

## **Displaying Sequence Gaps**

**Goal**: Generate and show sequence gaps (time between packets) by running traffic through a WanLink with an intermittent latency spike.

Tracking sequence gaps can be useful in the following scenarios:

- Roaming with and without 802.11r.
- OSPF failovers.
- Cellular to WiFi handoff.

In this test scenario, LANforge will be set up to generate sequence gaps. Then the sequence gaps will be shown via the layer-3 display window.

Four physical ports will be used, two to generate traffic and two for the WanLink endpoints. This test uses a LANforge CT922 system.

LANforge will be generating UDP traffic at 1 Mbps through a WanLink that is scripted to apply one second of latency every ten seconds. The one second latency should create a one second sequence gap. The packet size will be smaller to increase the rate of traffic and thus decreasing sequence gaps, this will make any larger sequence gaps more apparent.

- 1. Set IPs on traffic generating ports, **eth0** and **eth3** in this case.
  - A. In the **Port Manager** tab modify **eth0**.

eth0 (brent-6port) Configure Settings							
Cu Dr	Port Status Information Current: LINK-UP 1000bt-FD AUTO-NEGOTIATE Flow-Control TSO GSO GRO Driver Info: Port Type: Ethernet Driver: e1000e(3.2.6-k) Bus: 0000:02:00.0 Cur: 2.5GT/s x1 Max: 2.5GT/s x1						
	Port Configurables						
Enable		General In	terface Settings		Port Rates	Advert Rates —	
Set MAC	Down	Aux-Mgt	DHCP Vendor ID:	None	<ul> <li>✓ 1001-FD</li> <li>○ 100bt-HD</li> <li>○ 100bt-FD</li> <li>○ 100bt-FD</li> <li>○ 100bt-FD</li> </ul>	<ul><li>✓ 10bt-FD</li><li>✓ 100bt-HD</li></ul>	
Set MTU	DHCP-IPv4	Secondary-IPs BLANK	DHCP Client ID: Peer IP:	None ·	<ul> <li>O 10G-FD</li> <li>O 40G-FD</li> <li>O Autonegotiate</li> </ul>	<ul> <li>✓ 100bt-FD</li> <li>✓ 1000-FD</li> </ul>	
Set PROMISC	IP Address: IP Mask:	0.0.0.0	Global IPv6: Link IPv6:	AUTO AUTO	Renegotiate	40G-FD	
Set Bypass	Gateway IP: Alias:	0.0.0.0	IPv6 GW: MTU:	AUTO 1500		Offload	
Set CPU Mask	MAC Addr: Br Cost:	00:90:0b:38:82:70	TX Q Len Priority:	1000 Ignore	RX-FCS	UFO Enabled	
HTTP FTP	Rpt Timer: CPU Mask:	medium (8 s) 🔻	Watchdog: WiFi Bridge:	NONE	Bypass Power-UP	LRO Enabled	
RADIUS					Bypass Disconnect		
	Print Vi	ew Details	Probe Sync	Apply	OK Cancel		

A. Set the **IP Address**.

B. In the **Port Manager** tab modify **eth3**.

Enable Set IF Down Set MAC Down Set TX Q Len DHCPJ	General In	Port Configur	rables		
Enable Set IF Down Set MAC Down Set TX Q Len DHCPJ	General In	terface Settings			
Set TX Q Len	Aux-Mgt	Ĩ		Port Rates	Advert Rates
Set MTU	Pv6 DHCP Release	DHCP Vendor ID: DHCP Client ID:	None	0 100bt-FD 0 100bt-FD 0 1000-FD 0 10G-FD	<ul> <li>✓ 100bt-HD</li> <li>✓ 100bt-FD</li> </ul>
Set Offload DNS Serve	rs: BLANK : 10.0.0.2/24	Peer IP: Global IPv6:	NA AUTO	Autonegotiate	✓ 1000-FD ☐ 10G-FD
Set PROMISC IP Mask: Set Rx-All/FCS Gateway II	0.0.0.0 0.0.0.0	Link IPv6:	AUTO AUTO	Restart Xcvr	Flow-Contro
Set Bridge Info Set CPU Mask	00:90:0b:38:82:73	MTU: TX Q Len	1500 1000	RX-ALL	Offload TSO Enable
	Ignore version	Priority: Watchdog:	Ignore v	Bypass NOW!	GSO Enable
FTP CPU Mask	NO-SET	WiFi Bridge:	NONE	Bypass Power-DOWN	GRO Enable

A. Set the **IP Address**.

- 2. Create a WanLink.
  - A. In Netsmith, right click an open area and click New Connection.

