

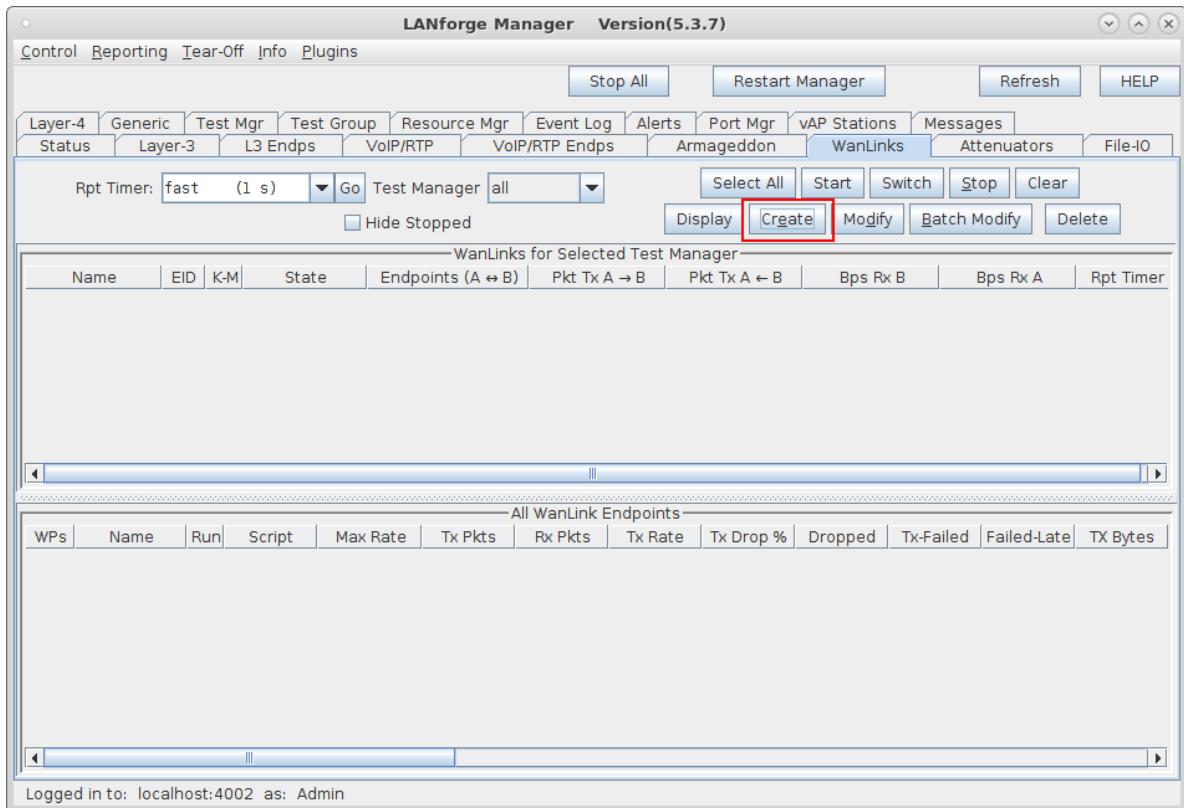
WanPath Corruptions

Goal: Setup a WanLink with WanPath Corruptions.

In this test scenario, LANforge-ICE is used to filter traffic by VLAN on a WanLink with the use of WanPaths and then use WanPath Corruptions to overwrite the DSCP field in the IP packet.

Note: VLAN filtering was recently fixed and should be used with LANforge version 5.3.7 and up.

1. Setup a WanLink connection.
 - A. Go to the **WanLinks** tab and select **Create**.



- B. Enter the WanLink name, physical ports, base transfer rate, delay, jitter etc...
These impairments will be applied to all traffic on the WanLink.

