在UCS上配置ELAM

目錄

簡介

本檔案介紹整合運算系統(UCS)第4代光纖互連(FI)6454中使用嵌入式邏輯分析器模組(ELAM)工具，以及如何以最佳方式使用該工具。

必要條件

本檔案沒有先決條件。

需求

思科建議您瞭解以下主題：

- UCS 6454光纖互連

採用元件

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

背景資訊

UCS第4代FI能夠運行ELAM捕獲。ELAM捕獲嵌入在ASIC中。

ELAM工具允許即時檢視在ASIC級別轉發的資料包。您可以檢視封包的詳細資訊，例如：

- 輸入和輸出介面
- 最大傳輸單位(MTU)大小
- VLAN標籤
- 源裝置和目的裝置的MAC和IP地址

- 封包捨棄及其原因
- 服務品質(QoS)標籤

ELAM提供資料包轉發的詳細資訊。它對資料平面沒有中斷。

設定

通過命令列介面(CLI)登入UCS。

運行以下命令：

#**connect nxos a|b**

#**attach module 1**

#**debug platform internal tah elam asic 0**

#**trigger init asic 0 slice 0 lu-a2d 1 in-select 6 out-select 1**

#**set outer ...**

#**start**

#**report**

> **附註**：第4代FI是一個單機架單元，具有一個單個模組（模組1），帶有一個ASIC(asic 0)和一個片（片0）。 請參閱下面的輸出。

```
RCH-SV-FFAIII-A(nx-os)# show hardware internal tah interface ethernet 1/30
######################################
IfIndex: 436222464
DstIndex: 6028
IfType: 26
Interface name Ethernet1/30
Asic: 0
Asic: 0        <<<<<
AsicPort: 49
SrcId: 98
Slice: 0       <<<<<
PortOnSlice: 49
Table entries for interface Ethernet1/30
```

對於觸發器基於資料包屬性「lu-a2d 1」的ELAM，則使用它。值6和1將分別用於「in-select」和「out-select」

「set outer」命令是我們的過濾器，在此定義並告知FI我們要捕獲的資料包，有許多選項，我們可以根據需要進行細化：

```
module-1(TAH-elam-insel6)# set outer ?
  arp   ARP Fields
  fcoe  FCoE Fields
  ipv4  IPv4 Fields
  ipv6  IPv6 Fields
  l2    All Layer 2 Fields
  l4    L4 Fields
```

```
module-1(TAH-elam-insel6)# set outer l2 ?
  cfi            CFI Setting
  cntag_vld      CNTag Information Valid
  cos            Class of Service
  dst_mac        Destination MAC Address
  qtag_vld       VLAN Tag Information Valid
  snap_vld       SNAP Header Information Valid
  src_mac        Source MAC Address
  vlan           VLAN Id (Present only in case of FEX)
  vntag_dvif     VNTAG Destination vif
  vntag_looped   VNTAG Header Looped Valid
  vntag_pointer  VNTAG Header Pointer Valid
  vntag_svif     VNTAG Source vif
  vntag_vld      VNTAG Information Valid

module-1(TAH-elam-insel6)# set outer ipv4 ?
  checksum       Checksum
  dscp           Diff. Serv. Code Point
  dst_ip         Destination IP Address
  ecn            Explicit Congestion Ntfn
  fragment-off   Fragments Offset
  header-len     Header Length
  more-frags     More Fragments Available
  next-protocol  Next Protocol
  packet-len     Packet Total Length
  pyld-len       Payload Length
  src_ip         Source IP Address
  ttl            Time to Live
  version        Version
```

定義過濾器後，運行命令start運行ELAM工具。如果沒有捕獲到填充過濾條件的內容，則會出現以下情況：

```
module-1(TAH-elam-insel6)# report

ELAM not triggered yet on slot - 1, asic - 0, slice - 0
```