<u></u>	🖆 Create/Modify Connection 🛛				
		Interface-Cost:	1		
Port 1-A:	2 (eth1)	RIP-Metric:	1		
Port 1-B: 🗹 Skip	<auto create="" new="" port=""> 🔻</auto>	OSPF Area: VRRP IP:	0.0.000.000.000		
WanLink: 🔲 Skip	<auto create="" new="" wanlink=""> 💌</auto>	VRRP ID:	1		
Port 2-B: Skip	<auto create="" new="" port=""> 👻</auto>	VRRP Priority:	100		
	2 (oth2)	VRRP Interval:	1		
Port 2-A: Skip	s (ethz)	Next-Hop:			
DHCP Lease Time:	43200	Subnets (a.b.c.d/xx):			
DHCP DNS:					
DHCP Range Min:					
DHCP Range Max:					
DHCP Domain:	example.com				
DHCPv6 DNS:	0::0	Next-Hop-IPv6:			
DHCPv6 Range Min:	0::0	IPv6 Subnets (aaa::0/xx):			
DHCPv6 Range Max:					
DHCPd Config File:					
NAT DHCP	DHCPv6 Custom DHC	Cancel	1		

- A. Select the Skip checkboxes on **Port 1-B** and **Port 2-B**.
- B. Set Port 1-A to eth1.
- c. Set Port 2-A to eth2.
- D. Click **OK**.
- E. Click **Apply** in Netsmith.

- 3. Configure the WanLink.
  - A. In the **WanLinks** tab, modify the WanLink.

4	VRWL-1.1.000 - Create/Modify WanLink				
+ - All				Apply OK Display Want	Link & WanPaths Cancel
Name: Presets:	WanLink Information VRWL-1.1.000 CUSTOM		2	WanLink Information Pass-Through Coupled-Mode	] HW Pass-Through
	Endpoint A Endpoint B		Resource:	1 (brent-6port)	· · · · · · · · · · · · · · · · · · ·
Port:	3 (eth2)	▼ 2 (eth1) ▼	Rpt Timer:	default (5 s)	
Transfer Rate:	10M (10 Mbps)	▼ 10M (10 Mbps) ▼		Endpoint A En	Idpoint B
Delay:	zero (O us)	v zero (O us) v	Reorder-Fre	q: zero (0%) 🔽 ze	ero (0%)
Drop-Freq:	zero (0%)	▼ zero (0%) ▼	Dup-Freq:	zero (0%) 💌 ze	ero (0%) 🔻
Jitter:	zero (O us)	v zero (O us) v	Drop Burst:	min 1 max 1 min	1 max 1
Jitter-Freq:	zero (O%)	▼ zero (0%) ▼	Reorder Amt	; min 1 max 20 min	1 max 20
				Script	Script
8	Endpoint A	WAN Paths		Endpoint B WAN Pa	aths
Name 1	te-WP Modif	Filter Pattern	Cr Delay Name	Tx Bate Disabled I Fil	Delete-WP
CPU-ID:	WanLink Information	1_1	Test Manager:	WanLink Information	
		• • • • • • •		Gerauit_tin	
	Endpoint A	Endpoint B		Dump Packets	np Packets
Replay File:			Dump File:		
	Dir	Dir		Force Packet Gap	e Packet Gap
	🗹 Loop Replay	Loop Replay		Drop-Xth Drop	o-Xth Inder-Xth ▼

- A. Set the Transfer Rate to  $\mathbf{10Mbps}$  for  $\mathbf{both}$  endpoints.
- B. Click the **Script** button on **Endpoint A**.

\$	Add/Modify Script 📃 🗆 🗙
Endpoint Name:	VRWL-1.1.000-A Script Type: ScriptWL
Script Name:	my-script Group Action: All
🗹 Enable Script	t 🗹 Show Reports 🗌 Symmetric 🗹 Loop 🗌 Hide Iteration Details 🗌 Hide Legend 📄 Hide CSV
Loop Count	Forever Script Iterations: 10(0) Estimated Duration: 10 s (0 ms)
	Script Configuration
	Run Duration: 1 s (1 s)
	10Mbps
	Rates
	0,0,0,0,0,0,0,0,1000
	Latencies:
	Jitter:
	0
	Drops:
	Show Previous Report Sync Apply OK Cancel

- A. Set the **Script Type** to **ScriptWL**.
- B. Click the **Loop** checkbox.
- c. Run Duration = 1s
- D. Rates = 10Mbps
- E. Latencies = 0,0,0,0,0,0,0,0,0,1000
- F. **Jitter = 0**
- G. **Drops = 0**
- H. Click OK.
- C. Click **OK** to close the WanLink modify window.