100Mbps-wan - Create/Modify WanLink

+ - All Apply OK Display WanLink & WanPaths Cancel

WanLink Information

Name: 100Mbps-wan

Presets: CUSTOM

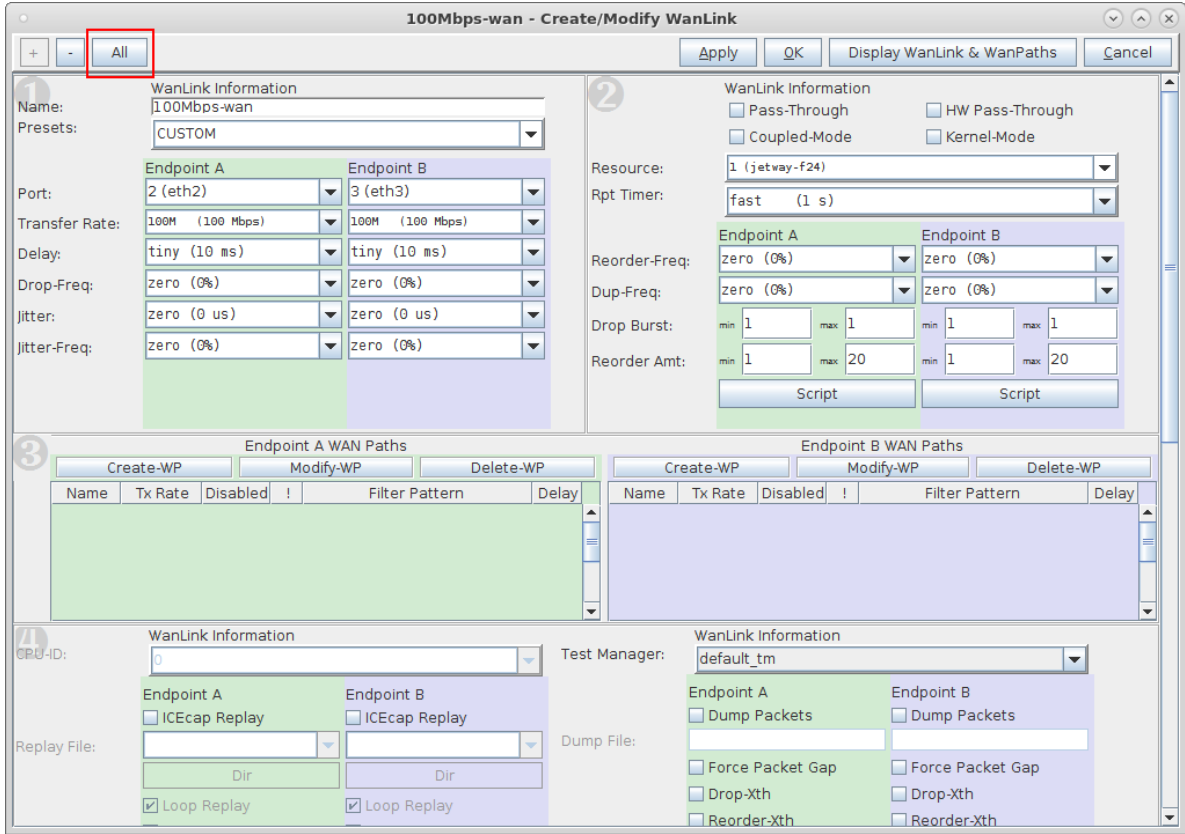
	Endpoint A	Endpoint B
Port:	2 (eth2)	3 (eth3)
Transfer Rate:	100M (100 Mbps)	100M (100 Mbps)
Delay:	tiny (10 ms)	tiny (10 ms)
Drop-Freq:	zero (0%)	zero (0%)
Jitter:	zero (0 us)	zero (0 us)
Jitter-Freq:	zero (0%)	zero (0%)

- C. Select **Apply** to create the base WanLink.

