验证Catalyst 9000系列交换机上的第2层硬件

目录

简介

本文档介绍如何验证Catalyst 9400系列交换机上的第2层硬件编程和转发。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档中的信息基于Catalyst 9400(UADP 2.0)系列交换机。

注意: **本文档中使用的软件版本是16.6.1，但这应该适用于Cisco IOS-XE的更高版本。**

注意: **您可以将本文档用于其他类型的Catalyst 9000交换机，但忽略任何引用线卡的命令。**

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

- Catalyst 9400 Supervisor1(C9400-SUP-1)具有3个UADP 2.0转发ASIC(0、1、2)。
- 每个UADP 2.0转发ASIC具有： 双核(0、1) — 这在前几代UADP 2.0 ASICS中不存在。SIF（堆栈接口） — 用于通过内部堆栈环连接到其他2个UADP 2.0 ASIC。NIF（网络接口） — 用于通过背板连接到1个或多个线路卡。

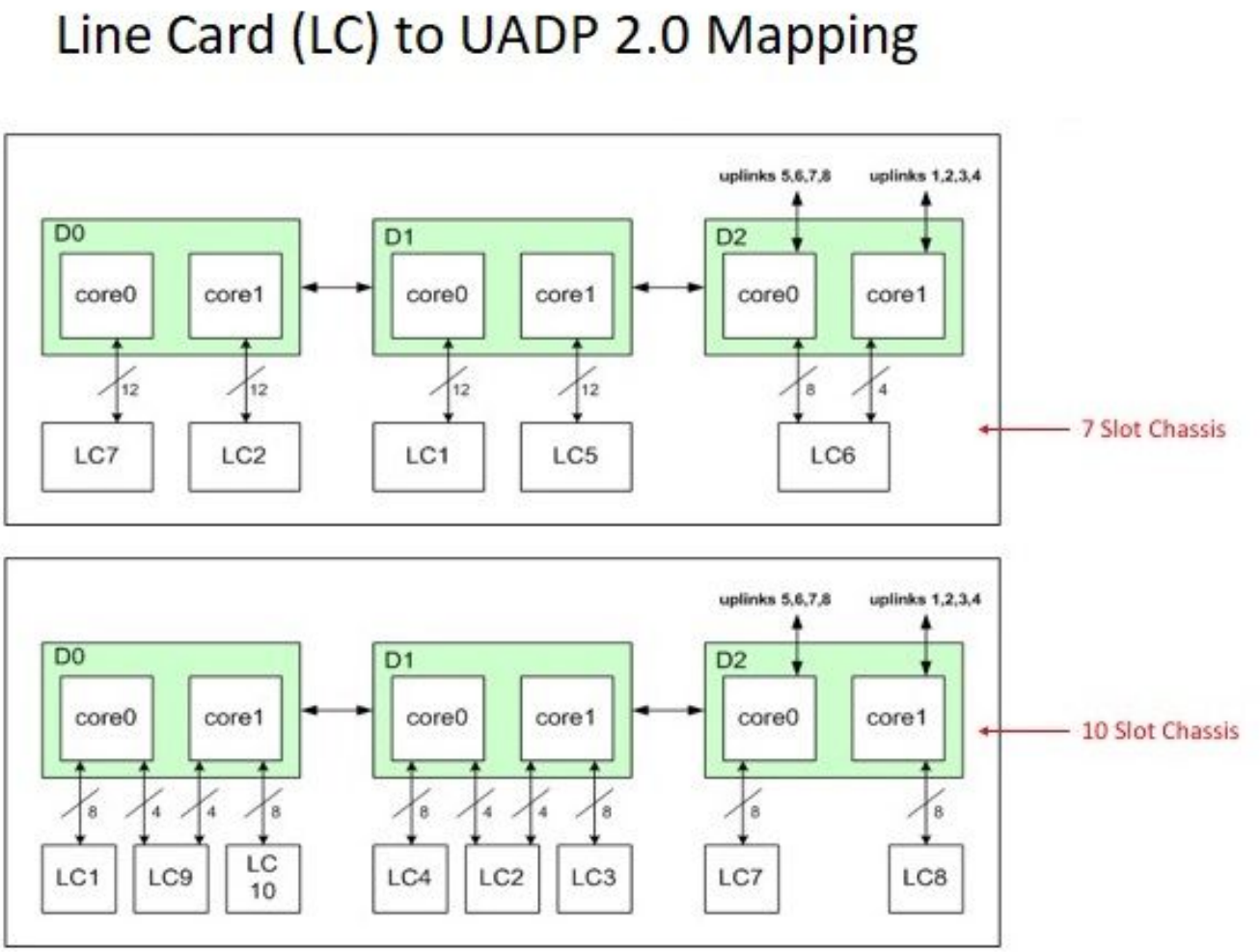
- 线卡和管理引擎上行链路接口的所有数据包转发决策由活动管理引擎上的3个UADP 2.0转发ASIC做出。
- 本示例中使用的线卡有1个线卡单核末节ASIC，它不参与数据包转发决策。
- 线卡上的线卡末节ASIC通过背板连接到Supervisor上的3个UADP 2.0转发ASIC中的1个或更多。
- 管理引擎上的3个UADP 2.0转发ASIC做出所有数据包转发决策。

术语

缩写词	定义
RP	路由处理器
FP	转发处理器
美联储	转发引擎驱动程序。用于编程Supervisor转发ASIC的软件进程。
对象管理器	FP软件MAC条目，存储为对象数据库中的异步对象。
LSMPI	Linux共享内存Punt接口。数据平面（硬件 — UADP 2.0）和控制平面（软件 — CPU）之间输。
IFM	接口管理器软件进程。
IF_ID	接口IDentifier是表示特定接口的唯一值。在交换机的内部编程过程中使用。
实例	实例。表示接口与UADP 2.0 Asic/Core连接：0=ASIC0/Core0、1=ASIC0/Core1、2=ASIC1/Core0、3=ASIC1/Core1、4=ASIC2/Core0、5=ASIC2/Core1。
ASIC	指定接口与哪个UADP 2.0关联：0=UADP 2.0 #0、1=UADP 2.0 #1、2= UADP 2.0 #2。
核心	指定UADP 2.0接口上与哪个核心关联：0=core0,1=core1。
端口	插槽中端口的序号实例数。在同一插槽中，所有端口号都是唯一的。

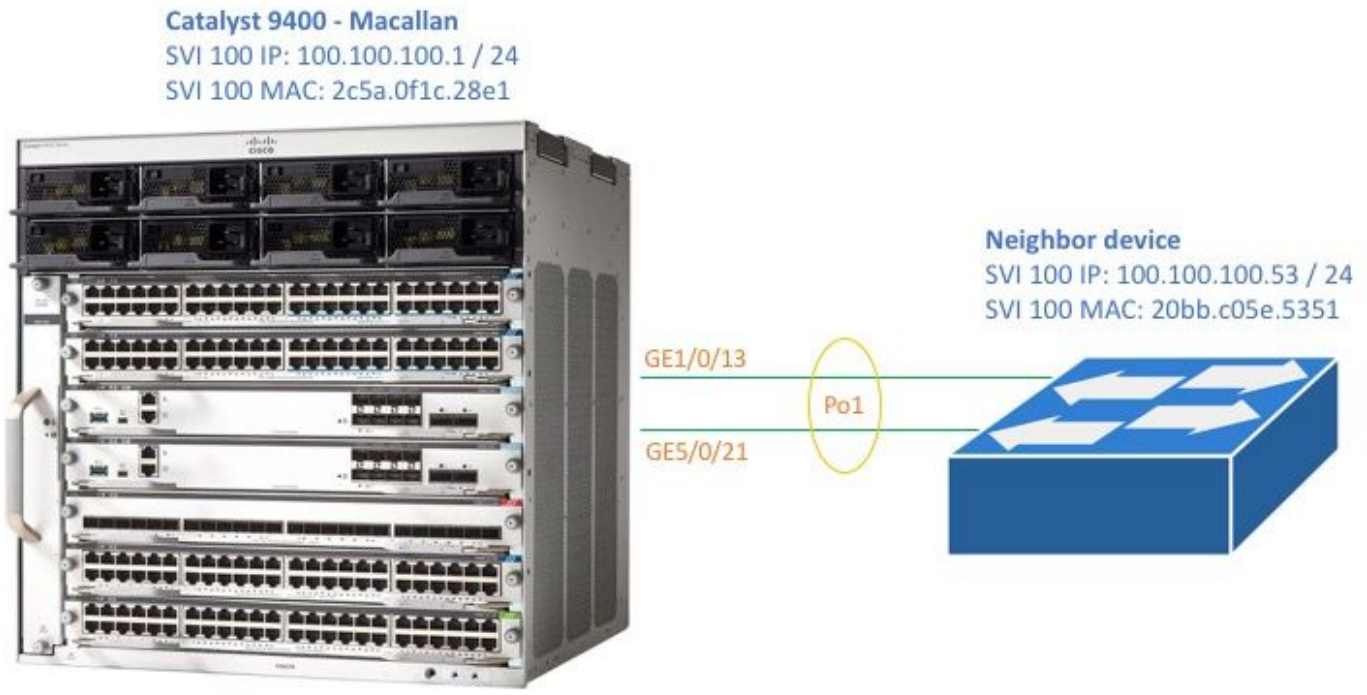
子端口	为子端口的前面板端口标识端口组(Cntx)中的端口（Cntx和SubPort一起标识子端口的唯一端口）。
MAC	接口运行MACsec（安全身份验证和加密）时使用的接口标识符。
Cntx	背景。当前面板接口被子端口时端口所属的组号（Cntx和SubPort一起标识子端口的唯一端口）。
LPN	与接口关联的逻辑端口号。
GPN	与接口关联的全局端口号。
键入NIF	网络接口;NRU =网络冗余上行链路
IF_IS	接口标识符.这是表示特定接口的唯一值。它在交换机内部的各种编程过程中使用。
Port_LE	端口逻辑实体。这是接口配置。
AOM	异步对象管理器。FP将信息作为对象编程到对象数据库中。
副总裁	虚拟端口
MATM	MAC地址表管理器
RP	路由处理器
OM_PTR	对象管理器指针
Tbl_ID	表标识符= vlan
CMAN	机箱管理器
FP	转发处理器
fp_port	前面板端口。
锡夫	堆栈接口（指向Supervisor上的其他2个UADP 2.0转发ASIC）。
Nif	网络接口（朝前面板接口）
IGR/EGR	入口/出口
IQS	入口队列调度程序
SQS	堆栈队列调度程序
PBC	数据包缓冲区复杂
AQM	活动队列管理。这会执行拥塞管理检查。
AQMRed	主动队列管理随机早期检测。
EQC	出口队列控制器
ESM	出口调度程序管理
RWE	重写引擎。从数据包添加或删除报头信息。
IOMD	输入输出模块驱动程序
fp_port	前面板端口。
Nif	网络接口（朝前面板接口）
SLI	系统链路接口（指向Supervisor）
IGR/EGR =	入口/出口
AQMRed	主动队列管理随机早期检测。
OCI	带外控制接口=线卡和活动Supervisor之间的内部通信通道
MATM	MAC地址表管理器
MAC移动计	这是MAC地址在新接口上移动（获取）时的计数。当终端主机从一个接口物理地移动到另一