4. Create a Layer 3 connection.

A. In the Layer-3 tab, Click Create.

<u>\$</u>			udp-1m - Create/M	Aodify Cross Connec	t			
+ - All				Display	Sync Batch-Crea	ite	Apply OK	Cance
CX Name: CX Type:	Cross-Connect Judp-1m			Report Timer:	Cross-Connect fast (1 s)			•
Resource: Port: Min Tx Rate: Max Tx Rate: Min PDU Size: Max PDU Size: IP ToS: Pkts To Send:	Endpoint A 1 (brent-Gport) 1 (eth0) 1m Same Tiny (64 B) Same Best Effort (0) Infinite	* * * * *	Endpoint B 1 (brent-6port) 4 (eth3) 1m Same Tiny (64 B) Same Best Effort (0) Infinite	Pld Pattern Min IP Port: Max IP Port: Min Duration: Max Duration: Min Reconn: Max Reconn: Multi-Conn:	Endpoint A increasing AUTO Same Forever Same 0 (0 ms) Same Normal (0) Script	▼ ▼ ▼ ▼ ▼ ▼	Endpoint B Increasing AUTO Same Forever Same 0 (0 ms) Same Normal (0) Theorematic	
Test Manager Quiesce: IP Addr: Filename:	Cross-Connect default_tm  3 (3 sec)  Endpoint A Endpoint B AUTO AUTO AUTO Replay File Loop Dest Mac Dest Mac		Sind Buff Size: Rcv Buff Size: Send Bad FCS: Src MAC: Proxy Addr: Proxy Port: Socket Priority:	Endpoint A OS Default OS Default Zero (0%) 00:00:00:00:00 Use-Proxy 0.0.0.0 0	<ul> <li>▼</li> <li>▼</li> <li>▼</li> <li>▼</li> </ul>	Endpoint B OS Default OS Default zero (0%) 00:00:00:00:00:00 Use-Proxy 0.0.0.0 0 0		

- A. CX Name = udp-1m
- B. Report Timer = 1s
- c. Endpoint A Port = eth0
- D. Endpoint B Port = eth3
- E. Endpoint A and B = 1m
- F. Endpoint A and B Min PDU Size = 64 B
- G. Click **OK**.
- 5. Create a test group to start the layer 3 connection and WanLink at the same time.

A. In the **Test Group** tab, click **Create**.

🖆 Crea	te/Modify Test Group	
Test Group Name: tg	Script	🗌 Config As Totals
	Cross Connects (CX)	1
Registered CXs VRWL-1.1.000 udp-1m	← Add Cx Free Cx →	Free CXs
Арр	ly OK Cance	21

- A. Test Group Name = tg
- $\ensuremath{\text{B.}}$  Select the WanLink and Layer 3 connection on the right and click  $\ensuremath{\text{Add}}\xspace{\ensuremath{\text{Cx}}}$  .
- C. Click **OK**.
- 6. Start the test group. This will start both the layer 3 connection and the scripted WanLink.
  - A. In the **Test Group** tab, select **tg** and click **Start**. You will see the Script Report window appear.

🖆 LANforge Manager Version(5.3.4)	- • ×				
<u>C</u> ontrol <u>R</u> eporting <u>T</u> ear-Off <u>Info</u> <u>P</u> lugins					
Stop All Restart Manager Refresh	HELP				
Layer-4         Generic         Test Mgr         Test Group         Resource Mgr         Event Log         Alerts         Port Mgr         VAP Stations         Messages           Status         Layer-3         L3 Endps         VolP/RTP         VolP/RTP         Armageddon         WanLinks         Attenuators	File-I0				
Rpt Timer:     default (5 s)     Go     Select All     Start     Stop     Quiesce     Clear       Display     Create     Modify     Delete					
LANTORGE LESS Groups					
ta Dinge VRWL11000 udp.1m					
Logged in to: brent-6port:4002 as: Admin	Logged in to: brent-6port:4002 as: Admin				