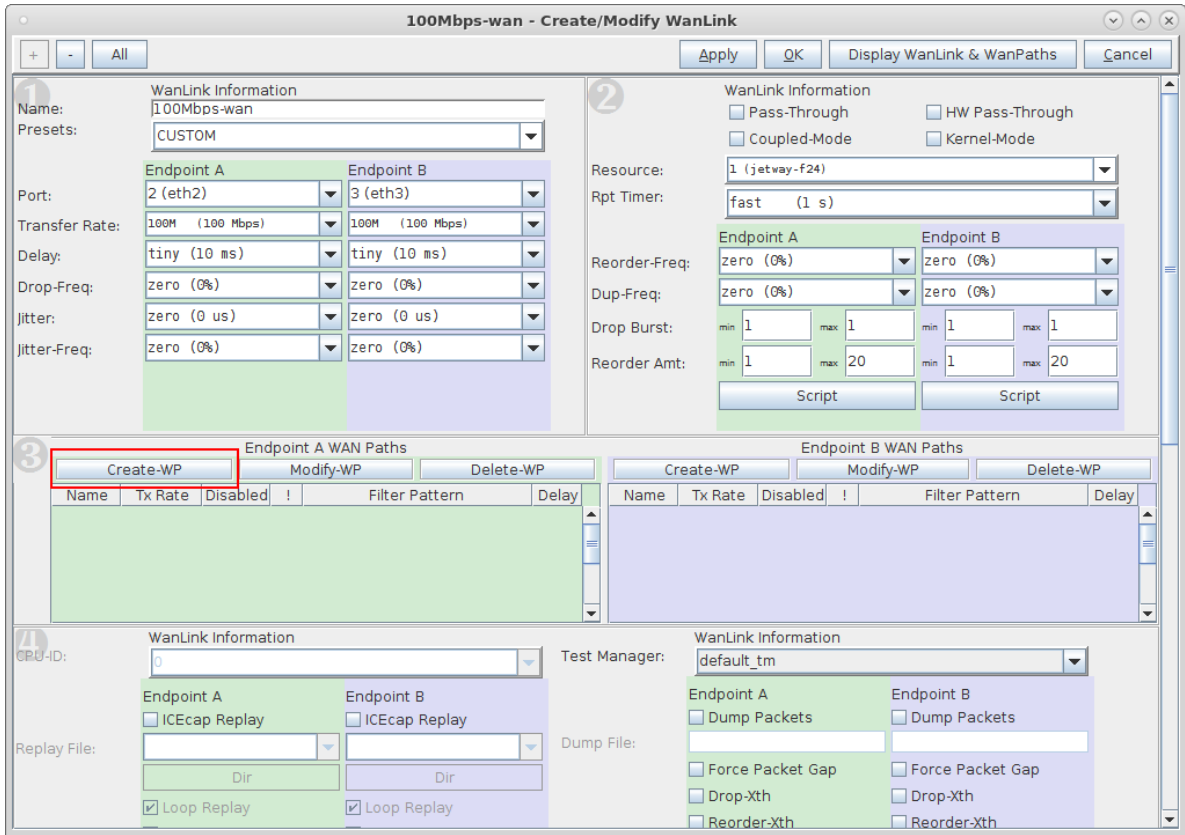
For more information see [LANforge-GUI User Guide: Creating & Modifying WanLinks](#)

2. Setup the WanPaths.

- A. Select **All** to un-hide the other WanLink config panels.



- B. In panel 3, for Endpoint-A WAN Paths, select **Create-WP**.



- C. Enter a Name and Transfer Rate for the WanPath.
Here we are matching the WanLink's transfer rate.

Create/Modify WanPath for Endpoint: 100Mbps-wan-A

Display Clear Counters Apply OK Cancel

Name: wp-a Backlog Buffer: AUTO

PCAP Filter:

Source IP/MAC: 0.0.0.0 Source Mask: 0.0.0.0

Dest IP/MAC: 0.0.0.0 Dest Mask: 0.0.0.0

Transfer Rate: 100M (100 Mbps) Delay: zero (0 us)

Jitter: zero (0 us) Drop-Freq: zero (0%)

Min Drop Burst: 1 Max Drop Burst: 1

Min Reorder Amount: 1 Max Reorder Amount: 20

Reorder-Freq: zero (0%) Dup-Freq: zero (0%)

Jitter-Freq: zero (0%) Test Manager:

ICEcap Replay Replay File: Dir

Disabled Loop Replay Replay Latency Replay Loss

Same As WanLink Replay Dup Replay Bandwidth Use Pcap Filter

Inverse Match Drop-Xth Duplicate-Xth Reorder-Xth

Corruption #0	Corruption #1	Corruption #2
Rate: 0	Rate: 0	Rate: 0
Corruption: Random Write	Corruption: Random Write	Corruption: Random Write
Byte-to-Write: 0	Byte-to-Write: 0	Byte-to-Write: 0
Min Offset: 0	Min Offset: 0	Min Offset: 0
Max Offset: 0	Max Offset: 0	Max Offset: 0
<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum

