

# Perform an ELAM for MPLS with F3 Line Cards

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## Introduction

This document describes how to perform an ELAM packet capture on Nexus 7000 (linecards F3) using Flanker ASIC for MPLS-labeled packets.

## Prerequisites

ELAM knowledge for Nexus7000 platform.

## Requirements

Cisco recommends knowledge of these topics:

- ELAM on Nexus7000
- Multiprotocol Label Switching (MPLS)

## Components Used

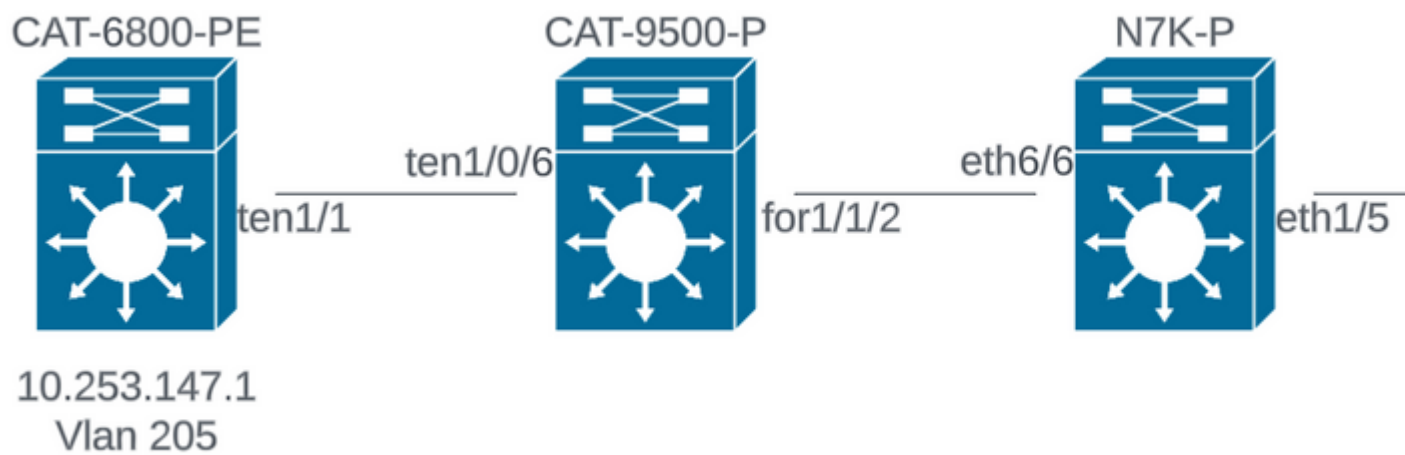
The modules and versions being used:

Hardware: N77-F324FQ-25

Version: 7.3(4)D1(1)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

## Network Diagram

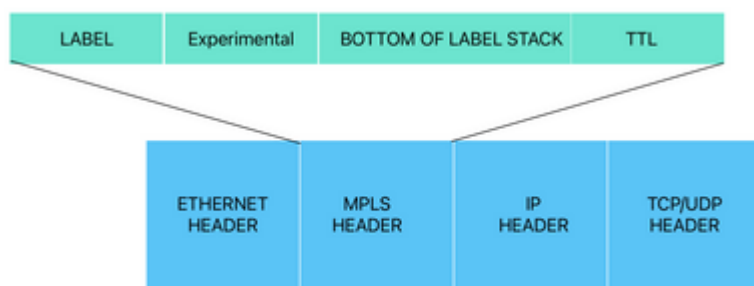


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## Capturing MPLS Frames with Flanker ASIC

### Triggering the ELAM

MPLS header:



To send a ICMP from CAT-6500-PE to N7K-PE, you need to confirm the number of labels the packet is going to have when arriving at the N7K-P. In this case, it has 2, the outer and inner.

From CAT-6500-PE, you know it uses label 19 to send the traffic toward CAT-9500-P.

On the CAT-9500-P, you can confirm which label to use to send the traffic to the N7K-P.