> **附註**：「set」命令將跨ELAM存在，好的做法是在每次要捕獲具有不同IP、MAC等的流量時運行「reset」命令。

範例

1.從VM 172.16.35.31 ping網關172.16.35.126:

```
RCH-SV-FFAIII-A(nx-os)# attach module 1
module-1# debug platform internal tah elam asic 0
module-1(TAH-elam)# trigger init asic 0 slice 0 lu-a2d 1 in-select 6 out-select 1

param values: start asic 0, start slice 0, lu-a2d 1, in-select 6, out-select 1

module-1(TAH-elam-insel6)# set outer ipv4 src_ip 172.16.35.31 dst_ip 172.16.35.126
module-1(TAH-elam-insel6)# start
GBL_C++:  [MSG] rocky_elam_wrapper_init:54:asic type 8 inst 0 slice 0 a_to_d 1 insel 6 outsel 1
GBL_C++:  [MSG] rocky_elam_wrapper_enable:149:asic type 8 inst 0 slice 0 a_to_d 1
GBL_C++:  [MSG]  - writing
data=0x00000000000000000000000000000000000000000000000000000000000000000000000000000056
08118F800000
```

```
00000000000000000000560811BF00000000000000000000001000000000000000000000000000000000000000000000000000
0000000000001
GBL_C++:  [MSG]  - writing
mask=0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000007F
FFFFFF800000
0000000000000000007FFFFFFF8000000000000000000000380000000000000000000000000000000000000000000000000000
0000000000001

module-1(TAH-elam-insel6)# report

HOMEWOOD ELAM REPORT SUMMARY
slot - 1, asic - 0, slice - 0
============================

Incoming Interface: Eth1/33
Src Idx : 0x1002, Src BD : 35
Outgoing Interface Info: dmod 1, dpid 4
Dst Idx : 0x604, Dst BD : 35

Packet Type: IPv4

Dst MAC address: 8C:60:4F:CD:FD:7C
Src MAC address: 00:25:C5:00:00:1E
.1q Tag0 VLAN: 35,  cos = 0x1

Dst IPv4 address: 172.16.35.126
Src IPv4 address: 172.16.35.31
Ver    =  4, DSCP    =    0, Don't Fragment = 0
Proto  =  1, TTL     =   64, More Fragments = 0
Hdr len = 20, Pkt len =   84, Checksum       = 0x5f19

L4 Protocol  : 1
ICMP type    : 8
ICMP code    : 0

Drop Info:
----------

LUA:
LUB:
LUC:
LUD:
Final Drops:
```

驗證

帶有src_ip 172.16.35.31和dst_ip 172.16.35.126的資料包位於VLAN 35上，到達埠1/33（傳入介面），目的地為（傳出介面）介面"dpid4" ..什麼？「dpid」是ASIC埠內部識別符號，可以使用「show interface hardware-mappings」找到對映：

```
Incoming Interface: Eth1/33
Src Idx : 0x1002, Src BD : 35

interface Ethernet1/33
  description S: Server, Port-channel 1025
  no pinning server sticky
  switchport mode fex-fabric
  priority-flow-control mode on
  fex associate 1
  channel-group 1025
  no shutdown
```

```
Outgoing Interface Info: dmod 1, dpid 4
Dst Idx : 0x604, Dst BD : 35


RCH-SV-FFAIII-A(nx-os)# show interface hardware-mappings
Legends:
        SMod  - Source Mod. 0 is N/A
        Unit  - Unit on which port resides. N/A for port channels
        HPort - Hardware Port Number or Hardware Trunk Id:
        HName - Hardware port name. None means N/A
        FPort - Fabric facing port number. 255 means N/A
        NPort - Front panel port number
        VPort - Virtual Port Number. -1 means N/A
        Slice - Slice Number. N/A for BCM systems
        SPort - Port Number wrt Slice. N/A for BCM systems
        SrcId - Source Id Number. N/A for BCM systems


------------------------------------------------------------------------
Name        Ifindex  Smod Unit HPort FPort NPort VPort Slice SPort SrcId
------------------------------------------------------------------------
.
Eth1/13     1a001800 1    0    4     255   48    -1    0     4     8
```

此「dpid 4」也對應於「show hardware internal tah interface ethernet 1/13」的含義：

```
RCH-SV-FFAIII-A(nx-os)# show hardware internal tah interface ethernet 1/13
#######################################
IfIndex: 436213760
DstIndex: 6096
IfType: 26
Interface name Ethernet1/13
Asic: 0
Asic: 0
AsicPort: 4      <<<<<
SrcId: 8
Slice: 0
PortOnSlice: 4   <<<<<
```