Corruption #3	Corruption #4	Corruption #5
Rate: 0	Rate: 0	Rate: 0
Corruption: Random Write	Corruption: Random Write	Corruption: Random Write
Byte-to-Write: 0	Byte-to-Write: 0	Byte-to-Write: 0
Min Offset: 0	Min Offset: 0	Min Offset: 0
Max Offset: 0	Max Offset: 0	Max Offset: 0
<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum

D. Select checkbox for **Use Pcap Filter**

The image shows a Windows-style dialog box titled "Create/Modify WanPath for Endpoint: 100Mbps-wan-A". At the top, there are buttons for "Display", "Clear Counters", "Apply", "OK", and "Cancel". The main area contains various configuration fields:

- Name: wp-a
- Backlog Buffer: AUTO
- PCAP Filter: (empty)
- Source IP/MAC: 0.0.0.0
- Source Mask: 0.0.0.0
- Dest IP/MAC: 0.0.0.0
- Dest Mask: 0.0.0.0
- Transfer Rate: 100M (100 Mbps)
- Delay: zero (0 us)
- Jitter: zero (0 us)
- Drop-Freq: zero (0%)
- Min Drop Burst: 1
- Max Drop Burst: 1
- Min Reorder Amount: 1
- Max Reorder Amount: 20
- Reorder-Freq: zero (0%)
- Dup-Freq: zero (0%)
- Jitter-Freq: zero (0%)
- Test Manager: (empty)

Below these fields is the "ICEcap Replay" section with a "Replay File:" field and a "Dir" button. There are several checkboxes for replay options:

- Disabled
- Same As WanLink
- Inverse Match
- Loop Replay
- Replay Dup
- Drop-Xth
- Replay Latency
- Replay Bandwidth
- Duplicate-Xth
- Use Pcap Filter
- Replay Loss
- Reorder-Xth

At the bottom, there are six "Corruption" sections, each with its own "Rate", "Corruption" (set to "Random Write"), "Byte-to-Write", "Min Offset", "Max Offset", and checkboxes for "Chain-to-Next" and "Do Checksum".

- E. Enter the PCAP Filter **vlan 1010** to apply any WanPath impairment or corruptions only to packets with 802.1q vlan id 1010
Expression is based on the tcpdump expression field.

Create/Modify WanPath for Endpoint: 100Mbps-wan-A

Buttons: Display, Clear Counters, Apply, OK, Cancel

Name: wp-a Backlog Buffer: AUTO

PCAP Filter: vlan 1010

Source IP/MAC: 0.0.0.0 Source Mask: 0.0.0.0

Dest IP/MAC: 0.0.0.0 Dest Mask: 0.0.0.0

Transfer Rate: 100M (100 Mbps) Delay: zero (0 us)

Jitter: zero (0 us) Drop-Freq: zero (0%)

Min Drop Burst: 1 Max Drop Burst: 1

Min Reorder Amount: 1 Max Reorder Amount: 20

Reorder-Freq: zero (0%) Dup-Freq: zero (0%)

Jitter-Freq: zero (0%) Test Manager:

ICEcap Replay Replay File: Dir

Disabled Loop Replay Replay Latency Replay Loss

Same As WanLink Replay Dup Replay Bandwidth Use Pcap Filter

Inverse Match Drop-Xth Duplicate-Xth Reorder-Xth

Corruption #0: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

Corruption #1: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

Corruption #2: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

Corruption #3: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

Corruption #4: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

Corruption #5: Rate: 0 Corruption: Random Write Byte-to-Write: 0 Min Offset: 0 Max Offset: 0 Chain-to-Next Do Checksum

- F. Select **Apply** to create the WanPath.

For more information see [Tcpdump man page](#) , [Pcap Filter Syntax](#)

3. Setup the Corruptions.

A. Enter the following values into **Corruption #0** fields

A. Rate **100000**

(how often, per million packets, should the corruption be applied)

B. Corruption **Write Byte**

C. Byte-to-Write **40**

(hex 0x00-0xff or decimal 0-255)

If you enter 0x28 and select OK, the GUI will translate it to decimal 40.

D. Min Offset **19**

E. Max Offset **20**

The Differentiated Services Field is in byte 20 of the ethernet frame which corresponds to the 2nd byte of the IP header.

B. Select checkbox **Do Checksum** which will re-calculate the checksum after making the errors so that the packet is still valid.