数	口，无线主机从一个接入点(AP)漫游到另一个AP（连接在不同接口上），或者生成树路径发改或环路时，可能会发生移动计数。



线路卡到UADP

拓扑




```
C9400#show version
Cisco IOS XE Software, Version 16.06.01
Cisco IOS Software [Everest], Catalyst L3 Switch Software (CAT9K_IOSXE), Version 16.6.1, RELEASE
SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Sat 22-Jul-17 05:51 by mcpre
--snip--

C9400#show module
Chassis Type: C9407R

Mod Ports Card Type                                Model          Serial No.
---+-----+--------------------------------------+--------------+--------------
1   48    48-Port 10/100/1000 (RJ-45)            C9400-LC-48T   JAE211703RC
2   48    48-Port UPOE 10/100/1000 (RJ-45)       C9400-LC-48U   JAE21150CGD
3   10    Supervisor 1 Module                    C9400-SUP-1    JAE21240235
4   10    Supervisor 1 Module                    C9400-SUP-1    JAE21240235
5   48    48-Port UPOE 10/100/1000 (RJ-45)       C9400-LC-48U   JAE21150CG9

Mod MAC addresses                     Hw   Fw           Sw                  Status
---+--------------------------------+----+------------+-------------------+--------
1   E4AA.5D54.C84C to E4AA.5D54.C87B 0.6  16.6.1r [FC  16.06.01            ok
2   E4AA.5D54.B430 to E4AA.5D54.B45F 0.6  16.6.1r [FC  16.06.01            ok
3   2C5A.0F1C.28EC to 2C5A.0F1C.28F5 0.6  16.6.1r [FC  16.06.01            ok
4   2C5A.0F1C.28F6 to 2C5A.0F1C.28FF 0.6  16.6.1r [FC  16.06.01            ok
5   E4AA.5D54.B658 to E4AA.5D54.B687 0.6  16.6.1r [FC  16.06.01            ok

Mod Redundancy Role     Operating Redundancy Mode Configured Redundancy Mode
---+------------------+-------------------------+---------------------------
3   Active              sso                        sso
4   Standby             sso                        sso

C9400#show running-config interface port-channel 1
interface Port-channel1
switchport trunk allowed vlan 100
switchport mode trunk
```

```
C9400#show running-config interface gigabitEthernet 1/0/13
interface GigabitEthernet1/0/13
switchport trunk allowed vlan 100
switchport mode trunk
channel-group 1 mode active

C9400#show running-config interface gigabitEthernet 5/0/21
interface GigabitEthernet5/0/21
switchport trunk allowed vlan 100
switchport mode trunk
channel-group 1 mode active

C9400#show etherchannel summary
--snip--
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)
```

注意：show platform命令可能要求语句中包含service internal全局配置命令。

接口编程

到UADP 2.0实例映射的接口

接口编程命令显示所有线卡到活动Supervisor上3个UADP 2.0转发ASIC之一的前面板接口映射。

输出示例

该示例显示：

- 接口Gig1/0/3连接到：管理引擎上的UADP 2.0实例2（UADP 2.0 Asic 1，核心0）。
- 接口Gig5/0/21连接到：UADP 2.0实例3(UADP 2.0 Asic 1,Core 1)在Supervisor上。

```
C9400#show platform software fed active ifm mappings
Interface IF_ID Inst Asic Core Port SubPort Mac Cntx LPN GPN Type Active GigabitEthernet1/0/1
0x7 2 1 0 0 0 4 4 1 101 NIF Y GigabitEthernet1/0/2 0x8 2 1 0 1 1 4 4 2 102 NIF Y --snip--
GigabitEthernet1/0/13 0x13 2 1 0 12 4 0 0 13 1105 NIF Y --snip-- GigabitEthernet5/0/21 0x8f 3 1
1 20 4 5 5 21 1104 NIF Y --snip--
```

物理接口编程

show platform命令根据上一个命令示例中的IF_ID值显示Gig1/0/3的软件配置详细信息。

```
C9400#show platform software fed active ifm if-id 0x13
Interface IF_ID : 0x0000000000000013
Interface Name : GigabitEthernet1/0/13
Interface Block Pointer : 0x7fe5c5aab7b8
Interface State : READY
Interface Status : ADD, UPD
Interface Ref-Cnt : 7
Interface Type : ETHER
      Port Type : SWITCH PORT
      Port Location : LOCAL
```

```
      Slot : 1
      Unit : 0
      Slot Unit : 13
      SNMP IF Index : 14
      GPN : 1105
      EC Channel : 1
      EC Index : 1
      Port Handle : 0x72000285
      LISP v4 Mobility : false
      LISP v6 Mobility : false
      QoS Trust Type : 0

      Port Information
      Handle ............ [0x72000285]
      Type .............. [Layer2]
      Identifier ........ [0x13]
      Slot .............. [1]
      Unit .............. [13]
      Port Physical Subblock
           Affinity .......... [local]
           Asic Instance ..... [2 (A:1,C:0)]
           AsicPort .......... [12]
           AsicSubPort ....... [4]
           MacNum ............ [0]
           ContextId ......... [0]
           LPN ............... [13]
           GPN ............... [113]
           Speed ............. [1GB]
           type .............. [NIF]
           PORT_LE ........... [0x7fe5c5aabc28]
           L3IF_LE ........... [0x0]
           EC GPN ............ [1105]
           EC L3IF_LE ........ [0x0]
           EC Port Mask ...... [0xaaaaaaaaaaaaaaaa]
           DI ................ [0x7fe5c5ab5c48]
      Port L2 Subblock
           Enabled ............. [Yes]
           Allow dot1q ......... [Yes] ---> interface Gig1/0/13 is configured as a trunk
           Allow native ........ [Yes]
           Default VLAN ........ [1]
           Allow priority tag ... [Yes]
           Allow unknown unicast [Yes]
           Allow unknown multicast[Yes]
           Allow unknown broadcast[Yes]
           Allow unknown multicast[Enabled]
           Allow unknown unicast [Enabled]
           IPv4 ARP snoop ....... [No]
           IPv6 ARP snoop ....... [No]
           Jumbo MTU ............ [1500]
           Learning Mode ........ [1]
      Port QoS Subblock
           Trust Type ..................... [0x2]
           Default Value .................. [0]
           Ingress Table Map .............. [0x0]
           Egress Table Map ............... [0x0]
           Queue Map ...................... [0x0]
      Port Netflow Subblock
      Port Policy Subblock
      List of Ingress Policies attached to an interface
      List of Egress Policies attached to an interface
Ref Count : 7 (feature Ref Counts + 1)
IFM Feature Ref Counts
      FID : 100, Ref Count : 1
      FID : 57, Ref Count : 1
```

```
      FID : 115, Ref Count : 1
      FID : 17, Ref Count : 1
      FID : 78, Ref Count : 1
      FID : 30, Ref Count : 1
IFM Feature Sub block information
      FID : 57, Private Data : 0x7fe5c685e748
      FID : 17, Private Data : 0x7fe5c5e85f38
      FID : 30, Private Data : 0x7fe5c5e85aa8
```

此命令根据上一命令的PORT_LE值显示Gig1/0/3的硬件配置详细信息。

价值	定义
值0	未设置该值。
值1	在大多数情况下设置的值。

```
C9400#show platform hardware fed active fwd-asic abstraction print-resource-handle
0x7fe5c5aabc28 1
Handle:0x7fe5c5aabc28 Res-Type:ASIC_RSC_PORT_LE Res-Switch-Num:0 Asic-Num:2 Feature-
ID:AL_FID_IFM Lkp-ftr-id:LKP_FEAT_INGRESS_PRECLASS1_IPV4 ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index2:0xc mtu_index/l3u_ri_index2:0x4 sm
handle [ASIC 2]: 0x7fe5c5abb588

Detailed Resource Information (ASIC#2)
---------------------------------------
LEAD_PORT_ALLOW_BROADCAST value 1 Pass LEAD_PORT_ALLOW_CAPWAP value 0 Pass LEAD_PORT_ALLOW_CTS
value 0 Pass LEAD_PORT_ALLOW_DOT1Q_TAGGED value 1 Pass LEAD_PORT_ALLOW_MULTICAST value 1 Pass
LEAD_PORT_ALLOW_NATIVE value 1 Pass LEAD_PORT_ALLOW_NON_CTS value 0 Pass
LEAD_PORT_ALLOW_PRIORITY_TAGGED value 1 Pass LEAD_PORT_ALLOW_UNICAST value 1 Pass
LEAD_PORT_ALLOW_UNKNOWN_ETHER_TYPE value 0 Pass LEAD_PORT_ALLOW_UNKNOWN_UNICAST value 1 Pass
LEAD_PORT_ALLOW_VLAN_LOAD_BALANCE_GROUP value 15 Pass LEAD_PORT_ALLOW_VRF value 0 Pass
LEAD_PORT_ARP_OR_ND_SNOOPING_ENABLED_IPV4 value 0 Pass LEAD_PORT_ARP_OR_ND_SNOOPING_ENABLED_IPV6
value 0 Pass LEAD_PORT_AUTH_MODE value 0 Pass LEAD_PORT_CAPWAP_TUNNEL value 0 Pass
LEAD_PORT_CONTENT_MATCHING_ENABLED value 0 Pass LEAD_PORT_CTS_ENABLED value 0 Pass
LEAD_PORT_CUSTOMER_PORT value 0 Pass LEAD_PORT_DAI_OR_ND_TRUST_MODE_IPV4 value 0 Pass
LEAD_PORT_DAI_OR_ND_TRUST_MODE_IPV6 value 0 Pass LEAD_PORT_DATA_GLEAN_LEARN_IPV4 value 0 Pass --
snip--
```

Etherchannel编程

在这些Etherchannel编程示例输出中，RP对FP编程，FP对FED编程，FED对Supervisor转发ASIC硬件编程，RP软件条目作为对象存储在对象数据库中，FP软件条目作为异步对象存储在对象数据库中。

```
C9400#show etherchannel summary
--snip--
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)
```

组掩码在此输出中为非零值。它用于散列过程中，以确定任何流量流出的EtherChannel中的链路。

```
C9400#show platform software interface rp active brief
Forwarding Manager Interfaces Information

Name                               ID              QFP ID
-------------------------------------------------------------
Null0                              1                 0
GigabitEthernet1/0/1               7                 0
GigabitEthernet1/0/2               8                 0
```

```
GigabitEthernet1/0/3              9                0
—snip—
GigabitEthernet1/0/13             19               0
—snip—
GigabitEthernet5/0/21            143               0
—snip—
Port-channel1                    748               0
—snip—

C9400#show platform software fed active etherchannel 1 group-mask
Group Mask Info
Aggport IIF Id: 00000000000002EC ---> hex 0x2EC = dec 748
Active Port: : 2 ------------------> 2 active interfaces in the etherchannel = the Member ports
below

Member Ports
                If Name             If Id  local        Group Mask
-------------------------------------------------------------------
   GigabitEthernet1/0/13  0000000000000013  true   5555555555555555 ---> hex 0x13 = dec 19
   GigabitEthernet5/0/21  000000000000008f  true   aaaaaaaaaaaaaaaa ---> hex 0x8f = dec 143
```