The label from Catalyst in this case is:

<#root>

**CAT-9500-P#show mpls forwarding-table**

| Local Label<br><...> | Outgoing Label | Prefix or Tunnel Id | Bytes Label Switched | Outgoing interface | Next Hop |
|----------------------|----------------|---------------------|----------------------|--------------------|----------|
| <b>19</b>            | <b>44</b>      |                     |                      |                    |          |

|    |                  |                 |         |              |              |
|----|------------------|-----------------|---------|--------------|--------------|
|    | 10.249.200.42/32 | 61446           | Fo1/1/2 | 10.224.80.65 | <<<<<<<<<    |
| 21 | No Label         | 10.224.80.0/30  | 0       | Fo1/1/2      | 10.224.80.65 |
| 22 | No Label         | 10.224.66.88/30 | 0       | Fo1/1/2      | 10.224.80.65 |

N7K-P:

First, confirm from which interface you are receiving the traffic. In this case, on the N7K-P, the traffic is received from interface eth6/6.

Here is how the packet is arriving at the Nexus N7K-P with 2 labels:

Packet from Wireshark

```
> Frame 13585: 102 bytes on wire (816 bits), 68 bytes captured (544 bits)
> Ethernet II, Src: Cisco_3a:a5:76 (0c:d0:f8:3a:a5:76), Dst: Cisco_26:93:c0 (2c:5
✓ MultiProtocol Label Switching Header, Label: 44, Exp: 0, S: 0, TTL: 253
    0000 0000 0000 0010 1100 .... = MPLS Label: 44 (0x0002c)
    .... 000. .... = MPLS Experimental Bits: 0
    .... 0 .... = MPLS Bottom Of Label Stack: 0
    .... 1111 1101 = MPLS TTL: 253
✓ MultiProtocol Label Switching Header, Label: 18, Exp: 0, S: 1, TTL: 254
    0000 0000 0000 0001 0010 .... = MPLS Label: 18 (0x00012)
    .... 000. .... = MPLS Experimental Bits: 0
    .... 1 .... = MPLS Bottom Of Label Stack: 1
    .... 1111 1110 = MPLS TTL: 254
> Internet Protocol Version 4, Src: 10.253.147.1, Dst: 10.253.142.226
> Internet Control Message Protocol
```

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You can apply the trigger in the N7K-P to capture the traffic:

To get the instance used on the ELAM, check the L2LKP column of the port where the traffic is being received.

```
attach module 6
module-6# sh hardware internal dev-port-m
-----
CARD_TYPE:      24 port 40G
>Front Panel ports:24
-----
Device name      Dev role      Abbr num_inst:
-----
> Flanker Eth Mac Driver DEV_ETHERNET_MAC MAC_0 12
> Flanker Fwd Driver    DEV_LAYER_2_LOOKUP L2LKP 12
> Flanker Xbar Driver    DEV_XBAR_INTF      XBAR_INTF 12
> Flanker Queue Driver   DEV_QUEUEING        QUEUE 12
> Sacramento Xbar ASIC   DEV_SWITCH_FABRIC   SWICHF 2
```

```

> Flanker L3 Driver      DEV_LAYER_3_LOOKUP    L3LKP  12
> EDC                   DEV_PHY              PHYS    8
> NCP Manager           DEV_UNDEFINED        (null) 12
+-----+
+-----+++FRONT PANEL PORT TO ASIC INSTANCE MAP+++-----+
+-----+
FP port |  PHYS | MAC_0 | L2LKP | L3LKP | QUEUE | SWICHF
  1      |      | 0      | 0      | 0      | 0      | 0,1
  2      |      | 0      | 0      | 0      | 0      | 0,1
  3      |      | 1      | 1      | 1      | 1      | 0,1
  4      |      | 1      | 1      | 1      | 1      | 0,1
  5      | 0     | 2      | 2      | 2      | 2      | 0,1
  6      | 0     | 2      | 2      | 2      | 2      | 0,1    <<<<<<<< Port 6 mapped to L2KP 2
  7      | 1     | 3      | 3      | 3      | 3      | 0,1
  8      | 1     | 3      | 3      | 3      | 3      | 0,1
  9      | 2     | 4      | 4      | 4      | 4      | 0,1
 10     | 2     | 4      | 4      | 4      | 4      | 0,1
 11     | 3     | 5      | 5      | 5      | 5      | 0,1
 12     | 3     | 5      | 5      | 5      | 5      | 0,1
 13     | 4     | 6      | 6      | 6      | 6      | 0,1
<...>