7. Display the Layer 3 connection and analyze the Rx Gap (sequence gap).

A. In the Layer-3 tab, select  ${\bf udp-1m}$  and click  ${\bf Display}.$ 

🙆	Cross Connect: udp-1m	n Manager: brent-6port	
Endpoint: udp	-1m-A	Endpoint: udp-1m-8	
Port Endpoint	1: 157746 RT-Lat 1: 159828 1W-Lat	Port Endpoint 1: 170266 RT-Lat 1: 193720 7 2: 1768 Auro 2: 135	1W-Lat
Resource: brent-6port EID: 1.1.1.33	4:58 AVG:0 4:75 AVG:0 Pa	ackets: Resource: brent-6port EID: 1.1.4.34 8:29 01004 8:0	4vg:0 068
Port: eth0 Min TX: 1 Mbps	32: 285 32: 285 10	92585 Port: eth3 Min TX: 1 Mbps 32: 0 32: 0	
IP: 10.0.0.1 Max TX: 1 Mbps	128:50 128:57 256:0 256:0	IP: 10.0.0.2 Max TX: 1 Mbps 128:22 128:2 256:0 256:0	
bps TX: 1.717 Mbps RX Rate: 999.976 Kbps	512: 0 1024: 17687   2^20 1024: 17687   2^20	bps TX: 1.719 Mbps RX Rate: 1 Mbps 512: 0 512: 0 512: 0 1024: 17651 2 2 2 0 1024: 0	2^20
Pps Tx: 1951 RX Pkts: 176716	2048: 0 -2^15 2048: 0 -2^15 Dr	ropped: Pps Tx: 1953 RX Pkts: 192585 2048: 0 -2^15 2048: 0	-2^15
bps RX: 1.562 Mbps RX Drop: 16416	-1024 -1024 0	bps RX: 1.719 Mbps RX Drop: 0 -1024	-1024
Pps RX: 1774 TX Pkts: 193136		Pps RX: 1953 TX Pkts: 192582 -32	-32
Errors: 0 Type: LF/UDP	1819: 7 Drops 1: 124890 Rx Gap	Errors: 0 Type: LF/UDP 1:0 Drops 1:149164 F	Rx Gap
6 537 Kpp 26 pp 6 pp 25 pp 25 pp 25 pp 25 pp 25 pp 26 pp 11 10 pp 12 01 pp 12 0 p	1100         Avg1924         2 2752         Avg0           11200         1100.00         1100.00         0.262103           1180         1100.00         120.00         0.262103           1180         1100.00         120.00         120.00           1180         120.00         120.00         120.00           1180         120.00         120.00         120.00           1180         120.00         120.00         120.00           1180         120.00         120.00         120.00           1280.00         22.020         120.00         120.00           1280.00         -2.015         120.00         -2.015           1280.00         -2.015         -320.00         0           100.24         -10.024         -10.024         -32.00           0         0         100.00         0	c65.55 Kpp         20         Avgr0         2         4622           ackets:         -256 pp         16.0         0.0         16.10         20.0           76716         -256 pp         26.0         18.2         18.2         18.2         18.2           76716         -256 pp         16.0         -27.05         22.6         18.2         18.2           76716         -256 pp         16.0         -27.05         22.4         27.20         12.2         18.2           76716         -27.05         -27.05         24.6         -27.05         24.6         18.2           76716         -27.05         -27.05         24.6         -27.05         24.6         27.25         24.6         27.25         24.6         27.25         24.6         27.25         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6         -27.15         24.6	Avg:0 2,20 -2,215 -1024 -32 0
Pause Display	Print Stop Sync	Dynamic Report Modify Clear Close	

B. The **Rx Gap** graph is highlighted in the below screenshot. The Rx Gap for Endpoint B doesn't show one second sequence gaps because that side of the WanLink was not scripted.

1: 134890 2: 42762 4: 73 8: 27 16: 10 32: 0 64: 0 128: 2	Rx Gap Avg:0 026210]
256: 0 512: 0 1024: 9 2048: 0	2^20 -2^15 -1024
<b>h</b>	-32 0

A. The colored numbers on the left side of the colon represent time in milliseconds. The right colored numbers represent the number of times a sequence gap reached the particular time on the left side.

You'll notice that 9 sequence gaps hit 1024ms. These gaps were the result of the WanLink script occasionally sending one second latency.

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