此命令显示Port-channel 1的配置：

```
C9400#show platform software fed active ifm if-id 0x000002ec
Interface IF_ID : 0x00000000000002ec
Interface Name : Port-channel1
Interface Block Pointer : 0x7fe5c685df98
Interface State : READY
Interface Status : ADD, UPD
Interface Ref-Cnt : 5
Interface Type : ETHERCHANNEL
Port Type : SWITCH PORT
Channel Number : 1
SNMP IF Index : 720
Port Handle : 0x50002f6
#Of Active Ports : 2
Base GPN : 1104
Index[2] : 0000000000000013 ---> Gig1/0/13 from previous command output
Index[3] : 000000000000008f ---> Gig5/0/21 from previous command output

Port Information
Handle ............ [0x50002f6]
Type .............. [L2-Ethchannel]
Identifier ........ [0x2ec]
Unit .............. [1]
Port Logical Subblock
L3IF_LE handle .... [0x0]
Num physical port . [2]
GPN Base .......... [1104]
Num physical port on asic [0] is [0]
DiBcam handle on asic [0].... [0x0]
Num physical port on asic [1] is [0]
DiBcam handle on asic [1].... [0x0]
Num physical port on asic [2] is [1] ------------> Gig1/0/13 is on ASIC instance 2 (Supervisor
ASIC 1, core 0)
DiBcam handle on asic [2].... [0x7fe5c6ae3608]
Num physical port on asic [3] is [1] ------------> Gig5/0/21 is on ASIC instance 3 (Supervisor
ASIC 1, core 1)
DiBcam handle on asic [3].... [0x7fe5c685d7e8]
Num physical port on asic [4] is [0]
DiBcam handle on asic [4].... [0x0]
Num physical port on asic [5] is [0]
DiBcam handle on asic [5].... [0x0]
```

```
Port L2 Subblock
Enabled ..... [No]
Allow dot1q ..... [No]
Allow native ..... [No]
Default VLAN ..... [0]
Allow priority tag ... [No]
Allow unknown unicast [No]
Allow unknown multicast[No]
Allow unknown broadcast[No]
Allow unknown multicast[Enabled]
Allow unknown unicast [Enabled]
IPv4 ARP snoop ..... [No]
IPv6 ARP snoop ..... [No]
Jumbo MTU ..... [0]
Learning Mode ..... [0]
Port QoS Subblock
Trust Type ..... [0x7]
Default Value ..... [0]
Ingress Table Map ..... [0x0]
Egress Table Map ..... [0x0]
Queue Map ..... [0x0]
Port Netflow Subblock
Port Policy Subblock
List of Ingress Policies attached to an interface
List of Egress Policies attached to an interface
Ref Count : 5 (feature Ref Counts + 1)
IFM Feature Ref Counts
FID : 115, Ref Count : 1
FID : 78, Ref Count : 1
No Sub Blocks Present
```

此命令显示映射接口的配置。

缩写词/实例	定义
IFM	接口管理器
实例	Gig1/0/13在接口ID为0x13的ASIC实例2（UADP 2.0 ASIC 1，核心0）上
实例	Gig5/0/21在接口ID为0x8f的ASIC实例3（UADP 2.0 ASIC 1，核心1）上

```
C9400#show platform software fed active ifm mappings
Interface IF_ID Inst Asic Core Port SubPort Mac Cntx LPN GPN Type Active GigabitEthernet1/0/1
0x7 2 1 0 0 0 4 4 1 101 NIF Y GigabitEthernet1/0/2 0x8 2 1 0 1 1 4 4 2 102 NIF Y --snip--
GigabitEthernet1/0/13 0x13 2 1 0 12 4 0 0 13 1105 NIF Y --snip-- GigabitEthernet5/0/21 0x8f 3 1
1 20 4 5 5 21 1104 NIF Y --snip--
```

全局EtherChannel配置

```
C9400#show platform software ether-channel rp active global-config
Forwarding Manager EtherChannel Global Configuration Information

  Frame Dist Method: Dest-IP-Address ---> distribution (hash) method: a packet's destination IP
address is used to determine which etherchannel member link it is sent out on
```

```
C9400#show platform software ether-channel fp active global-config
Forwarding Manager EtherChannel Global Configuration Information

  Frame Dist Method: Dest-IP-Address
             AOM ID: 27
```

```
            Status: Done ----------------> Programming in hardware is complete (FP received
acknowledgement from FED)


C9400#show platform software object-manager fp active object 27
Object identifier: 27
  Description: EtherChannel global configuration object
  Status: Done, Epoch: 0, Client data: 0x792e6e28
```

VLAN编程

```
C9400#show platform software fed active vlan 100
VLAN Fed Information

Vlan Id IF Id              LE Handle          STP Handle      L3 IF Handle          SVI IF ID
MVID
-------------------------------------------------------------------------------------------
---------------
100     0x0000000000420011 0x00007fe5c4616ef8 0x00007fe5c4617778 0x00007fe5c50dac28
0x00000000000002ea 10
```

此命令显示VLAN 100的硬件配置设置详细信息。

价值	定义
值0	未设置该值。
值1	在大多数情况下设置的值。

```
C9400#show platform hardware fed active fwd-asic abstraction print-resource-handle
0x00007fe5c4616ef8 1
Handle:0x7fe5c4616ef8 Res-Type:ASIC_RSC_VLAN_LE Res-Switch-Num:255 Asic-Num:255 Feature-
ID:AL_FID_L2 Lkp-ftr-id:LKP_FEAT_INVALID ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0xa mtu_index/l3u_ri_index0:0x0 sm
handle [ASIC 0]: 0x7fe5c461c1d8 index1:0xa mtu_index/l3u_ri_index1:0x0 sm handle [ASIC 1]:
0x7fe5c461d688 index2:0xa mtu_index/l3u_ri_index2:0x0 sm handle [ASIC 2]: 0x7fe5c461eb38
index3:0xa mtu_index/l3u_ri_index3:0x0 index4:0xa mtu_index/l3u_ri_index4:0x0 index5:0xa
mtu_index/l3u_ri_index5:0x0
Cookie length: 56
00 00 00 00 00 00 00 00 64 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information (ASIC#0) ---> ASIC instance 0 = Supervisor ASIC 0, core 0
--snip--
Detailed Resource Information (ASIC#1) ---> ASIC instance 1 = Supervisor ASIC 0, core 1
--snip--
Detailed Resource Information (ASIC#2) ---> ASIC instance 2 = Supervisor ASIC 1, core 0
----------------------------------------

LEAD_VLAN_ALLOW_SNOOPING_IGMP_OR_MLD_IPV4 value 0 Pass
LEAD_VLAN_ALLOW_SNOOPING_IGMP_OR_MLD_IPV6 value 0 Pass
LEAD_VLAN_ARP_OR_ND_SNOOPING_ENABLED_IPV4 value 0 Pass
LEAD_VLAN_ARP_OR_ND_SNOOPING_ENABLED_IPV6 value 0 Pass
LEAD_VLAN_BLOCK_L2_LEARN value 0 Pass
LEAD_VLAN_CONTENT_MATCHING_ENABLED value 0 Pass
LEAD_VLAN_DEST_MOD_INDEX_TVLAN_LE value 0 Pass
LEAD_VLAN_DHCP_SNOOPING_ENABLED_IPV4 value 0 Pass
LEAD_VLAN_DHCP_SNOOPING_ENABLED_IPV6 value 0 Pass
LEAD_VLAN_ENABLE_SECURE_VLAN_LEARNING_IPV4 value 0 Pass
LEAD_VLAN_ENABLE_SECURE_VLAN_LEARNING_IPV6 value 0 Pass
LEAD_VLAN_EPOCH value 0 Pass
LEAD_VLAN_L2_PROCESSING_STP_TCN value 0 Pass
```

```
LEAD_VLAN_L2FORWARD_IPV4_MULTICAST_PKT value 0 Pass
LEAD_VLAN_L2FORWARD_IPV6_MULTICAST_PKT value 0 Pass
LEAD_VLAN_L3_IF_LE_INDEX_PRIO value 1 Pass
LEAD_VLAN_L3IF_LE_INDEX value 111 Pass
LEAD_VLAN_LOOKUP_VLAN value 10 Pass ------------> MVID 10 = vlan 100
LEAD_VLAN_MCAST_LOOKUP_VLAN value 10 Pass
LEAD_VLAN_RIET_OFFSET value 1 Pass
LEAD_VLAN_SNOOPING_FLOODING_ENABLED_IGMP_OR_MLD_IPV4 value 0 Pass
LEAD_VLAN_SNOOPING_FLOODING_ENABLED_IGMP_OR_MLD_IPV6 value 1 Pass
LEAD_VLAN_SNOOPING_PROCESSING_STP_TCN_IGMP_OR_MLD_IPV4 value 0 Pass
LEAD_VLAN_SNOOPING_PROCESSING_STP_TCN_IGMP_OR_MLD_IPV6 value 0 Pass
LEAD_VLAN_VLAN_CLIENT_LABEL value 0 Pass
LEAD_VLAN_VLAN_CONFIG value 0 Pass
LEAD_VLAN_VLAN_FLOOD_ENABLED value 0 Pass
LEAD_VLAN_VLAN_ID_VALID value 1 Pass
LEAD_VLAN_VLAN_LOAD_BALANCE_GROUP value 15 Pass
LEAD_VLAN_VLAN_ROLE value 0 Pass
LEAD_VLAN_VLAN_FLOOD_MODE_BITS value 3 Pass
LEAD_VLAN_LVX_VLAN value 0 Pass
LEAD_VLAN_EGRESS_DEJAVU_CANON value 0 Pass
LEAD_VLAN_EGRESS_INGRESS_VLAN_MODE value 0 Pass
LEAD_VLAN_EGRESS_LOOKUP_VLAN value 0 Pass
LEAD_VLAN_EGRESS_SGACL_DISABLED value 3 Pass
LEAD_VLAN_EGRESS_VLAN_CLIENT_LABEL value 0 Pass
LEAD_VLAN_EGRESS_VLAN_ID_VALID value 1 Pass
LEAD_VLAN_EGRESS_VLAN_LOAD_BALANCE_GROUP value 15 Pass
LEAD_VLAN_EGRESS_INTRA_POD_BCAST value 0 Pass
LEAD_VLAN_EGRESS_INTER_POD_BCAST value 0 Pass
LEAD_VLAN_MAX value 0 Pass

Detailed Resource Information (ASIC#3) ---> ASIC instance 3 = Supervisor ASIC 1, core 1
--snip--
Detailed Resource Information (ASIC#4) ---> ASIC instance 4 = Supervisor ASIC 2, core 0
--snip-
Detailed Resource Information (ASIC#5) ---> ASIC instance 5 = Supervisor ASIC 2, core 1
--snip--
```

生成树编程

```
C9400#show spanning-tree vlan 100

VLAN0100
Spanning tree enabled protocol rstp Root ID Priority 32868 Address 20bb.c05e.5300 Cost 4 Port
2473 (Port-channel1) Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec Bridge ID Priority
32868 (priority 32768 sys-id-ext 100) Address 2c5a.0f1c.28c0 Hello Time 2 sec Max Age 20 sec
Forward Delay 15 sec Aging Time 300 sec Interface Role Sts Cost Prio.Nbr Type ------------------
- ---- --- --------- -------- -------------------------------- Gi1/0/1 Desg FWD 19 128.1 Shr
Gi2/0/11 Desg FWD 4 128.107 P2p Po1 Root FWD 3 128.2473 P2p Peer(STP)

C9400#show etherchannel summary

--snip--

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)
```

这些命令显示Port-channel 1的生成树转发状态。

```
C9400#show platform software interface rp active brief
Forwarding Manager Interfaces Information

Name                               ID              QFP ID
-----------------------------------------------------------
Null0                               1                0
GigabitEthernet1/0/1                7                0
GigabitEthernet1/0/2                8                0
GigabitEthernet1/0/3                9                0
—snip—
Port-channel1                     748                0
—snip—
```

```
C9400#show platform software fed active vp summary interface if_id 748
           if_id      vlan_id   pvlan_mode   pvlan_vlan   stp_state  vtp pruned
Untagged
-------------------------------------------------------------------------------------------------
-
             748          100        trunk            1  forwarding          No
No
```

下一个命令显示VLAN 100的生成树硬件转发状态。

```
C9400#show platform software fed active vp summary vlan 100
           if_id      vlan_id   pvlan_mode   pvlan_vlan   stp_state  vtp pruned
Untagged
-------------------------------------------------------------------------------------------------
-
--snip--
             748 100        trunk           1  forwarding          No                No
--snip--
```

```
C9400#show platform hardware fed active vlan 100 ingress
VLAN STP State in hardware

vlan id is:: 100
Interfaces in forwarding state: : Gi2/0/11(Tagged), Gi1/0/1(Tagged), Gi1/0/13(Tagged),
Gi5/0/21(Tagged)
flood list: : Gi2/0/11, Gi1/0/1, Gi1/0/13, Gi5/0/21

C9400#show platform hardware fed active vlan 100 egress
VLAN STP State in hardware

vlan id is:: 100
Interfaces in forwarding state: : Gi2/0/11(Tagged), Gi1/0/1(Tagged), Gi1/0/13(Tagged),
Gi5/0/21(Tagged)
```