此封包已被ELAM第4層(L4)通訊協定識別為網際網路控制訊息通訊協定(ICMP)。請參閱IANA協定編號清單。您也可以使用特定的MTU大小進行過濾。 只有在達到準確的MTU時，ELAM才會觸發。

```
module-1(TAH-elam-insel6)# set outer ipv4 src_ip 172.16.35.31 dst_ip 172.16.35.126 packet-len
1500

Dst IPv4 address: 172.16.35.126
Src IPv4 address: 172.16.35.31
Ver    = 4, DSCP    =    0, Don't Fragment = 1
Proto  = 1, TTL     =   64, More Fragments = 0
Hdr len = 20, Pkt len = 1500, Checksum        = 0x1758

L4 Protocol  : 1
ICMP type    : 8
ICMP code    : 0
```

從虛擬機器(VM)到上游網路的ARP請求，將MAC地址設定為過濾器：

```
RCH-SV-FFAIII-B(nx-os)# attach module 1
module-1# debug platform internal tah elam asic 0
module-1(TAH-elam)# trigger init asic 0 slice 0 lu-a2d 1 in-select 6 out-select 1
```

```
param values: start asic 0, start slice 0, lu-a2d 1, in-select 6, out-select 1

module-1(TAH-elam-insel6)# set outer l2 src_mac 00:25:c5:00:00:1e dst_mac ff:ff:ff:ff:ff:ff
module-1(TAH-elam-insel6)# start
GBL_C++:   [MSG] rocky_elam_wrapper_init:36:asic type 8 inst 0 slice 0 a_to_d 1 insel 6 outsel 1
GBL_C++:   [MSG] rocky_elam_wrapper_enable:95:asic type 8 inst 0 slice 0 a_to_d 1
GBL_C++:   [MSG]   - writing
data=0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000
00000015820463E004B8A00003C000000000000000000000200000000000000000000000000000000000000000000000000
0000000000001
GBL_C++:   [MSG]   - writing
mask=0x0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000
0000001FFFFFFFFFFFFFFFFFFFFFE00000000000000000000003800000000000000000000000000000000000000000000000
0000000000001

module-1(TAH-elam-insel6)# report
HOMEWOOD ELAM REPORT SUMMARY
slot - 1, asic - 0, slice - 0
============================

Incoming Interface: Eth1/33
Src Idx : 0x1002, Src BD : 35
Outgoing Interface Info: dmod 1, dpid 4
Dst Idx : 0x604, Dst BD : 35

Packet Type: ARP

Dst MAC address: FF:FF:FF:FF:FF:FF
Src MAC address: 00:25:C5:00:00:1E
.1q Tag0 VLAN: 35,  cos = 0x1

Target Hardware address: 00:00:00:00:00:00
Sender Hardware address: 00:25:C5:00:00:1E
Target Protocol address: 172.16.35.110
Sender Protocol address: 172.16.35.31
ARP opcode: 1

Drop Info:
----------

LUA:
LUB:
LUC:
LUD:
Final Drops:
```

系統會將資料包識別為ARP，當在VM或網關級別的ARP條目不完整時，這一點尤其有用。

如果適用，還將列出TCP/UDP埠，此處會測試SSH:

```
RCH-SV-FFAIII-B(nx-os)# attach module 1
module-1# debug platform internal tah elam asic 0
module-1(TAH-elam)# trigger init asic 0 slice 0 lu-a2d 1 in-select 6 out-select 1

param values: start asic 0, start slice 0, lu-a2d 1, in-select 6, out-select 1

module-1(TAH-elam-insel6)# set outer ipv4 src_ip 172.16.35.126 dst_ip 172.16.35.31

module-1(TAH-elam-insel6)# start
GBL_C++:   [MSG] rocky_elam_wrapper_init:36:asic type 8 inst 0 slice 0 a_to_d 1 insel 6 outsel 1
GBL_C++:   [MSG] rocky_elam_wrapper_enable:95:asic type 8 inst 0 slice 0 a_to_d 1
```

```
GBL_C++:  [MSG]   - writing
data=0x0000000000000000000000000000000000000000000000000000000000000000000000000000000056
0811BF0000
0000000000000000000005608118F8000000000000000000000010000000000000000000000000000000000000
000000000000001
GBL_C++:  [MSG]   - writing
mask=0x0000000000000000000000000000000000000000000000000000000000000000000000000000000007F
FFFFFF8000
0000000000000000000007FFFFFFF80000000000000000000000380000000000000000000000000000000000000
000000000000001
```

```
module-1(TAH-elam-insel6)# report

HOMEWOOD ELAM REPORT SUMMARY
slot - 1, asic - 0, slice - 0
============================
```