The screenshot shows the 'Create/Modify WanPath for Endpoint: 100Mbps-wan-A' dialog box. The dialog has a title bar with standard window controls and buttons for 'Display', 'Clear Counters', 'Apply', 'OK', and 'Cancel'. The main area is divided into several sections:

- Name:** wp-a
- Backlog Buffer:** AUTO
- PCAP Filter:** vlan 1010
- Source IP/MAC:** 0.0.0.0
- Source Mask:** 0.0.0.0
- Dest IP/MAC:** 0.0.0.0
- Dest Mask:** 0.0.0.0
- Transfer Rate:** 100M (100 Mbps)
- Delay:** zero (0 us)
- Jitter:** zero (0 us)
- Drop-Freq:** zero (0%)
- Min Drop Burst:** 1
- Max Drop Burst:** 1
- Min Reorder Amount:** 1
- Max Reorder Amount:** 20
- Reorder-Freq:** zero (0%)
- Dup-Freq:** zero (0%)
- Jitter-Freq:** zero (0%)
- Test Manager:** (empty)

Below these fields are radio buttons for 'ICEscap Replay' (Disabled or Same As WanLink) and checkboxes for 'Loop Replay', 'Replay Latency', 'Replay Loss', 'Replay Dup', 'Replay Bandwidth', 'Use Pcap Filter', 'Inverse Match', 'Drop-Xth', 'Duplicate-Xth', and 'Reorder-Xth'.

The bottom section contains six corruption configuration panels, labeled 'Corruption #0' through 'Corruption #5'. Each panel has fields for 'Rate', 'Corruption', 'Byte-to-Write', 'Min Offset', and 'Max Offset', along with 'Chain-to-Next' and 'Do Checksum' checkboxes. The 'Corruption #0' panel is highlighted with a red box, showing the following values:

- Rate:** 100000
- Corruption:** Write Byte
- Byte-to-Write:** 40
- Min Offset:** 19
- Max Offset:** 20
- Chain-to-Next:** unchecked
- Do Checksum:** checked

C. Select **OK** then create a second WanPath for this WanLink on Endpoint-B using the same values.

Create/Modify WanPath for Endpoint: 100Mbps-wan-B

Buttons: Display, Clear Counters, Apply, OK, Cancel

Name: wp-b Backlog Buffer: AUTO

PCAP Filter: vlan 1010

Source IP/MAC: 0.0.0.0 Source Mask: 0.0.0.0

Dest IP/MAC: 0.0.0.0 Dest Mask: 0.0.0.0

Transfer Rate: 100M (100 Mbps) Delay: zero (0 us)

Jitter: zero (0 us) Drop-Freq: zero (0%)

Min Drop Burst: 1 Max Drop Burst: 1

Min Reorder Amount: 1 Max Reorder Amount: 20

Reorder-Freq: zero (0%) Dup-Freq: zero (0%)

Jitter-Freq: zero (0%) Test Manager:

ICEcap Replay Replay File: Dir

Disabled Loop Replay Replay Latency Replay Loss

Same As WanLink Replay Dup Replay Bandwidth Use Pcap Filter

Inverse Match Drop-Xth Duplicate-Xth Reorder-Xth

Corruption #0	Corruption #1	Corruption #2
Rate: 100000	Rate: 0	Rate: 0
Corruption: Write Byte	Corruption: Random Write	Corruption: Random Write
Byte-to-Write: 40	Byte-to-Write: 0	Byte-to-Write: 0
Min Offset: 19	Min Offset: 0	Min Offset: 0
Max Offset: 20	Max Offset: 0	Max Offset: 0
<input type="checkbox"/> Chain-to-Next <input checked="" type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum

Corruption #3	Corruption #4	Corruption #5
Rate: 0	Rate: 0	Rate: 0
Corruption: Random Write	Corruption: Random Write	Corruption: Random Write
Byte-to-Write: 0	Byte-to-Write: 0	Byte-to-Write: 0
Min Offset: 0	Min Offset: 0	Min Offset: 0
Max Offset: 0	Max Offset: 0	Max Offset: 0
<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum	<input type="checkbox"/> Chain-to-Next <input type="checkbox"/> Do Checksum

D. Verify that the WanPaths on this WanLink are setup correctly, then select **OK** on the *Create/Modify WanLink* window shown here

