在UCS上配置ELAM

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简介

本文档介绍在统一计算系统(UCS)第4代交换矩阵互联(FI)6454中使用嵌入式逻辑分析器模块 (ELAM)工具,以及如何最好地使用它。

先决条件

读者无需满足任何前提条件即可理解本文档内容。

要求

Cisco 建议您了解以下主题:

• UCS 6454交换矩阵互联

使用的组件

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原 始(默认)配置。如果您的网络处于活动状态,请确保您了解所有命令的潜在影响。

背景信息

UCS第4代FI能够运行ELAM捕获。ELAM捕获嵌入在ASIC中。

ELAM工具允许实时查看在ASIC级别转发的数据包。您可以查看数据包的详细信息,例如:

- •入口和出口接口
- 最大传输单位(MTU)大小
- VLAN标记
- •源设备和目的设备的MAC和IP地址

- 丢包及原因
- •服务质量(QoS)标记

ELAM提供数据包转发的详细信息。它对数据平面无干扰。

配置

通过命令行界面(CLI)登录UCS。

运行以下命令:

#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

注意:第4代FI是单机架单元,具有一个模块(模块1)、一个ASIC(asic 0)和一个片(片 0)。 请参阅以下输出。

对于ELAM,使用基于数据包属性"lu-a2d 1"的触发器。值6和1将分别用于"in-select"和"out-select",以用于出现兴趣

"set outer"命令是我们的过滤器,我们在此定义并告诉FI我们要捕获什么数据包,有许多选项,我们 可以根据需要进行粒度化:

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 12 ?
  cfi CFI Setting
  cntag_vld CNTag Information Valid
cos Class of Service
 dst_macDestination MAC Addressqtag_vldVLAN Tag Information Validsnap_vldSNAP Header Information Validsrc_macSource MAC Address
  sna<sub>P_</sub>
src_mac
  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
  vntag_vld
module-1(TAH-elam-insel6) # set outer ipv4 ?
  checksum Checksum
  dscp
                 Diff. Serv. Code Point
                 Destination IP Address
  dst ip
                 Explicit Congestion Ntfn
  ecn
  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
                 Source IP Address
  src ip
                  Time to Live
  ++1
  version
                  Version
```

定义过滤器后,运行命令**start**以运行ELAM工具。如果未捕获填充过滤器条件的内容,则会看到:

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

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

注意:"set"命令将在ELAM中生存,一个好的做法是,每次我们要捕获具有不同IP、MAC等的 流量时,都运行"reset"命令。

示例

1.从VM 172.16.35.31 ping网关172.16.35.126:

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:

验证

具有src_ip 172.16.35.31和dst_ip 172.16.35.126的数据包在VLAN 35上,到达端口1/33(传入接口),并发往(传出接口)接口"dpid4"……什么?"dpid"是ASIC端口内部标识符,映射可通过"show interface hardware-mappings"找到:

```
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
                               255 48 -1 0
Eth1/13 1a001800 1
                    0 4
                                                   4
                                                         8
此"dpid 4"还与"show hardware internal than interface ethernet 1/13"的建议相对应:
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

PortOnSlice: 4 <<<<

Slice: 0

该数据包被ELAM第4层(L4)协议识别为Internet控制消息协议(ICMP)。请参阅IANA协<u>议号列表</u>。您 还可以使用特定MTU大小进行过滤。 ELAM仅在达到确切MTU时触发。

```
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 从虚拟机(VM)到上游网络的ARP请求,MAC地址设置为过滤器:

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

module-1(TAH-elam-insel6)# set outer 12 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 0000000000000 GBL_C++: [MSG] - writing 0000000000000 0000000000001 module-1(TAH-elam-insel6)# report HOMEWOOD ELAM REPORT SUMMARY slot - 1, asic - 0, slice - 0Incoming 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: 数据包由系统识别为ARP,这在VM或网关级别存在不完整的ARP条目时特别有用。 如果适用,TCP/UDP端口也将列出,SSH将在以下位置进行测试: 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

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:
```

故障排除

还记录丢包。FI丢弃ARP请求:

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 12 src_mac 00:25:c5:00:00:1e dst_mac 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

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在端口1/18(这是上行链路端口)上收到ARP请求,源MAC为00:25:c5:00:00:1e,在虚拟以太网 (vEth)端口上本地获取。此条件触发反向路径转发(RPF)丢弃。请注意,传**出接口信**息报**告dpid** 0,这是丢弃。

端口1/18上不允许VLAN 35,这也触发了丢弃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

相关信息

- ELAM概述
- 技术支持和文档 Cisco Systems