检查生成树的稳定性。确保拓扑更改通知(TCN)不常出现。

```
C9400#show spanning-tree vlan 100 detail

 VLAN0100 is executing the rstp compatible Spanning Tree protocol
  Bridge Identifier has priority 32768, sysid 10, address 2c5a.0f1c.28c0
  Configured hello time 2, max age 20, forward delay 15, transmit hold-count 6
  Current root has priority 32868, address 2c5a.0f1c.5300
  Root port is 2473 (Port-channel1), cost of root path is 4
  Topology change flag not set, detected flag not set
```

```
  Number of topology changes 1 last change occurred 2w6d ago
          from Port-channel1
  Times:  hold 1, topology change 35, notification 2
          hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0, aging 300

--snip--
```

L2转发编程

```
C9400#show etherchannel summary
--snip--
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)

C9400#ping 100.100.900.53
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 100.100.900.53, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/5 ms

C9400#show mac address-table dynamic vlan 100
Mac Address Table
-------------------------------------------

Vlan Mac Address     Type     Ports
---- -----------     -------- -----
100  0000.0200.0800  DYNAMIC  Gi1/0/1
100  20bb.c05e.5318  DYNAMIC  Po1
100  20bb.c05e.5351  DYNAMIC  Po1
Total Mac Addresses for this criterion: 3
```

软件编程

在下一个输出示例中，RP对FP编程，FP对FED编程，FED最后对Supervisor转发ASIC硬件编程，RP软件MAC条目作为对象存储在对象数据库中，FP软件MAC条目作为异步对象存储在对象数据库中。

```
C9400#show platform software matm rp active mac 20bb.c05e.5351 1 100 ---> 100 = vlan
Tbl_Type   Tbl_ID    MAC_Address  Type   Ports  AOM_ID/OM_PTR
MAT_VLAN      100 20bb.c05e.5351     1     1  OM: 0x3700860010
List of Ports: 748

C9400#show platform software interface rp active brief
Forwarding Manager Interfaces Information

Name                               ID              QFP ID
-----------------------------------------------------------
Null0                               1                0
GigabitEthernet1/0/1                7                0
GigabitEthernet1/0/2                8                0
GigabitEthernet1/0/3                9                0
—snip—
Port-channel1                     748                0
—snip—
```

```
C9400#show platform software matm fp active mac 20bb.c05e.5351
Tbl_Type   Tbl_ID    MAC_Address  Type   Ports  AOM_ID/OM_PTR
MAT_VLAN      100 20bb.c05e.5351     1     1  6567 created
  List of Ports: 748

C9400#show platform software object-manager fp active object 6567
Object identifier: 6567
  Description: matm mac entry type VLAN, id 100, 20bb.c05e.5351
Status: Done, Epoch: 0, Client data: 0x799633f8
```

硬件编程 — 方法1

```
C9400#show platform software fed active matm macTable vlan 100
VLAN MAC Type  Seq#  macHandle      siHandle       diHandle      *a_time  *e_time   ports
100  2c5a.0f1c.28e1 0X8002 0    0x7fe5c5eaf1c8 0x7fe5c5924f38 0x0            0        0
Vlan100
100  20bb.c05e.5351 0X1    589  0x7fe5c6b03d68 0x7fe5c6865f78 0x7fe51001b458 300      1
Port-channel1
100  0000.0200.0800 0X1    610  0x7fe5c6b07888 0x7fe5c6b076e8 0x7fe5c5972ce8 300      1
GigabitEthernet1/0/1
Total Mac number of addresses:: 3
*a_time=aging_time(secs) *e_time=total_elapsed_time(secs)
Type:
MAT_DYNAMIC_ADDR     0x1       MAT_STATIC_ADDR       0x2 ---> Type = dynamically learned MAC
address entry
MAT_CPU_ADDR         0x4       MAT_DISCARD_ADDR      0x8
MAT_ALL_VLANS        0x10      MAT_NO_FORWARD        0x20
MAT_IPMULT_ADDR      0x40      MAT_RESYNC            0x80
MAT_DO_NOT_AGE       0x100     MAT_SECURE_ADDR       0x200
MAT_NO_PORT          0x400     MAT_DROP_ADDR         0x800
MAT_DUP_ADDR         0x1000    MAT_NULL_DESTINATION  0x2000
MAT_DOT1X_ADDR       0x4000    MAT_ROUTER_ADDR       0x8000
MAT_WIRELESS_ADDR    0x10000   MAT_SECURE_CFG_ADDR   0x20000
MAT_OPQ_DATA_PRESENT 0x40000   MAT_WIRED_TUNNEL_ADDR 0x80000
MAT_DLR_ADDR         0x100000  MAT_MRP_ADDR          0x200000
MAT_MSRP_ADDR        0x400000  MAT_LISP_LOCAL_ADDR   0x800000
MAT_LISP_REMOTE_ADDR 0x1000000 MAT_VPLS_ADDR         0x2000000
```

macHandle编程

缩写词/术语	定义
vlan:10	MVID 10. VLAN 100在交换机内部使用映射的VLAN ID(MVID)10。
gpn:1104	端口通道1的全局端口号。
mac:0x20bbc05e5351	MAC地址20bb.c05e.5351

以下是macHandle编程输出示例：

```
C9400#show platform hardware fed active fwd-asic abstraction print-resource-handle
0x7fe5c6b03d68 1
Handle:0x7fe5c6b03d68 Res-Type:ASIC_RSC_HASH_TCAM Res-Switch-Num:0 Asic-Num:255 Feature-
ID:AL_FID_L2 Lkp-ftr-id:LKP_FEAT_L2_SRC_MAC_VLAN ref_count:1
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: handle [ASIC: 0]: 0x7fe5c6aed898 handle
[ASIC: 1]: 0x7fe5c6b00fd8 handle [ASIC: 2]: 0x7fe5c6858208
Features sharing this resource:Cookie length: 12
5e c0 bb 20 51 53 0a 80 07 00 00 00
```

```
Detailed Resource Information (ASIC#0)
---------------------------------------
Number of HTM Entries: 1
Entry 0: (handle 0x7fe5c6aed898) Abs_hash_index: 294 KEY - vlan:10 mac:0x20bbc05e5351 l3_if:0
gpn:1104 epoch:0 static:0 flood_en: 0 vlan_lead_wless_flood_en: 0 client_home_asic: 0 MASK -
vlan:0 mac:0x0 l3_if:0 gpn:0 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0
client_home_asic: 0 SRC_AD - need_to_learn:0 lrn_v:0 catchall:0 static_mac:0 chain_ptr_v:0
chain_ptr: 0 static_entry_v:0 auth_state:0 auth_mode:0 auth_behavior_tag:0 traf_m:0 is_src_ce:0
DST_AD - si:0xcd bridge:0 replicate:0 blk_fwd_o:0 v4_rmac:0 v6_rmac:0 catchall:0 ign_src_lrn:0
port_mask_o:0 afd_cli_f:0 afd_lbl:0 prio:3 dest_mod_idx:0 destined_to_us:0 pv_trunk:1 smr:0
Detailed Resource Information (ASIC#1) --snip-- Detailed Resource Information (ASIC#2) --snip--

C9400#show platform software fed active vlan 100
VLAN Fed Information

Vlan Id IF Id              LE Handle          STP Handle      L3 IF Handle          SVI IF ID
MVID
-------------------------------------------------------------------------------------------
--------------
100     0x0000000000420011 0x00007fe5c4616ef8 0x00007fe5c4617778 0x00007fe5c50dac28
0x00000000000002ea 10

C9400#show platform software fed active ifm mappings etherchannel
Mappings Table

Chan    Interface        IF_ID
-----------------------------------------------------
1       Port-channel1    0x000002ec
--snip--

C9400#show platform software fed active ifm if-id 0x000002ec <-- IF_ID from previous output
Interface IF_ID : 0x00000000000002ec
Interface Name : Port-channel1
Interface Block Pointer : 0x7fe5c685df98
Interface State : READY
Interface Status : ADD, UPD
Interface Ref-Cnt : 5
Interface Type : ETHERCHANNEL
Port Type : SWITCH PORT
Channel Number : 1
SNMP IF Index : 720
Port Handle : 0x50002f6
#Of Active Ports : 2
Base GPN : 1104
Index[2] : 0000000000000013
Index[3] : 000000000000008f

Port Information
Handle ............ [0x50002f6]
Type .............. [L2-Ethchannel]
Identifier ........ [0x2ec]
Unit .............. [1]
Port Logical Subblock
L3IF_LE handle .... [0x0]
Num physical port . [2]
GPN Base .......... [1104]
--snip--
```

注意：mac所学习的接口是单个接口而不是端口通道，此命令用于确定GPN到接口的映射

```
C9400#show platform software fed active ifm mappings gpn
```

```
Mappings Table


GPN   Interface              IF_ID
------------------------------------------------------------
101   GigabitEthernet1/0/1   0x00000007
102   GigabitEthernet1/0/2   0x00000008
103   GigabitEthernet1/0/3   0x00000009
--snip--
```

siHandle编程

缩写词/术语	定义
siHandle	站索引句柄。数据包重写信息（RI =重写索引）和传出接口信息（DI =目标索引）。

单Supervisor ASIC上双核的复制位图：

缩写词/术语	定义
本地ASIC（LD =本地数据）	目标在同一ASIC上，核心与
核心拷贝(CD =核心数据	相同。 同一ASIC上的目标，另一个
远程ASIC（RD =远程数据）	心。 另一个ASIC上的目标。

```
C9400#show platform hardware fed active fwd-asic abstraction print-resource-handle
0x7fe5c6865f78 1
Handle:0x7fe5c6865f78 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-
ID:AL_FID_L3_UNICAST_IPV4 Lkp-ftr-id:LKP_FEAT_INVALID ref_count:2
priv_ri/priv_si Handle: 0x7fe5c6864938Hardware Indices/Handles: index0:0xcd
mtu_index/l3u_ri_index0:0x0 index1:0xcd mtu_index/l3u_ri_index1:0x0 index2:0xcd
mtu_index/l3u_ri_index2:0x0 index3:0xcd mtu_index/l3u_ri_index3:0x0 index4:0xcd
mtu_index/l3u_ri_index4:0x0 index5:0xcd mtu_index/l3u_ri_index5:0x0
Features sharing this resource:64 (1)]
55 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 64 00 00 00 00 00 00 00 00 00 00 00 07 00 20 bb c0 5e 53 51 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Detailed Resource Information (ASIC#0) ---> ASIC instance 0 = Supervisor ASIC 0, core 0
----------------------------------------

Station Index (SI) [0xcd]
RI = 0x29   ------------------------------> Rewrite index (no MAC rewrite for L2 forwarding)
DI = 0x51c2 ------------------------------> Destination index = outgoing interface
stationTableGenericLabel = 0
stationFdConstructionLabel = 0
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0x1
Replication Bitmap: LD RD CD

Detailed Resource Information (ASIC#1) ---> ASIC instance 1 = Supervisor ASIC 0, core 1
--snip--
Detailed Resource Information (ASIC#2) ---> ASIC instance 2 = Supervisor ASIC 1, core 0
--snip--
Detailed Resource Information (ASIC#3) ---> ASIC instance 3 = Supervisor ASIC 1, core 1
--snip--
Detailed Resource Information (ASIC#4) ---> ASIC instance 4 = Supervisor ASIC 2, core 0
```

```
--snip--
Detailed Resource Information (ASIC#5) ---> ASIC instance 5 = Supervisor ASIC 2, core 1
--snip--

C9400#show platform hardware fed active fwd-asic resource asic all destination-index range
0x51c2 0x51c2

ASIC#0:
--snip--
ASIC#1:
--snip--

ASIC#2: ------------------------> ASIC Instance 2 = Supervisor ASIC 1, core 0
Destination Index (DI) [0x51c2]
portMap = 0x00000000 00001000 ---> binary 0001 0000 0000 0000 = Port 12 (see next command
output)
cmi1 = 0                          (read right to left, zero based)
rcpPortMap = 0
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0

ASIC#3: ------------------------> ASIC instance 3 = Supervisor ASIC 1, core 1
Destination Index (DI) [0x51c2]
portMap = 0x00000000 00100000 ---> binary 0001 0000 0000 0000 0000 0000 = Port 20 (see next
command output)
cmi1 = 0                          (read right to left, zero based)
rcpPortMap = 0
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0

ASIC#4:
--snip--
ASIC#5:
--snip--

C9400#show platform software fed active ifm mappings
Interface              IF_ID Inst Asic Core Port SubPort Mac Cntx LPN GPN  Type Active
GigabitEthernet1/0/1   0x7   2    1    0    0    0       4   4    1   101  NIF  Y
GigabitEthernet1/0/2   0x8   2    1    0    1    1       4   4    2   102  NIF  Y
--snip--
GigabitEthernet1/0/13  0x13  2    1    0    12   4       0   0    13  1105 NIF  Y
--snip--
GigabitEthernet5/0/21  0x8f  3    1    1    20   4       5   5    21  1104 NIF  Y
--snip--

C9400#show etherchannel summary
--snip--
```

```
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)
```