100Mbps-wan - Create/Modify WanLink

Apply OK Display WanLink & WanPaths Cancel

1 WanLink Information
 Name: 100Mbps-wan
 Presets: CUSTOM

Endpoint A Endpoint B
 Port: 2 (eth2) 3 (eth3)
 Transfer Rate: 100M (100 Mbps) 100M (100 Mbps)
 Delay: tiny (10 ms) tiny (10 ms)
 Drop-Freq: zero (0%) zero (0%)
 Jitter: zero (0 us) zero (0 us)
 Jitter-Freq: zero (0%) zero (0%)

2 WanLink Information
 Pass-Through HW Pass-Through
 Coupled-Mode Kernel-Mode
 Resource: 1 (jetway-f24)
 Rpt Timer: fast (1 s)
 Reorder-Freq: zero (0%) zero (0%)
 Dup-Freq: zero (0%) zero (0%)
 Drop Burst: min 1 max 1 min 1 max 1
 Reorder Amt: min 1 max 20 min 1 max 20
 Script Script

3 Endpoint A WAN Paths Endpoint B WAN Paths

Name	Tx Rate	Disabled	!	Filter Pattern	Delay
wp-a	100 M	<input type="checkbox"/>	<input type="checkbox"/>	Pcap: vlan 1010	0

Name	Tx Rate	Disabled	!	Filter Pattern	Delay
wp-b	100 M	<input type="checkbox"/>	<input type="checkbox"/>	Pcap: vlan 1010	0

4 CBU-ID: 0 Test Manager: default_tm

Replay File: Endpoint A Endpoint B
 ICEcap Replay ICEcap Replay
 Dir Dir
 Loop Replay Loop Replay

Dump File: Endpoint A Endpoint B
 Dump Packets Dump Packets
 Force Packet Gap Force Packet Gap
 Drop-Xth Drop-Xth
 Reorder-Xth Reorder-Xth

For more information see [LANforge-GUI User Guide: Creating & Modifying WanPaths](#)

4. Run traffic through LANforge-ICE ports **eth2** and **eth3**, and capture traffic on eth2.

A. Here we are using LANforge-FIRE on a secondary resource to send a 10Mbps bi-directional UDP flow between 802.1q VLAN endpoints eth2.1010 and eth3.1010 with an IP ToS value of decimal 184 which corresponds to DSCP value decimal 46 or Expedited Forwarding

B. Go to the **Port Mgr** tab and highlight WanLink port eth2, then select the **Sniff Packets** button to bring up Wireshark.

Port	Pha...	Down	IP	SEC	Alias	Parent Dev	RX Bytes	RX Pkts	Pps RX	bps RX	TX Bytes	TX Pkts	Pps
1.1.00			192.168.100.198	0	eth0		5,529,927,...	8,709,413	55	143,334	5,281,552,...	9,617,541	
1.1.01		<input checked="" type="checkbox"/>	0.0.0.0	0	eth1		0	0	0	0	0	0	0
1.1.02		<input checked="" type="checkbox"/>	0.0.0.0	0	eth2		3,482,049,...	2,399,718	0	4	7,757,660,...	4,297,3...	
1.1.03			0.0.0.0	0	eth3		3,482,026,...	2,399,705	0	0	7,757,666,...	4,297,3...	
1.1.04			0.0.0.0	0	eth4		0	0	0	0	12,506	147	
1.1.05			0.0.0.0	0	eth5		0	0	0	0	12,234	147	
1.1.06			0.0.0.0	0	wiphy0		0	0	0	0	0	0	0
1.1.07			0.0.0.0	0	wiphy1		0	0	0	0	0	0	0
1.1.08		<input checked="" type="checkbox"/>	0.0.0.0	0	wlan0	wiphy0	0	0	0	0	0	0	0
1.1.09		<input checked="" type="checkbox"/>	0.0.0.0	0	wlan1	wiphy1	0	0	0	0	0	0	0
1.2.00			192.168.100.103	0	eth0		653,572,601	5,346,946	13	15,109	5,202,101,...	4,863,373	
1.2.01		<input checked="" type="checkbox"/>	0.0.0.0	0	eth1		0	0	0	0	0	0	0
1.2.02			172.16.0.102	0	eth2		3,460,380,...	2,384,176	0	0	3,482,059,...	2,399,880	
1.2.03			172.16.0.103	0	eth3		3,460,386,...	2,384,178	0	0	3,482,036,...	2,399,868	
1.2.04			0.0.0.0	0	eth4		2,394	7	0	0	9,852	138	
1.2.05			0.0.0.0	0	eth5		2,052	6	0	0	9,852	138	
1.2.06			192.168.9.29	0	eth3.1009	eth3	0	0	0	0	9,306	131	
1.2.07			192.168.8.28	0	eth3.1008	eth3	0	0	0	0	9,306	131	
1.2.08			192.168.1.11	0	eth2.1001	eth2	84,760,294	68,374	0	0	85,730,804	68,508	
1.2.09			192.168.9.19	0	eth2.1009	eth2	0	0	0	0	9,236	130	
1.2.10			192.168.5.15	0	eth2.1005	eth2	0	0	0	0	9,236	130	
1.2.11			192.168.7.17	0	eth2.1007	eth2	0	0	0	0	9,306	131	

