | | | | | | | | | | |
| Del | Del Resource Profile Mod Amount Uses-1 Uses-2 Frequency Maps To | | | | | | | | | | | | | | | |
| × | 1 | .1 | | | STA: STA-AC | • | Ø | 1(1) | • | wiphyl | • | AUTO | • | AUTO (-1 Mhz) | • | DUT: jw3 Radio-1 💌 |
| × | 1 | .1 | | | Upstream: upstream-dhcp | • | 0 | 1 (1) | • | ethl | • | AUTO | • | AUTO (-1 Mhz) | • | DUT: jw3 LAN 🔽 |
| × | 1 | .1 | | | STA: STA-AC | • | 0 | 1 (1) | • | wiphy0 | • | AUTO | • | AUTO (-1 Mhz) | • | DUT: jw3 Radio-2 💌 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| E | Load Update and Apply and Cancel Build New Scenario Save Scenario Cancel | | | | | | | | | | | | | | | |

2. Use Chamber View to run a Dataplane comparison 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 **Dataplane** test and click **Run Test**. You should see the RX Sensitivity Test configuration window pop up. It will remember the last configuration for most fields. Select the DUT and WiFi station device, and select the combinations of traffic types you wish to send. Select the **Another Iteration** checkbox to allow comparison graphs.:

| Dataplane Test 💿 🔿 😣 | | | | | | | |
|--|---|--------------------|---------------------------------|---------------|---|--|--|
| Settings Report | Configurat | ion | | | | | |
| Selected DUT: | jw3 | - | Duration: | 15 sec (15 s) | - | | |
| Selected WiFi Port: | 1.1.6 | sta0000 👻 | Upstream Port: | 1.1.1 eth1 | - | | |
| Path Loss: | 10 | | Rate: | 85% | - | | |
| Channels | Mode | | PDU Size | | | | |
| AUTO No-Change 1 2 3 | ▲ Auto 802.1 802.1 802.1 802.1 ▼ 802.1 | la = lb = lg | 64 128 256 512 1024 | | | | |
| Spatial Streams | Securi | ty | Bandwidth | | | | |
| 1 2 3 4 | Open WEP WPA WPA2 | - | 20 40 80 160 | | | | |
| Traffic Type UDP TCP Direction DUT Transmit DUT Receive | Attenu 200 300 | (0) 400 500 | | | | | |
| | | | | | | | |

C. We have 4 total BSSIDs that we wish to test. The Scenario creation logic will have chosen one of the BSSIDs for the station, but we will need to override that for each of our comparison runs. Go to the Port-Mgr tab in the LANforge-GUI, double-click the station, and make sure that its SSID is correct. In case you are using different passwords you could change that at this time as well. When complete, click Apply. You can leave the window open as you will need it in future steps:

| sta0000 (If0313-6477) Configure Settings Sta0000 (If0313-6477) Configure Settings | | | | | | | | |
|--|--------------------|----------------------|------------------|------------------------------|---|--|--|--|
| Port Status Information | | | | | | | | |
| Current: LINK-UP GRO Authorized | | | | | | | | |
| Driver Info: Port Type: WIFI-STA Parent: wiphy1 wiphy1 | | | | | | | | |
| | Port Configurables | | | | | | | |
| Standard Configuratio | Advanced C | onfiguration Misc | Configuration C | Corruptions Custom WiFi | | | | |
| Enable — | | General In | terface Settings | | | | | |
| Set MAC | Down | Aux-Mgt | g- | | | | | |
| Set TX Q Len | DHCP-IPv6 | DHCP Release | DHCP Vendor ID: | None | | | | |
| Set MTU | | Secondary-IPs | DHCP Client ID: | None | | | | |
| Set Offload | DNS Servers: | 8.8.8.8 | Peer IP: | NA | | | | |
| Set PROMISC | IP Address: | 0.0.0.0 | Global IPv6: | AUTO | | | | |
| Services— | IP Mask: | 0.0.0.0 | Link IPv6: | AUTO | | | | |
| HTTP | Gateway IP: | 0.0.0.0 | IPv6 GW: | AUTO | | | | |
| FTP | Alias: | | MTU: | 1500 | | | | |
| RADIUS | MAC Addr: | 04:f0:21:1f:ca:f3 | TX Q Len | 1000 | | | | |
| | Rpt Timer: | faster (1 s) 🔻 | WiFi Bridge: | NONE | | | | |
| | | WiF | i Settings | | | | | |
| TS0 Enabled | SSID: jw | 3-0 | AP: DEF | AULT | | | | |
| UFO Enabled | Key/Phrase: | | Mode: (Aut | :0) 🔻 | | | | |
| GS0 Enabled | Freq/Channel: 5 | 180/36 | Rate: OS D | Default 💌 | | | | |
| LRO Enabled | WPA WPA | 2 🗌 WPA3 🔲 OSEN | I 🔲 WEP | | | | | |
| GRO Enabled | Disable HT4 | 0 🔲 Enable VHT160 | Disable SGI | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Print Display | <u>P</u> robe | Display Sca <u>n</u> | ync <u>A</u> p | ply <u>O</u> K <u>C</u> ance | ! | | | |

D. 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.



E. When the first comparison run is complete, a popup window will be shown, and the **Paused** checkbox will be selected. Select new BSSID by reconfiguring the station with a new BSSID, and when the reconfiguration is complete, un-select the Paused checkbox on the Dataplane test to do the next comparison run. Continue to run new comparisons in this manner until the full test is complete. When complete, unselect the **Another Iteration**, and then unselect 'Paused* to have the test complete:

| Dataplane Test 📀 | | | | | | | | |
|--|--|---------------------------------|---------------|---------------|--|--|--|--|
| Settings Report Co | nfiguration | | | | | | | |
| Selected DUT: | jw3 🗣 | Duration: | 15 sec (15 s) | - | | | | |
| Selected WiFi Port: | 1.1.6 sta0000 | Upstream Port: | 1.1.1 eth1 | - | | | | |
| Path Loss: | 10 | Rate: | 85% | - | | | | |
| Channels | Mode | PDU Size | | | | | | |
| AUTO No-Change | Auto 4 802.11a 4 802.11b 802.11g 802.11g 802.11abg 4 | 64 128 256 512 1024 | | | | | | |
| Spatial Streams | Security | Bandwidth | | | | | | |
| AUTO | AUTO Open WEP WPA WPA2 | AUTO 20 40 80 160 | | | | | | |
| Traffic Type UDP TCP Direction DUT Transmit DUT Receive | Attenuator: | | | | | | | |
| Stop | Another Itera | ation 🔽 Pa | use | <u>C</u> lose | | | | |

F. This is the pause message, it is just informational and you can close it after it pops up.



G. 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 Dataplane Comparison Report

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