由于这是第2层MAC转发条目，因此没有预期的MAC重写信息。

```
C9400#show platform hardware fed active fwd-asic resource asic all rewrite-index range 0x29 0x29
1
ASIC#0:

Rewrite Data Table Entry,
ASIC#:0, rewrite_type:1, RI:41 ---> dec 41 = hex 0x29

MAC Addr:
MAC Addr: 20:bb:c0:5e:53:51,
 L3IF LE Index 111

ASIC#1:

Rewrite Data Table Entry,
ASIC#:1, rewrite_type:1, RI:41

MAC Addr:
MAC Addr: 20:bb:c0:5e:53:51,
 L3IF LE Index 111

ASIC#2:
--snip--
ASIC#3:
--snip--
ASIC#4:
--snip--
ASIC#5:
--snip--

C9400#show mac address-table address 20bb.c05e.5351
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
 100    20bb.c05e.5351    DYNAMIC     Po1
Total Mac Addresses for this criterion: 1
```

diHandle编程

缩写词	定义
diHandle	目标索引句柄。这是传出接口信息。

```
C9400#show platform hardware fed active fwd-asic abstraction print-resource-handle
0x7fe51001b458 1
Handle:0x7fe51001b458 Res-Type:ASIC_RSC_DI Res-Switch-Num:0 Asic-Num:255 Feature-
ID:AL_FID_INVALID Lkp-ftr-id:LKP_FEAT_INVALID ref_count:21
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x51c2 mtu_index/l3u_ri_index0:0x0
index1:0x51c2 mtu_index/l3u_ri_index1:0x0 index2:0x51c2 mtu_index/l3u_ri_index2:0x0
index3:0x51c2 mtu_index/l3u_ri_index3:0x0 index4:0x51c2 mtu_index/l3u_ri_index4:0x0
index5:0x51c2 mtu_index/l3u_ri_index5:0x0
Features sharing this resource:Cookie length: 8
01 00 00 00 c2 51 00 00
```

```
Detailed Resource Information (ASIC#0)
--snip--
Detailed Resource Information (ASIC#1)
--snip--

Detailed Resource Information (ASIC#2) ---> ASIC Instance 2 = Supervisor ASIC 1, core 0
----------------------------------------
Destination Index (DI) [0x51c2]
portMap = 0x00000000 00001000 -------------> binary 0001 0000 0000 0000 = Port 12 (see next
command output)
cmi1 = 0                                    (read right to left, zero based)
rcpPortMap = 0
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0

Detailed Resource Information (ASIC#3) ---> ASIC Instance 3 = Supervisor ASIC 1, core 1
----------------------------------------
Destination Index (DI) [0x51c2]
portMap = 0x00000000 00100000 ---> binary 0001 0000 0000 0000 0000 0000 = Port 20 (see next
command output)
cmi1 = 0                           (read right to left, zero based)
rcpPortMap = 0
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0

Detailed Resource Information (ASIC#4) --snip-- Detailed Resource Information (ASIC#5) --snip--

C9400#show platform software fed active ifm mappings
Interface IF_ID Inst Asic Core Port SubPort Mac Cntx LPN GPN Type Active GigabitEthernet1/0/1
0x7 2 1 0 0 0 4 4 1 101 NIF Y GigabitEthernet1/0/2 0x8 2 1 0 1 1 4 4 2 102 NIF Y --snip--
GigabitEthernet1/0/13 0x13 2 1 0 12 4 0 0 13 1105 NIF Y --snip-- GigabitEthernet5/0/21 0x8f 3 1
1 20 4 5 5 21 1104 NIF Y --snip--

C9400#show etherchannel summary
--snip--
Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)       LACP        Gi1/0/13(P) Gi5/0/21(P)
```

硬件编程 — 方法2

缩写词/术语	定义
vlan:10	MVID 10. VLAN 100在交换机内部使用映射的VLAN ID(MVID)10。
gpn:1104	端口通道1的全局端口号。

mac:0x20bbc05e5351 MAC地址20bb.c05e.5351

硬件编程方法2示例输出：

```
C9400#show platform hardware fed active matm macTable vlan 100
--snip--
HEAD: MAC address 20bb.c05e.5351 in VLAN 100
KEY: vlan 10, mac 0x20bbc05e5351, l3_if 0, gpn 1104, epoch 0, static 0, flood_en 0,
vlan_lead_wless_flood_en 0, client_home_asic 0
MASK: vlan 0, mac 0x0, l3_if 0, gpn 0, epoch 0, static 0, flood_en 0, vlan_lead_wless_flood_en
0, client_home_asic 0
SRC_AD: need_to_learn 0, lrn_v 0, catchall 0, static_mac 0, chain_ptr_v 0, chain_ptr 0,
static_entry_v 0, auth_state 0, auth_mode 0, traf_mode 0, is_src_ce 0
DST_AD: si 0xc7, bridge 0, replicate 0, blk_fwd_o 0, v4_mac 0, v6_mac 0, catchall 0, ign_src_lrn
0, port_mask_o 0, afd_cli_f 0, afd_lbl 0, priority 3, dest_mod_idx 0, destined_to_us 0, pv_trunk
1
--snip--

C9400#show platform software fed active vlan 100
VLAN Fed Information

Vlan Id IF Id              LE Handle          STP Handle      L3 IF Handle          SVI IF ID
MVID
-------------------------------------------------------------------------------------------------
---------------
100     0x0000000000420011 0x00007fe5c4616ef8 0x00007fe5c4617778 0x00007fe5c50dac28
0x00000000000002ea 10

C9400#show platform software fed active ifm mappings etherchannel
Mappings Table

Chan    Interface        IF_ID
-----------------------------------------------------
1       Port-channel1    0x000002ec
--snip--

C9400#show platform software fed active ifm if-id 0x000002ec
Interface IF_ID : 0x00000000000002ec
Interface Name : Port-channel1
Interface Block Pointer : 0x7fe5c685df98
Interface State : READY
Interface Status : ADD, UPD
Interface Ref-Cnt : 5
Interface Type : ETHERCHANNEL
Port Type : SWITCH PORT
Channel Number : 1
SNMP IF Index : 720
Port Handle : 0x50002f6
#Of Active Ports : 2
Base GPN : 1104
Index[2] : 0000000000000013
Index[3] : 000000000000008f

Port Information
Handle ..... [0x50002f6]
Type ..... [L2-Ethchannel]
Identifier ..... [0x2ec]
Unit ..... [1]
Port Logical Subblock
L3IF_LE handle .... [0x0]
```

```
Num physical port . [2]
GPN Base ......... [1104]
--snip--
```

注意：如果mac获取的接口是单个接口而不是端口通道，则下一条命令用于确定gpn到接口的映射：

```
C9400#show platform software fed active ifm mappings gpn
Mappings Table

GPN   Interface              IF_ID
------------------------------------------------------------
101   GigabitEthernet1/0/1   0x00000007
102   GigabitEthernet1/0/2   0x00000008
103   GigabitEthernet1/0/3   0x00000009
--snip--
```

TCAM 利用率

检查每个Supervisor ASIC实例上MAC地址条目的TCAM利用率，确保交换机不会耗尽TCAM空间来存储硬件中的条目。

```
C9400show platform hardware fed active fwd-asic resource tcam utilization
CAM Utilization for ASIC Instance [0]
--snip--
CAM Utilization for ASIC Instance [1]
 --snip--
CAM Utilization for ASIC Instance [2]
 --snip--
CAM Utilization for ASIC Instance [3]---> ASIC instance 3 = Supervisor ASIC 1, Core 1
Table Max Values Used Values ------------------------------------------------------------------------
------------- Unicast MAC addresses 65536/1024  13/1 -------------> prefix/mask
 IGMP and Multicast groups                          16384/1024          0/7
 L2 Multicast groups                                16384/1024          1/9
 Directly or indirectly connected routes            49152/65536          0/0
 NAT/PAT SA address and Port                           0                 0
 QoS Access Control Entries                         18432                34
 Security Access Control Entries                    18432                 0
 Ingress Netflow ACEs                               1024                 0
 Policy Based Routing ACEs                          2048                 9
 Egress Netflow ACEs                                2048                 8
 Input Microflow policer ACEs                          0                 0
 Output Microflow policer ACEs                         0                 0
 Flow SPAN ACEs                                     1024                13
 Control Plane Entries                              1024                 0
 Tunnels                                            1024                 0
 Lisp Instance Mapping Entries                      1024                 0
 Input Security Associations                         512                 3
 Output Security Associations and Policies           512                 0
 SGT_DGT                                            8192/512           0/0
 CLIENT_LE                                          4096/256           2/0
 INPUT_GROUP_LE                                     1024                 0
 OUTPUT_GROUP_LE                                    1024                 0
 Macsec SPD                                          256                 0
CAM Utilization for ASIC Instance [4]
--snip--
CAM Utilization for ASIC Instance [5]
--snip--
```

成功的硬件编程

所有功能（无论是MAC地址、接口、VLAN等）都存储在对象数据库中，并作为对象编程到硬件中。

RP对FP编程，FP对FED编程，然后FED最终对管理引擎转发ASIC硬件编程。RP软件条目作为对象存储在对象数据库中，而FP软件条目作为异步对象存储在对象数据库中。

当FP对FED进行编程（FED反过来对管理引擎转发ASIC进行编程）时，FED会向FP发回确认。然后，FP将其转发到RP，以指示硬件编程成功完成。如果FED硬件编程缺失或不正确，您可以使用下一命令检查问题和/或确认。

```
C9400#show platform software object-manager fp active statistics
Forwarding Manager Asynchronous Object Manager Statistics

Object update: Pending-issue: 0, Pending-acknowledgement: 0
Batch begin:   Pending-issue: 0, Pending-acknowledgement: 0
Batch end:     Pending-issue: 0, Pending-acknowledgement: 0
Command:       Pending-acknowledgement: 0
Total-objects: 3269
Stale-objects: 0
Resolve-objects: 0
Error-objects: 0
Paused-types: 0
```

如果上一个命令显示处于挂起发出状态的非零对象，请使用此命令查找涉及的对象编号：

```
C9400#show platform software object-manager fp active pending-issue-update
```

然后，使用此命令确定与对象编号关联的停滞进程：

```
C9400#show platform software object-manager fp active object {object#}
```

在RP端，使用此命令检查FP未确认的对象的删除挂起（删除挂起）。

```
C9400#show platform software object-manager rp active object-type-info
Object type Name Count Del Pend Layer ------------------------------------------------------------
-------------------- CC cc 5 0 2 SPA spa 0 0 4 PORT_DPIDB port_dpidb 164 0 10 CHANNEL_DPIDB
channel_dpidb 0 0 12 VIRTUAL_DPIDB virtual_dpidb 503 0 13 SW_DPIDB sw_dpidb 0 0 17 VLAN vlan 0 0
19
--snip--
```