Logged in to: localhost:4002 as: Admin

- C. The capture will show that periodically the DSCP field gets overwritten per the WanPath corruption logic of writing a decimal value 40 in the IP ToS field which corresponds to a DSCP value of decimal 10 or Assured Forwarding 11.

The screenshot displays the Wireshark interface for a capture file named 'ice_ex12_wanpath_corruption.pcap'. The packet list pane shows a series of packets from LANforge. Packet 150 is highlighted, showing a DSCP value of Assured Forwarding 11. The packet details pane shows the structure of the frame: Ethernet II, 802.1Q Virtual LAN, Internet Protocol Version 4, and User Datagram Protocol. The packet bytes pane shows the raw hex and ASCII data.

No.	Time	Source	Destination	Protocol	Length	Differentiated Services Codepoint	Info
149	0.086121	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 73
150	0.086902	192.168.0.30	192.168.0.20	LANforge	1518	Assured Forwarding 11	Seq: 74
151	0.089134	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 75
152	0.089337	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 76
153	0.089607	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 75
154	0.089652	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 77
155	0.090103	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 76
156	0.090684	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 78
157	0.091129	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 77
158	0.091657	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 79
159	0.092085	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 78
160	0.092601	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 80
161	0.093118	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 79
162	0.093899	192.168.0.30	192.168.0.20	LANforge	1518	Assured Forwarding 11	Seq: 80
163	0.095637	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 81
164	0.095843	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 82
165	0.096231	192.168.0.30	192.168.0.20	LANforge	1518	Expedited Forwarding	Seq: 81
166	0.097373	192.168.0.20	192.168.0.30	LANforge	1518	Expedited Forwarding	Seq: 83

Frame 147: 1518 bytes on wire (12144 bits), 1518 bytes captured (12144 bits) on interface eth0
 Ethernet II, Src: JetwayIn_cc:5b:d3 (00:30:18:cc:5b:d3), Dst: JetwayIn_cc:5b:d2 (00:30:18:cc:5b:d2)
 802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 1010
 Internet Protocol Version 4, Src: 192.168.0.30, Dst: 192.168.0.20
 User Datagram Protocol, Src Port: 33018, Dst Port: 33017
 LANforge Traffic Generator

```

0000 00 30 18 cc 5b d2 00 30 18 cc 5b d3 81 00 03 f2  .0..[.0 ..[.....
0010 08 00 45 b8 05 dc 79 90 40 00 40 11 39 46 c0 a8  ..E...y. @.@.9F..
0020 00 1e c0 a8 00 14 80 fa 80 f9 05 c8 49 fa 00 00  ....I.....
0030 00 00 1a 2b 3c 4d 00 14 00 13 05 9c 00 00 00 00  ..+<M.....
0040 00 48 5a 7a 28 58 11 02 e7 78 00 01 00 00 00 00  .HZz(X...x.....
0050 00 01 00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d  .....
0060 0e 0f 10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d  .....
0070 1e 1f 20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d  .....
  
```

File: "ice_ex12_wanpath_corruption.pcap" 3,038 kB 00:00:01 Packets: 1981 · Displayed: 1981 (100.0%) · Marked: 2 (0.1%) · Profile: Default

For more information see [LANforge-GUI User Guide: Layer-3 Cross-Connects](#)
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