

LANforge WiFi Attenuation vs PDU Size Test

Goal: Compare WiFi performance for 'download' traffic (AP to Client) as Payload Size and RF Attenuation levels change using a WiFi access point, a LANforge Attenuator and a LANforge Virtual Station. Traffic is generated by a RFC-2544 script on a Layer-3 UDP connection.

This demo consists of one WiFi access point and one CT523 LANforge WiFIRE machine connected to the LANforge Attenuator with coar SMA cables. (This i

Attenuator with coax SMA cables. (This is **not** over the air testing).



- 1. Create Layer-3 Cross Connect
 - A. Go to the Layer 3 tab

| | | LANforge Manager | Version(5.3.3 |) | \odot \sim \otimes |
|---|------------------------------------|--------------------|-----------------|-------------------------|----------------------------------|
| <u>Control</u> <u>Reporting</u> <u>Tear</u> | r-Off <u>I</u> nfo <u>P</u> lugins | | | | |
| | | St | op All R | estart Manager | Refresh HELP |
| File-IO Laver-4 G | eneric Test Mar | Test Group Resou | rce Mar Event | Log Alerts Port M | |
| Status Layer-3 | L3 Endps VoIP/ | RTP VoIP/RTP Endps | Armageddon | WanLinks Atten | nuators Collision-Domains |
| Rpt Timer: defau | ılt (5 s) 🔻 Go | Test Manager all | ▼ S | elect All Start St | top Quiesce Clear |
| View 0 - 20 | 00 | ▼ Go | | Display Cr <u>e</u> ate | Modify Delete |
| | | | Selected Test M | anager | |
| Name | Type State | Pkt Rx A Pkt Rx B | Bps Rx A | Bps Rx B Rx D | Drop % A Rx Drop % B Drop Pkts A |
| | | | | | |
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| | | | | | |
| | | | | | |
| A. Click Create | | | | | |

B. Create a cross connect with these settings:

| atten-vs-pdu - Create/Modify Cross Connect | | | | | | | | | | |
|---|---|---|-----------------|---|--|--|--|--|--|--|
| + - All Display Sync Batch-Create Apply OK | | | | | | | | | | |
| CX Name: CX Type: | Cross-Connect X Name: atten-vs-pdu X Type: LANforge / UDP | | | | | | | | | |
| | Endpoint A | | Endpoint B | _ | | | | | | |
| Resource: | 1 (dmz-lf-2u-1) | • | 1 (dmz-lf-2u-1) | - | | | | | | |
| Port: | 2 (eth2) | • | 11 (wlan0) | - | | | | | | |
| Min Tx Rate: | 900000000 (900 Mbps) | - | Zero (0 bps) | - | | | | | | |
| Max Tx Rate: | Same | - | Same | - | | | | | | |
| Min PDU Size: | Αυτο | • | AUTO | - | | | | | | |
| Max PDU Size: | Same | - | Same | - | | | | | | |
| IP ToS: | Best Effort (0) | • | Best Effort (0) | - | | | | | | |
| Pkts To Send: | Infinite | • | Infinite | - | | | | | | |
| | | | | | | | | | | |

- A. Make sure Endpoint A is eth2 or the wired port to the AP
- B. Make sure Endpoint B is **wlan0** or the station associated with the AP
- C. Min PDU Size for both should be AUTO
- D. NOTE: These rate and PDU size settings will be manipulated by the script we setup later.
- C. Verify that the connection is operational before adding a script.

2. Configure Scripting for Cross Connect

- A. On the Layer-3 tab, click Modify
- B. In the Level 2 box, click Endpoint A Script button

| atten-vs-pdu - Create/Modify Cross Connect | | | | | | | | | |
|---|---|---|-------------------|--|---------------|-----------------------------|---|------------|-------|
| + - All Display Sync Batch-Create Apply OK | | | | | | | | | ancel |
| CX Name: CX Type: | Cross-Connect atten-vs-pdu LANforge / UDP | | | | Report Timer: | Cross-Connect fast (1 s) | • | | |
| | Endpoint A | | Endpoint B | | Pld Pattern | increasing | - | increasing | - |
| Resource: | 1 (dmz-lf-2u-1) | - | 1 (dmz-lf-2u-1) 💌 | | Min IP Port: | Αυτο | - | AUTO | - |
| Port: | 2 (eth2) | - | 11 (wlan0) 🔻 | | Max IP Port: | Same | • | Same | - |
| Min Tx Rate: | 900000000 (900 Mbps) | - | Zero (0 bps) 💌 | | Min Duration: | Forever | - | Forever | - |
| Max Tx Rate: | Same | - | Same 💌 | | Max Duration: | Same | - | Same | - |
| Min PDU Size: | AUTO | - | AUTO 👻 | | Min Reconn: | 0 (0 ms) | • | 0 (0 ms) | - |
| Max PDU Size: | Same | - | Same 💌 | | Max Beconn: | Same | - | Same | - |
| IP ToS: | Best Effort (0) | - | Best Effort (0) 💌 | | Multi-Conn: | Normal (0) | - | Normal (0) | - |
| Pkts To Send: | Infinite | • | Infinite 💌 | | | Script | | Script | |
| | | | | | | Thresholds | | Thresholds | |
| | | | | | | | | | |
| - | | | | | | | | | |