运行状况检查

控制平面流量和策略

检查硬件UADP 2.0中CoPP（控制平面策略）丢包，以检查流量是否被传送到软件CPU。这会影响MAC学习和生成树稳定性。

```
C9400#show policy-map control-plane
 Control Plane
```

```
  Service-policy input: system-cpp-policy

--snip--

    Class-map: system-cpp-police-sw-forward (match-any)
      0 packets, 0 bytes
      5 minute offered rate 0000 bps, drop rate 0000 bps
      Match: none
      police:
          rate 1000 pps, burst 244 packets
        conformed 1298 bytes; actions:
          transmit
        exceeded 0 bytes; actions:
          drop

--snip--

    Class-map: system-cpp-police-l2-control (match-any)
      0 packets, 0 bytes
      5 minute offered rate 0000 bps, drop rate 0000 bps
      Match: none
      police:
          rate 500 pps, burst 122 packets
        conformed 239197001 bytes; actions:
          transmit
        exceeded 0 bytes; actions:
          drop

--snip--

    Class-map: system-cpp-default (match-any)
      0 packets, 0 bytes
      5 minute offered rate 0000 bps, drop rate 0000 bps
      Match: none
      police:
          rate 1000 pps, burst 244 packets
        conformed 0 bytes; actions:
          transmit
        exceeded 0 bytes; actions:
          drop

    Class-map: class-default (match-any)
      0 packets, 0 bytes
      5 minute offered rate 0000 bps, drop rate 0000 bps
      Match: any
```

与上例相同的CoPP输出以更精细且更易于读取（压缩）的格式显示在此。

```
C9400#show platform hardware fed active qos queue stats internal cpu policer

                          CPU Queue Statistics
============================================================================================
                                                (default) (set)     Queue        Queue
QId PlcIdx  Queue Name                 Enabled   Rate     Rate      Drop(Bytes)  Drop(Frames)
0    11     DOT1X Auth                   Yes     1000      1000     0            0
1    1      L2 Control                   Yes     2000      400      0            0
2    14     Forus traffic                Yes     1000      1000     0            0
3    0      ICMP GEN                     Yes     600       600      0            0
```

4	2	Routing Control	Yes	5400	1800	0	0
5	14	Forus Address resolution	Yes	1000	1000	0	0
6	0	ICMP Redirect	Yes	600	600	0	0
7	16	Unused	Yes	1000	1000	0	0
8	4	L2 LVX Cont Pack	Yes	1000	1000	0	0
9	16	EWLC Control	Yes	1000	1000	0	0
10	16	EWLC Data	Yes	1000	1000	0	0
11	13	L2 LVX Data Pack	Yes	1000	1000	0	0
12	0	BROADCAST	Yes	600	600	0	0
13	10	Learning cache ovfl	Yes	100	200	0	0
14	13	Sw forwarding	Yes	1000	1000	0	0
15	8	Topology Control	Yes	13000	13000	0	0
16	12	Proto Snooping	Yes	2000	2000	0	0
17	16	DHCP Snooping	Yes	1000	1000	0	0
18	9	Transit Traffic	Yes	500	400	0	0
19	10	RPF Failed	Yes	100	200	0	0
20	15	MCAST END STATION	Yes	2000	2000	0	0
21	13	LOGGING	Yes	1000	1000	0	0
22	7	Punt Webauth	Yes	1000	1000	0	0
23	10	Crypto Control	Yes	100	200	0	0
24	10	Exception	Yes	100	200	0	0
25	3	General Punt	Yes	200	200	0	0
26	10	NFL SAMPLED DATA	Yes	100	200	0	0
27	2	Low Latency	Yes	5400	1800	0	0
28	10	EGR Exception	Yes	100	200	0	0
29	5	Stackwise Virtual Control	No	8000	8000	0	0
30	9	MCAST Data	Yes	500	400	0	0
31	10	Gold Pkt	Yes	100	200	0	0

* NOTE: CPU queue policer rates are configured to the closest hardware supported value

CPU Queue Policer Statistics

Policer Index	Policer Accept Bytes	Policer Accept Frames	Policer Drop Bytes	Policer Drop Frames
0	3132	36	0	0
1	239197001	721952	0	0
2	123004776	978818	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	1024	16	0	0
9	0	0	0	0
10	13600	200	0	0
11	0	0	0	0
12	0	0	0	0
13	1298	3	0	0
14	80520	9158	0	0
15	2189268	23733	0	0
16	0	0	0	0
17	0	0	0	0

CPP Classes to queue map

PlcIdx	CPP Class	:	Queues
0	system-cpp-police-data	:	ICMP GEN/BROADCAST/ICMP Redirect/ 10 system-cpp-police-sys-data : Learning cache ovfl/Crypto Control/Exception/EGR Exception/NFL SAMPLED DATA/Gold Pkt/RPF Failed/ 13 system-cpp-police-sw-forward : Sw forwarding/LOGGING/L2 LVX Data Pack/ 9 system-cpp-police-multicast : Transit Traffic/MCAST Data/ 15 system-cpp-police-multicast-end-station : MCAST END STATION / 7 system-cpp-police-punt-webauth : Punt Webauth/ 1

```
system-cpp-police-l2-control : L2 Control/ 5 system-cpp-police-stackwise-virt-control :
Stackwise Virtual Control/ 2 system-cpp-police-routing-control : Routing Control/Low Latency/ 3
system-cpp-police-control-low-priority : General Punt/ 4 system-cpp-police-l2lvx-control : L2
LVX Cont Pack/ 8 system-cpp-police-topology-control : Topology Control/ 11 system-cpp-police-
dot1x-auth : DOT1X Auth/ 12 system-cpp-police-protocol-snooping : Proto Snooping/ 14 system-cpp-
police-forus : Forus Address resolution/Forus traffic/ 5 system-cpp-police-stackwise-virt-
control : Stackwise Virtual Control/ 16 system-cpp-default : DHCP Snooping/Unused/EWLC
Control/EWLC Data/
```

从软件(CPU)的角度检查CPU传送路径（面向软件CPU的硬件UADP 2.0）统计信息。

```
C9400#show platform software infrastructure lsmpi
LSMPI interface internal stats:
enabled=0, disabled=0, throttled=0, unthrottled=0, state is ready
Input Buffers = 8801257
Output Buffers = 5506129
rxdone count = 8801257
txdone count = 5506128
Rx no particletype count = 0
Tx no particletype count = 0
Txbuf from shadow count = 0
No start of packet = 0
No end of packet = 0
Punt drop stats:
Bad version 0
Bad type 0
Had feature header 0
Had platform header 0
Feature header missing 0
Common header mismatch 0
Bad total length 0
Bad packet length 0
Bad network offset 0
Not punt header 0
Unknown link type 0
No swidb 0
Bad ESS feature header  0
No ESS feature 0
No SSLVPN feature 0
No PPP bridge feature 0
Punt For PPP bridge type packets 0
Punt For Us type unknown 0
EPC CP RX Pkt cleansed 0
Punt cause out of range 0
IOSXE-RP Punt packet causes:
       42879 Layer2 control and legacy packets
     3644168 ARP request or response packets
        7584 For-us data packets
        1794 Mcast Directly Connected Source packets
        1573 Mcast PIM signaling packets
      750076 For-us control packets
38058 Layer2 bridge domain data packet packets
     3823736 Layer2 control protocols packets

   FOR_US Control IPv4 protcol stats:
         750076 [proto=0] packets
Packet histogram(500 bytes/bin), avg size in 125, out 126:
 Pak-Size      In-Count        Out-Count
      0+:       8228322          5207592
    500+:         41355             1717
   1000+:          4331             2402
```

```
   1500+:         35860            20017

Lsmpi11/3 is up, line protocol is up <-- CPU interface
  Hardware is LSMPI
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not set
  Unknown, Unknown, media type is unknown media type
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/1500/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     8309868 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     5231728 packets output, 659535525 bytes, 0 underruns 0 output errors, 0 collisions, 0
interface resets 0 unknown protocol drops 0 output buffer failures, 0 output buffers swapped out



C9400#show platform software infrastructure lsmpi punt
LSMPI punt statistics
    Total packets consumed:             876
    Total packets forwarded:            8468766
    First frag packets:                 0
    Total packets consumed & forwarded: 0

Cause                           Total          Total          Length         Dot1q encap
Other          SKB
                                consumed       forwarded      error          exceeded
linktype       invalid
MPLS ICMP Can't Fragment        0              0              0              0              0
0
IPv4 Options                    0              0              0              0              0
0
Layer2 control and legacy       0              0              0              0              0
0
PPP Control                     0              0              0              0              0
0
CLNS IS-IS Control              0              0              0              0              0
0
HDLC keepalives                 0              0              0              0              0
0
--snip--
```

从软件(CPU)的角度检查CPU注入路径（面向硬件管理引擎的软件CPU）统计信息。

```
C9400#show platform software infrastructure inject
Statistics for L3 injected packets:
 5233473 total inject pak, 3 failed
 0 sent, 859329 prerouted
 0 non-CEF capable, 855296 non-unicast
 859826 IP, 0 IPv6
 0 MPLS, 0 Non-IP Tunnel
```

```
 0 UDLR tunnel, 0 P2MP replicated mcast
 0 Non-IP Fastswitched over Tunnel, 4373497 legacy pak path
 0 Other packet
 0 IP fragmented
 644 normal, 391 nexthop
 858788 adjacency, 150 feature
 0 undefined
 3 pak find no adj, 0 no adj-id
 137322 sb alloc, 856085 sb local
 0 p2mcast failed count 0 p2mcast enqueue fail
 0 unicast dhc
 0 mobile ip
 0 IPv6 NA
 0 IPv6 NS
 0 Transport failed cases
 0 Grow packet buffer
 per feature packet inject statistics
 150 Feature multicast
 0 Feature Edge Switching Service
 0 Feature Session Border Controller
 0 Feature interrupt level
 0 Feature use outbound interface
 0 Feature interrupt level with OCE
 0 Feature ICMPv6 error message
 0 Feature Session Border Controller media packet injection
 0 Feature Tunnel Ethernet over GRE
 0 Feature Secure Socket Layer Virtual Private Network
 0 Feature EPC Wireshark injecting packets

Statistics for L2 injected packets:
 0 total L2 inject pak, 0 failed
 0 total BD  inject pak, 0 failed
 0 total EFP inject pak, 0 failed
 0 total VLAN inject pak, 0 failed
```

从FED(UADP 2.0)角度检查CPU投入/注入路径统计信息。

```
C9400#show platform software fed active lsmpi stat
LSMPI Statistics

-----------------------------------------
Transmit: ----------------------------------> FED transmit = FED (Supervisor) punt to CPU
     Packet Count        : 8469445
     Bytes Count         : 1055390613
     particle Count      : 8951009
     particle with App   : 7258
     Ring Full Error     : 0
     No Buff Error       : 0
     TX Ring Free        : 2047
     TX Ring Busy        : 0
     TX Ring Size        : 2048
     TXDone Ring Free    : 6816
     TXDone Ring Busy    : 9567
     TXDone Ring Size    : 16384
Receive: ---------------------------------> FED receive = CPU inject to FED (Supervisor)
     Packet Count        : 5450099
     Bytes Count         : 675084903 Particle Count : 5695697 Particles with App : 4294966854 RX
Done Count : 5696139 No SOP : 0 No EOP : 0 Not Enough Buf : 0 Max Not Enough Buf : 0 RX Ring
Free : 4095 RX Ring Busy : 0 RX Ring Size : 4096 RXDone Ring Free : 8191 RXDone Ring Busy : 0
RXDone Ring Size : 8192 ----------------------------------------
```