Incoming Interface: Eth1/14
```
Src Idx : 0x604, Src BD : 35
```
Outgoing Interface Info: dmod 1, **dpid 44**
```
Dst Idx : 0x1002, Dst BD : 35

Packet Type: IPv4

Dst MAC address: 00:25:C5:00:00:1E
Src MAC address: 8C:60:4F:CD:FD:7C
.1q Tag0 VLAN: 35,  cos = 0x0
```

```
Dst IPv4 address: 
```
172.16.35.31
```
Src IPv4 address: 
```
172.16.35.126
```
Ver    =  4, DSCP   =    0, Don't Fragment = 0
Proto  =  6, TTL    =   64, More Fragments = 0
Hdr len = 20, Pkt len =   60, Checksum      = 0x27f5
```

L4 Protocol : 6
TCP Dst Port : 22
TCP Src Port : 15067

```
Drop Info:
----------


LUA:
LUB:
LUC:
LUD:
Final Drops:
```

疑難排解

丟棄也記錄下來。FI會捨棄ARP請求：

```
RCH-SV-FFAIII-B(nx-os)# attach module 1
module-1# debug platform internal tah elam asic 0
module-1(TAH-elam)# trigger init asic 0 slice 0 lu-a2d 1 in-select 6 out-select 1

param values: start asic 0, start slice 0, lu-a2d 1, in-select 6, out-select 1

module-1(TAH-elam-insel6)# set outer l2 src_mac 00:25:c5:00:00:1e dst_mac ff:ff:ff:ff:ff:ff

module-1(TAH-elam-insel6)# start
GBL_C++:  [MSG] rocky_elam_wrapper_init:54:asic type 8 inst 0 slice 0 a_to_d 1 insel 6 outsel 1
```

```
GBL_C++:  [MSG] rocky_elam_wrapper_enable:149:asic type 8 inst 0 slice 0 a_to_d 1
GBL_C++:  [MSG]  - writing
data=0x00000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000971400007BFFFF
FFFFFFFFC00001
GBL_C++:  [MSG]  - writing
mask=0x00000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000
00000000000000000000000000000000000000000000000000000000000000000000000003FFFFFFFFFFFFFFFF
FFFFFFFC00001

module-1(TAH-elam-insel6)# report
HOMEWOOD ELAM REPORT SUMMARY
slot - 1, asic - 0, slice - 0
============================

Incoming Interface: Eth1/18
Src Idx : 0x603, Src BD : 35
Outgoing Interface Info: dmod 0, dpid 0
Dst Idx : 0x0, Dst BD : 35

Packet Type: ARP

Dst MAC address: FF:FF:FF:FF:FF:FF
Src MAC address: 00:25:C5:00:00:1E
.1q Tag0 VLAN: 35,  cos = 0x1

Target Hardware address: 00:00:00:00:00:00
Sender Hardware address: 00:25:C5:00:00:1E
Target Protocol address: 172.16.35.99
Sender Protocol address: 172.16.35.31
ARP opcode: 1

Drop Info:
----------

LUA:
LUB:
LUC:
LUD:
  MC_RPF_FAIILURE
  SRC_VLAN_MBR
Final Drops:
  MC_RPF_FAIILURE
  SRC_VLAN_MBR
```

FI在連線埠1/18（這是上行鏈路連線埠）上收到一個ARP要求，其來源MAC為
00:25:c5:00:00:1e，這可在虛擬乙太網路(vEth)連線埠上本地得知。此條件會觸發反向路徑轉發
(RPF)丟棄。請注意，**Outgoing Interface Info**報告dpid 0，即丟棄。

連線埠1/18上不允許VLAN 35，這也會觸發**捨棄**SRC_VLAN_MBR。

```
RCH-SV-FFAIII-A(nx-os)# show run interface ethernet 1/18

interface Ethernet1/18
  description U: Uplink
  pinning border
  switchport mode trunk
  switchport trunk allowed vlan 1
  channel-group 105 mode active
```

相關資訊

- [ELAM概述](#)
- [技術支援與文件 - Cisco Systems](#)