C. The Cross Connect Script window displays with Script Type: NONE

| • | | Add/Modif | y Script | | | | ∧ × | | | |
|----------------------|---|------------------|------------------|-------------------|--------------|--------|-----|--|--|--|
| Endpoint Name: | atten-vs-pdu-A | Script Type: | NONE | - | | | | | | |
| Script Name: | my-script | Group Action | ı: All | - | | | | | | |
| 🗷 Enable Script | Show Reports | 🗌 Symmetric 🗌 Lo | op 🗌 Hide Iterat | ion Details 🛛 🗌 H | lide Legend | 🗌 Hide | CSV | | | |
| Loop Count | Forever | Script Iterat | ons: NA | E | stimated Dur | ation: | NA | | | |
| Script Configuration | | | | | | | | | | |
| | Show Previous Report Sync Apply OK Cancel | | | | | | | | | |

D. Select Script Type: RFC-2544 and default values appear:

| 0 | | Add/Modi | fy Script | \odot \otimes \otimes |
|----------------------------|----------------------------|--------------|-------------------------------------|---------------------------------------|
| Endpoint Name: atten-vs-p | du-A 💌 Script | Туре: | RFC-2544 💌 | |
| Script Name: my-script | Group | Action: | All | |
| 🗹 Enable Script 🛛 🗹 Show I | Reports 🗌 Symme | tric 🗌 Loo | p 🗌 Hide Iteration Det | ails 🗌 Hide Legend 🗌 Hide CSV |
| Loop Count Forever | Script | Iterations: | 27 (27) | Estimated Duration: 15.75 m (15.75 m) |
| | | Script C | onfiguration | 1 |
| Show Dups Show 🤇 | 000 🗌 Show Atte | enuation | Hide Latency Distribu | tions 🗌 Hide Constraints |
| Run Duration: | 30 s (30 s) | | Pause Duration: | 5 s (5 s) 🗸 |
| Max Drop Percent: | 5% (5%) | | ▼ Max-Tx-Underrun: | 10% (10%) |
| Max Jitter: | high (100 ms) | | Max RT Latency: | 500ms (500 ms) 💌 |
| Max Failed OK: | 0 | | • | |
| Rates A | Rates B | Paylo | ad Sizes A Paylo | ad Sizes B—Attenuations (ddB)— |
| bps bj 10Mbps 10 | ps DMbps | 60 128 | 60 128 | NONE |
| 100Mbps 10 1Gbps 10 | 00Mbps Gbps | 256 512 | 256 512 | 100 |
| | | 1024 1280 | 1024 | 300 400 |
| | | 1460 1472 | 1460 | 600 800 |
| | | 1514 | 1514 | 955 |
| | | | | |
| | | | | |
| Show Pr | evious Report | Sync | Apply | OK Cancel |

A. Select **Show Attenuation**. This displays attenuation levels in the report.

B. Run Duration: 30 sec. This is how long each iteration will run.

C. Pause Duration: 5 sec. We give it some time to transition.

E. Setup Pass/Fail Criteria and Iteration Steps for the script. For each Attenuation Level, the script will step through each PDU size at the desired rate. If there were multiple rates then for each Attenuation Level, the script would step through each PDU size for each rate.

| • | | | Add/Mod | lify | Script | \odot \sim \otimes |
|-----------------|-------------|-----------|----------------------------------|--------|--|---|
| Endpoint Name: | atten-vs-pd | u-A | Script Type: | | RFC-2544 💌 | |
| Script Name: | my-script | | Group Action: | | All 👻 | |
| 🗷 Enable Script | Show Re | ports 📃 | Symmetric 🗌 Lo | оор | Hide Iteration Details | Hide Legend 🗌 Hide CSV |
| Loop Count | Forever | | Script Iteratio | ns: | 84 (84) Es | timated Duration: 49 m (49 m) |
| | | | Script | Con | figuration | 1 |
| Show Dups | Show OO | 0 🗹 Sho | ow Attenuation | | Hide Latency Distributions | Hide Constraints |
| Run Duration: | | 30 s (| 30 s) | - | Pause Duration: | 5 s (5 s) 💌 |
| Max Drop Perce | nt: | 20% (20%) | | - | Max-Tx-Underrun: | 10% (10%) |
| Max Jitter: | | 200ms (20 | Oms) | - | Max RT Latency: | 1000ms (1 s) 💌 |
| Max Failed OK: | | 0 | | - | | |
| Rates A | 900M | Rates I | B Payl 64, 512, 1 | 024, 1 | Sizes A Payload Size 64, 512, 1024, 1472 64, 512, 1024, 1472 | Attenuations (ddB) – 1.1.35 ▼ 0+50955 |
| | Show Previ | ous Repor | rt Sync | | Арріу ОК | Cancel |