从FED(Supervisor)角度检查CPU传送路径（面向软件CPU的硬件管理引擎）统计信息。

```
C9400#show platform software fed active punt cause summary
Statistics for all causes

Cause    Cause Info                                          Rcvd         Dropped
-------------------------------------------------------------------------------
7        ARP request or response                             3644168      0
11       For-us data                                         1524         0
12       Mcast Directly Connected Source                     1794         0
25       Mcast PIM signaling                                 1573         0
55       For-us control                                      750461       0
58       Layer2 bridge domain data packet                    38058        0
96       Layer2 control protocols                            3825228      0
-------------------------------------------------------------------------------
```

从FED（管理引擎）角度检查31个单独CPU传送队列的运行状况。

```
C9400#show platform software fed active cpu-interface
queue                       retrieved   dropped     invalid     hol-block
-------------------------------------------------------------------------
Routing Protocol            790844      0           0           0
L2 Protocol                 2774488     0           0           0
sw forwarding               0           0           0           0
broadcast                   0           0           0           0
icmp                        0           0           0           0
icmp redirect               0           0           0           0
logging                     0           0           0           0
rpf-fail                    1573        0           0           0
DOT1X authentication        0           0           0           0
Forus Traffic               1524        0           0           0
Forus Resolution            3644192     0           0           0
Wireless q5                 0           0           0           0
Wireless q1                 0           0           0           0
Wireless q2                 0           0           0           0
Wireless q3                 0           0           0           0
Wireless q4                 0           0           0           0
Learning cache              0           0           0           0
Topology control            1198807     0           0           0
Proto snooping              0           0           0           0
BFD Low latency             0           0           0           0
Transit Traffic             0           0           0           0
Multi End station           38058       0           0           0
Health Check                0           0           0           0
Health Check                0           0           0           0
Crypto control              0           0           0           0
Exception                   0           0           0           0
General Punt                0           0           0           0
NFL sampled data            0           0           0           0
STG cache                   0           0           0           0
EGR exception               0           0           0           0
FSS                         0           0           0           0
Multicast data              1794        0           0           0
```

```
C9400#show platform software fed active punt cpuq all
Punt CPU Q Statistics
=============================================
```

```
—snip—

CPU Q Id                        : 1
CPU Q Name                      : CPU_Q_L2_CONTROL
Packets received from ASIC      : 2669864 ----------> Packets received by the FED process from
the Supervisor forwarding ASICs
Send to IOSd total attempts     : 2669864 ----------> Packets sent from the FED process to IOSd
Send to IOSd failed count       : 0
RX suspend count                : 0
RX unsuspend count              : 0
RX unsuspend send count         : 0
RX unsuspend send failed count  : 0
RX consumed count               : 0
RX dropped count                : 0
RX non-active dropped count     : 0
RX conversion failure dropped   : 0
RX INTACK count                 : 2243784
RX packets dq'd after intack    : 5074
Active RxQ event                : 2243785
RX spurious interrupt           : 322266

CPU Q Id                        : 2
CPU Q Name                      : CPU_Q_FORUS_TRAFFIC
Packets received from ASIC      : 1524
Send to IOSd total attempts     : 1524
Send to IOSd failed count       : 0
RX suspend count                : 0
RX unsuspend count              : 0
RX unsuspend send count         : 0
RX unsuspend send failed count  : 0
RX consumed count               : 0
RX dropped count                : 0
RX non-active dropped count     : 0
RX conversion failure dropped   : 0
RX INTACK count                 : 1347
RX packets dq'd after intack    : 8
Active RxQ event                : 1347
RX spurious interrupt           : 38

—snip—
```

从FED(Supervisor)角度检查CPU注入路径（面向硬件管理引擎的软件CPU）统计信息。

```
C9400#show platform software fed active inject cause summary
Statistics for all causes

Cause    Cause Info                                          Rcvd         Dropped
-------------------------------------------------------------------------------
1        L2 control/legacy                                   4331682      0
2        QFP destination lookup                              290          0
3        QFP IPv4/v6 nexthop lookup                          391          0
7        QFP adjacency-id lookup                             859393       265
8        Mcast specific inject packet                        150          0
12       ARP request or response                             601          0
-------------------------------------------------------------------------------
```

从FED(UADP 2.0)角度检查2个单独CPU注入队列的运行状况。

```
C9400#show platform software fed active inject cpuq all
Inject CPU Q Statistics
=========================================
```

```
CPU Q Id                         : 0
CPU Q Name                       : TX_CPUQ_PRIO_LOW ---> low priority CPU inject queue
Packets received from IOSd       : 168342
Enq to pkt driver total attempts : 168277
Enq to pkt driver failed count   : 0
Count of TX CMPL received        : 168277
TX suspend count                 : 0
TX unsuspend count               : 0
TX dropped count                 : 265
TX punted count                  : 0
TX App enq failed                : 0

CPU Q Id                         : 7
CPU Q Name                       : TX_CPUQ_PRIO_HI ---> high priority CPU inject queue
Packets received from IOSd       : 5024664
Enq to pkt driver total attempts : 5024664
Enq to pkt driver failed count   : 0
Count of TX CMPL received        : 5024664
TX suspend count                 : 0
TX unsuspend count               : 0
TX dropped count                 : 0
TX punted count                  : 0
TX App enq failed                : 0

Stats for all txq:
-------------------------------------------
TX chunk malloc fail count       : 0
-------------------------------------------
```

MAC表事件统计信息

```
C9400#show platform software fed active matm stats
MATM counters


Total non-cpu mac entries       : 10
Mac Learn SPI Msg Count         : 0
Mac Learn SPI Err Count         : 0
Mac Delete SPI Msg Count        : 0
Mac Delete SPI Err Count        : 0
Mac Learn Count                 : 967
Mac Add Count                   : 989
Mac AL add Count                : 971
Mac Del Count                   : 957
Mac AL Del Count                : 961
Mac Move Count                  : 2 ---> MAC moves between interfaces (see details above)
Mac AL Move Count               : 0
Mac Clear Count                 : 0
Mac Del all count               : 6
Mac table create Count          : 9
Mac VP event Count              : 5
Mac Update info Count           : 0
Mac Vlan age config Event Count : 0
Mac Vlan Link Event Count       : 6
Mac SVI linkEvent Count         : 3
Mac Bsync Event Count           : 0
Mac Isync Event Count           : 0
Mac Recon Start Count           : 0
Mac Recon Event Count           : 0
```

```
Mac IFM event Count             : 75
Mac FEC Event Count             : 0
Mac Aging Tick Count            : 0
Mac Retry event Count           : 0
Mac Hw Update Err Count         : 0
Mac In retryQ Count             : 0

C9400#configure terminal

C9400(config)#mac address-table notification ?
  change     Enable/Disable MAC Notification feature on the switch
  mac-move   Enable Mac Move Notification
  threshold  Configure L2 Table monitoring

C9400(config)#mac address-table notification mac-move ---> enabled by default, syslog generated
for any MAC move (show logging)

C9400(config)#mac address-table notification change ?
  history-size  Number of MAC notifications to be stored
  interval      Interval between the MAC notifications
  <cr>          <cr>

C9400(config)#mac address-table notification change ---> disabled by default



C9400#show mac address-table notification mac-move
MAC Move Notification:  enabled

C9400#show mac address-table notification change
MAC Notification Feature is Enabled on the switch Interval between Notification Traps : 1 secs
Number of MAC Addresses Added : 0 Number of MAC Addresses Removed : 0 Number of Notifications
sent to NMS : 0 Maximum Number of entries configured in History Table : 1 Current History Table
Length : 0 MAC Notification Traps are Disabled History Table contents ----------------------
```

UADP 2.0异常丢弃

此命令详细说明UADP 2.0转发ASIC丢弃数据包的任何原因：

```
C9400#show platform hardware fed active fwd-asic drops exceptions
****EXCEPTION STATS ASIC INSTANCE 0 (asic/core 0/0)****
================================================================================ Asic/core |
NAME | prev | current | delta
================================================================================ 0 0
NO_EXCEPTION 0 0 0 0 0 IPV4_CHECKSUM_ERROR 0 0 0 0 0 ROUTED_AND_IP_OPTIONS_EXCEPTION 0 0 0 0 0
CTS_FILTERED_EXCEPTION 0 0 0 0 0 SIA_TTL_ZERO 0 0 0 0 0 ALLOW_NATIVE_EXCEPTION_COUNT 0 0 0 0 0
ALLOW_DOT1Q_EXCEPTION_COUNT 0 0 0 0 0 ALLOW_PRIORITY_TAGGED_EXCEPTION_COUNT 0 0 0 0 0
ALLOW_UNKNOWN_ETHER_TYPE_EXCEPTION 0 0 0 0 0 IP_SOURCE_GUARD_VIOLATION 0 0 0 0 0
SECURE_L3IF_LEARNING_VIOLATION 0 0 0 0 0 AUTH_DRIVEN_DROP 0 0 0 0 0 VLAN_LOADBALANCE_GROUP_DENY
0 0 0 0 0 RPF_UNICAST_FAIL 0 0 0 0 0 RPF_UNICAST_FAIL_SUPPRESS 0 0 0 0 0
RPF_UNICAST_CHECK_INCOMPLETE 0 0 0 0 0 RPF_MULTICAST_FAIL 0 0 0 0 0 PKT_DROP_COUNT 0 0 0 0 0
SOURCE_ROUTE_EXCEPTION 0 0 0 0 0 IGR_MISC_FATAL_ERROR 0 0 0 0 0 BLOCK_FORWARD 0 0 0 0 0
POLICER_DROP 0 0 0 0 0 DENY_ROUTE 0 0 0 0 0 DENY_BRIDGE 0 0 0 0 0 STATIC_MAC_VIOLATION 0 0 0 0 0
STATIC_IP_VIOLATION 0 0 0 0 0 FPM_DROP_PACKET 0 0 0 0 0 IGR_EXCEPTION_L4_ERROR 0 0 0 0 0
IGR_EXCEPTION_L5_ERROR 0 0 0 0 0 IGR_EXCEPTION_HARDWARE_PARSE_EXCEPTION 0 0 0 0 0
IGR_EXCEPTION_INVALID_VLAN_DROP 0 0 0 0 0 IGR_EXCEPTION_31 0 0 0 0 0
FRAGMENTING_IPV4_WITH_OPTIONS 0 0 0 0 0 FRAGMENTING_IPV6_WITH_EXTENSIONS 0 0 0 0 0 ICMP_REDIRECT
0 0 0 0 0 MTU_FAIL_PUNT_TO_CPU_NO_IP_UNREACHABLE 0 0 0 0 0
LINK_LOCAL_CHECK_FAIL_NO_IP_UNREACHABLE 0 0 0 0 0 IP_UNICAST_TTL_REACHED_ZERO 0 0 0 0 0
MISC_FATAL_ERROR 0 0 0 0 0 STP_OR_FLEXLINK_DROP 0 0 0 0 0 PROTECTED_PORT_DROP 0 0 0 0 0
```

```
PVLAN_ISOLATED_CHECK_FAILED 0 0 0 0 0 PVLAN_COMMUNITY_CHECK_FAILED 0 0 0 0 0
DEJA_VU_CHECK_FAILED 0 0 0 0 0 NOT_VLAN_LOAD_BALANCE_GROUP_ALLOWED 0 0 0 0 0 RSPAN_DROP 0 0 0 0
0 SPLIT_HORIZON_DROP 0 0 0 0 0 SYSTEM_TTL_DROP 0 0 0 0 0 PRUNED 0 0 0 0 0 DENY_NO_IP_UNREACHABLE
0 0 0 0 0 IP_MULTICAST_TTL_REACHED_ZERO 0 0 0 0 0 MTU_FAIL_DROP_BRIDGED 0 0 0 0 0
MTU_FAIL_DROP_BRIDGED_IP_ROUTED 0 0 0 0 0 MTU_FAIL_ERSPAN 0 0 0 0 0
LINK_LOCAL_CHECK_FAIL_L3M_VALID 0 0 0 0 0 DENY_NOT_NO_IP_UNREACHABLE 0 0 0 0 0
MTU_FAIL_PUNT_TO_CPU_NOT_NO_IP_UNREACHABLE 0 0 0 0 0 LINK_LOCAL_CHECK_FAIL_NOT_NO_IP_UNREACHABLE
0 0 0 0 0 COPY_TO_CPU 0 0 0 0 0 EGR_L3_ERROR 0 0 0 0 0 EGR_L4_ERROR 0 0 0 0 0 EGR_L5_ERROR 0 0 0
0 0 EGR_HARDWARE_PARSE_EXCEPTION 0 0 0 0 0 EGR_SHOW_FORWARD_DROP 0 0 0 ****EXCEPTION STATS ASIC
INSTANCE 1 (asic/core 0/1)****
================================================================================ Asic/core |
NAME | prev | current | delta
================================================================================ 0 1
NO_EXCEPTION 13168 16679 3511 0 1 IPV4_CHECKSUM_ERROR 0 0 0 0 1 ROUTED_AND_IP_OPTIONS_EXCEPTION
81 103 22
--snip--
```