```

Where:

- label-count - Number of labels in the packet we are matching
- destination-ipv4-address - Destination IP address
- lbl0-lbl - Outer label for MPLS
- mlh-type - 7 for MPLS
- l4 protocol - 1 for ICMP

On the Nexus N77-P:

```
<#root>
```

```

elam asic flanker instance 2
layer2
trigger dbus ipv4 ingress if

```

**label-count**

```

2 destination-ipv4-address 10.253.142.226 lbl0-lbl 44 mlh-type 7 l4-protocol 1
trigger rbus ingress if trig
start

```

---

**Note:** Only outer label trigger is possible for F3 linecards.

---

## Verify

Confirm the ELAM got triggered.

<#root>

```
module-6(fln-l2-elam)# status
ELAM Slot 6 instance 2: L2 DBUS Configuration: trigger dbus ipv4 ingress if label-count 2 destination-ip
L2 DBUS:
```

**Triggered**

```
ELAM Slot 6 instance 2: L2 RBUS Configuration: trigger rbus ingress if trig
L2 RBUS:
```

**Triggered**

Confirm the sequence number is the same for rbus and dbus.

```
module-6(fln-l2-elam)# sh dbus | i seq ; sh rbus | i seq
sequence-number : 0xb8 vl : 0x0
l2-rbus-trigger : 0x1 sequence-number : 0xb8
```

To confirm the egress interface, you can check the di-ltl-index on the rbus output.

```
module-6(fln-l2-elam)# sh rbus | i i di-
lcpu-ff-valid      : 0x0          sup-di-vqi          : 0x0
md-di-vld          : 0x0          rc                  : 0x0
di-ltl-index       : 0xe00        l3-multicast-di   : 0xe00
```

With the index, you can enter into the VDC where you are receiving the traffic, and decode it to find the egress interface.

```
N7K-P# sh system internal pixm info ltl 0xe00 <
```

| PC_TYPE              | PORT       | LTL    | RES_ID     | LTL_FLAG   | CB_FLAG    | PC_NODE_FLAG |
|----------------------|------------|--------|------------|------------|------------|--------------|
| MEMB_CNT             |            |        |            |            |            |              |
| Normal               | Po1        | 0x0e00 | 0x16000000 | 0x00000000 | 0x00000002 | 0x00000000 1 |
| RBH Mode: NON-MODULO |            |        |            |            |            |              |
| Member rbh rbh_cnt   |            |        |            |            |            |              |
| Eth1/5               | 0x000000ff | 0x08   |            |            |            |              |

CBL Check States: Ingress: Enabled; Egress: Enabled

| VLAN | BD  | BD-St              | CBL St & Direction: |
|------|-----|--------------------|---------------------|
| 0    | 0x0 | EXCLUDE_IF_FROM_BD | FORWARDING (Both)   |
| 1    | 0x0 | EXCLUDE_IF_FROM_BD | BLOCKING (Both)     |

Member info

```

-----
Type                LTL
-----
PORT_CHANNEL        Po1

```

In this case, ethernet 1/5 is the egress interface which is a member of port-channel 1. With this, you can confirm the forwarding decision is correct.

```

interface Ethernet1/5
  mtu 9216
  logging event port link-status
  channel-group 1 mode active
  no shutdown

```

Matches with control plane.

```

N7K-P# show mpls switching
Legend:
(P)=Protected, (F)=FRR active, (*)=more labels in stack.
In-Label  Out-Label  FEC name          Out-Interface  Next-Hop
VRF default
44         Pop Label  10.249.200.42/32 Po1             10.22.80.40

```