- A. Max Drop Percent 20%
- B. Max Jitter 200ms
- C. Max RT Latency 1000ms
- D. Rates A: 900Mbps. This sets the client download target rate.
- E. Pld A: 64,512,1024,1472
- F. Attenuator Resource: 1.1.35. You can find your attenuator resources in the Attenuator tab.
- G. Attenuation: 0..+50..955. This is shorthand for: Begin at zero dB attenuation, increase in 5.0dB steps, until 955 dB of attenuation. Individual dB steps could also be specified.
- H. Click OK
- F. On the Create/Modify Cross Connect window, click OK
- 3. Save Data to be able to view past results.

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| HELP |
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| i-Domains |
| lear |
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| |
| Drop Pkts A |
| 0 |
| |
| |
| |

- A. Go to Reporting Menu and select Reporting Manager
- B. Select the GUI Data Collection tab

C. Choose a directory and select Save

| Reporting Manager | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|
| Overview Generate Report Server Data Collection GUI Data Collection | | | | | | | | | | |
| GUI Data Collection Dir: /home/lanforge/attenuation_vs_pdu Choose Directory | | | | | | | | | | |
| Report Data Frequency: Best Precision | | | | | | | | | | |
| Collection Status: NOT saving reporting data. Save Stopped | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| Close | | | | | | | | | | |

- 4. Run the Cross Connect and Generate a Report
 - A. On the Layer-3 tab, click Start, and the Script Report window will appear.

| · · · · · · · | \odot |
|--|---------|
| Script on: atten-vs-pdu-A Script: Script2544 Name: my-script Flags: ACTIVE SHOW_REPORT SHOW_ATTENUATION RUN_ON_MGR Group-Action: ALL Loop-Count: 0 Max-Iterations: 84 Run-Duration: 30000ms Pause-Duration: 5000ms Rates-A: bps, 900000000 Payload-Sizes-A: 64,512,1024,1472 Rates-B: bps, 900000000 Payload-Sizes-A: 64,512,1024,1472 Rates-B: bps, 900000000 Payload-Sizes-B: 64,512,1024,1472 Attenuator: 1.1.35 Attenuations: 0+50955 Constraints: 200000,200000,1000000, 0 Steps-Completed: 0 Steps-Failed: 0 Estimated total script duration: 2940 seconds Started At: Wed Nov 18 16:43:26 2015 # iteration: 0/84 Endpoint: atten-vs-pdu-A now: 1447893846994ms duration: 30000ms paused: 5000ms # payload-Size: 64 cfg-rate: 900000000 | |
| <pre>tx-bps: 178213748 tx-bps-low-level: 293367876 trx-pts: 0 rx-bytes: 0 machine-load: 1.50 # rx-pts: 26136017 rx-bytes: 98010064 rx-pps: 51121 rx-pps-ll: 51121 # rx-bps: 26136017 rx-bytes: 98010064 rx-pps: 212000 avg-rt-latency(us): 24000 peer-machine-load: 1.50 # rx-signal: -4 tx-link-speed: 234000000 rx-link-speed: 234000000 rx-link-speed: 234000000 # peer-dropped: 0 peer drop percent: 0.0000 # * Failed transmit-percent constraint, reported: 19.8015% min: 90 # * Failed drop-percent constraint, reported: 85.3385% max: 20 </pre> | |

B. View the Dynamic Report

- A. While the script is running, you can view the real-time results of the running script.
- B. Right-Click on **wlan0** and select Dynamic Report
- C. Setup the Dynamic Report to view the data you are interested in.
- D. wlan0: RX Signal level shown on Axis-B and RX bps shown on Axis-A



E. To view Dynamic Report data after the test completes:

- F. Set the Reporting Manager, Generate Report to the directory containing saved data.
- G. Adjust the time scale and Load the data in the Dynamic Report window.

- C. View the graphical results of the script when it completes.
 - A. In the Script Report window, click on Graphical Display and a window with the graphical report will display
 - B. Scroll to the top of the window to view the graphs. Examples are shown below.
 - C. Attenuation v. RX signal, endpoint A



D. 3D graph of Peer RX Bps



E. Click on **Save File** and your browser will appear the the HTML copy of the report. See also: Full Report Raw Report Text

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