管理引擎统计信息 — 管理引擎到线卡数据路径

检查与特定前面板接口关联的活动Supervisor UADP 2.0转发ASIC统计信息。在本例中，使用接口Gig1/0/13。

输出示例：

- 检查线卡上哪些接口属于同一端口组。
- 每个端口组从线卡末节ASIC共享8 Gbps的带宽到管理引擎转发ASIC。
- 每个端口组与线卡末节ASIC上指向Supervisor转发ASIC的SLI（系统链路接口）之一关联。

```
C9400#show platform hardware cman fp active data-path 1 13 detail ---> Slot 1, interface 13
showing cman data-path for frontpanel 1/0/13 fp_portmap.xml: ---> Supervisor ASIC 1, core 0 is
associated with front panel (fp) interface Gig1/0/13
id 13 asic 1 core 0 port 12 mac 0 subport 4 contextid 0 maxspeed DEV_PORT_SPEED_1G gpn 113
active 1

data path:

slot 3
    +- ACTIVE_SUP --+
    |   Sif 0      |
    | IQS     SQS  |  ---> Supervisor ASIC 1, core 0 on the slot 3 active Supervisor associated
with interface Gig1/0/13
    |     PBC      |
    |          AQM  |
    |          EQC  |
    |          ESM  |
    |          RWE  |
    |   ASIC 1     |
    |   Core 0     |
    | Asic Port 12 |
    |              |
    |   (Mac  0)   |
    |Nif_Rx   NifTx|
    +--------------+
        ^       |
        |       |
        |       |
        |       V

==========================================
Nif MAC 0 Inforation:
```

```
NifRxByteGroupStats:                          NifTxByteGroupStats:
 rxBytes                  4495494             txBytes                  6499427
NifRxByteDestinationGroupStats:               NifTxByteDestinationGroupStats:
 rxUnicastBytes           1174628             txUnicastBytes           1175536
 rxMulticastBytes         3320866             txMulticastBytes         5298482
 rxBroadcastBytes         0                   txBroadcastBytes         25409
NifRxPortStatusGroupStats:                    NifTxFrameDestinationGroupStats:
 rxUnicastFrames          18326               txUnicastFrames          18330
 rxMulticastFrames        21387               txMulticastFrames        24834
 rxBroadcastFrames        0                   txBroadcastFrames        51
 rxPauseFrames            0                   txPauseFrames            0
 rxCos0PauseFrames        0                   txCos0PauseFrames        0
 rxCos1PauseFrames        0                   txCos1PauseFrames        0
 rxCos2PauseFrames        0                   txCos2PauseFrames        0
 rxCos3PauseFrames        0                   txCos3PauseFrames        0
 rxCos4PauseFrames        0                   txCos4PauseFrames        0
 rxCos5PauseFrames        0                   txCos5PauseFrames        0
 rxCos6PauseFrames        0                   txCos6PauseFrames        0
 rxCos7PauseFrames        0                   txCos7PauseFrames        0
 rxOamProcessedFrames     0                   txOamFrames              0
NifRxPortStatusGroupStats:                    NifTxPortStatusGroupStats:
 rxCollisionFragments     0                   txLateCollisionFrames    0
 rxFcsErrorFrames         0                   txsystemFcsErrorFrames   0
 rxInvalidOversizeFrames  0                   txOversizeFrames         0
 rxMacOverrunFrames       0                   txMacUnderrunFrames      0
 rxIpgViolationFrames     0                   txDeferredFrames         0
 rxOamDroppedFrames       0                   txExcessiveDeferralFrames  0
 rxSymbolErrorFrames      0                   txOkMultipleCollisionFrames  0
 rxValidOversizeFrames    0                   txOkSingleCollisionFrames  0
 rxValidUndersizeFrames   0                   goldFramesTruncated      0
NifRxSizeGroupStats:                          NifTxSizeGroupStats:
 rx32768toMtuFrames       0                   tx32768toMtuFrames       0
 rx16384to32767ByteFrames 0                   tx16384to32767ByteFrames 0
 rx8192to16383ByteFrames  0                   tx8192to16383ByteFrames  0
 rx4096to8191ByteFrames   0                   tx4096to8191ByteFrames   0
 rx2048to4095ByteFrames   0                   tx2048to4095ByteFrames   0
 rx1519to2047ByteFrames   51                  tx1519to2047ByteFrames   0
 rx1024to1518ByteFrames   15                  tx1024to1518ByteFrames   0
 rx512to1023ByteFrames    17                  tx512to1023ByteFrames    187
 rx256to511ByteFrames     3406                tx256to511ByteFrames     9407
 rx128to255ByteFrames     6567                tx128to255ByteFrames     6580
 rx65to127ByteFrames      11295               tx65to127ByteFrames      8583
 rx64ByteFrames           18362               tx64ByteFrames           18458
============================================= ---------------------------------------------
--> Input queue (Igr = Ingress)
IgrPacketCounters:                            EgrPacketCounters:
 packetsIn                97777               packetsIn                580324
 packetsOut               97777               packetsEnqueueFcd_val    0
 packetsDropped           3383                packetsMarkedForDrop     278
 fpsSourcedPadErrorCount  0                   padErrorPacketsIn        0
 igrSourcedPadErrorCount  0                   padErrorPacketsOut       0
=============================================
For RWE for core 0:
                                              RweTotalEnqStats:
                                               packetCount             580324
                                              RweTotalDeqStats:
                                               packetCount             580046
                                               FragmentCount           580046
=============================================
For EQC for core 0:
                                              EqcTotalEnqStats:
                                               Count                   580704
                                              EqcTotalDeqStats:
                                               Count                   580324
```

```
==========================================
For aqmRedQueueStats for asic port 12:
                                                    AqmRedQueueStats:         (sum of all queues)
---> Output queue (Aqm = Active queue management)
                                                     acceptByteCnt0             0
                                                     acceptFrameCnt0            0
                                                     acceptByteCnt1             6407742
                                                     acceptFrameCnt1            43070
                                                     acceptByteCnt2             39609
                                                     acceptFrameCnt2            395
                                                     dropByteCnt0               0
                                                     dropFrameCnt0              0
                                                     dropByteCnt1               0
                                                     dropFrameCnt1              0
                                                     dropByteCnt2               0
                                                     dropFrameCnt2              0
                                                     outOfSoftBufDropByteCnt    0
                                                     outOfSoftBufDropFrameCnt   0
                                                     maxQebDropByteCnt          0
                                                     maxQebDropFrameCnt         0
==========================================
For PBC for core 0:
PbcIngressErrorDropCount:                           PbcEgressErrorDropCount:
 iCount                     0                       eS0Count                   0
 iCount                     0                       eS1Count                   0
PbcCreditCount:                                     PbcEnqFcErrorDropCount:
 creditCount                64                      fCount                     0
 rwePbcStall                0
==========================================
For local/core 0 Switching:
                                                    SqsCumulativeStatistics
                                                     totalEnqStat               1368200
                                                     totalDeqStat               1368200
                                                     totalDropStat              0
                                                    SqsCumulativeStatisticsB
                                                     totalEnqStat               173449513
                                                     totalDeqStat               173449513
                                                     totalDropStat              0
==========================================
For local/core 1 Switching:
                                                    SqsCumulativeStatistics
                                                     totalEnqStat               890114
                                                     totalDeqStat               890114
                                                     totalDropStat              0
                                                    SqsCumulativeStatisticsB
                                                     totalEnqStat               105061923
                                                     totalDeqStat               105061923
                                                     totalDropStat              0
==========================================
For Sif 0 Switching:
                                                    SifSifPbcCnt0:
                                                     Count                      81302675
                                                    SifSifPbcCnt1:
                                                     Count                      58187651
SifRacInsertedCnt:                                  SifRacCopiedCnt:
 SifRacInsertedCnt[0]       2295051                  SifRacCopiedCnt[0]         35850468
 SifRacInsertedCnt[1]       1738892                  SifRacCopiedCnt[1]         19265491
 SifRacInsertedCnt[2]       1666479                  SifRacCopiedCnt[2]         23814855
 SifRacInsertedCnt[3]       2773364                  SifRacCopiedCnt[3]         32727259
 SifRacInsertedCnt[4]       3126116                  SifRacCopiedCnt[4]         38376676
 SifRacInsertedCnt[5]       2066567                  SifRacCopiedCnt[5]         22176467
==========================================
For Sif 1 Switching:
                                                    SifSifPbcCnt0:
```

```
                                                Count                       40956521
                                               SifSifPbcCnt1:
                                                Count                       40956521
SifRacInsertedCnt:                             SifRacCopiedCnt:
 SifRacInsertedCnt[0]       11713808            SifRacCopiedCnt[0]          8615615
 SifRacInsertedCnt[1]       8319576             SifRacCopiedCnt[1]          7489596
 SifRacInsertedCnt[2]       8816344             SifRacCopiedCnt[2]          7608895
 SifRacInsertedCnt[3]       15404080            SifRacCopiedCnt[3]          8717898
 SifRacInsertedCnt[4]       16161715            SifRacCopiedCnt[4]          9685735
 SifRacInsertedCnt[5]       9745420             SifRacCopiedCnt[5]          7866174
```

从Supervisor的角度检查前面板接口的流量控制状态。这有助于确定接口上是否存在拥塞。

```
C9400#show platform hardware cman fp active flowcontrol status
slot 1:Port 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 EsmF - - - -
- - - - - - - - - - - - - - - - - - - - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - -
Port 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 EsmF - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - - slot 2:
Port 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 EsmF - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - - Port 25
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 EsmF - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - - slot 3: Port 01
02 03 04 05 06 07 08 09 10 EsmF - - - - - - - - - - IqsC 01 - - - - - - - - - slot 4: Port 01 02
03 04 05 06 07 08 09 10 EsmF - - - - - - - - - - IqsC - - - - - - - - - - slot 5: Port 01 02 03
04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 EsmF - - - - - - - - - - - - - -
- - - - - - - - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - - 01 - - - Port 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 EsmF - - - - - - - - - - - - - - - - - - - -
- - - - - - IqsC - - - - - - - - - - - - - - - - - - - - - - - - slot 6: Possibly linecard is not
inserted slot 7: Possibly linecard is not inserted
```

检查控制流量是否从主用Supervisor上的Supervisor转发ASIC和线卡上的线卡末节ASIC之间的Supervisor转发ASIC视角通过OCI接口流动。

```
C9400#show platform hardware cman fp active oci status
processing oci information:
 chassis_type:       1
 sup slot:           4
 sup num oci ports:  8

slot_id 1 : oci_enable Enabled    Link Status 0 (UP)
            asic_id 1 core_id 0 oci_port 3 mac_id 0
            NruRxByteGroupStats:  rxBytes 417829462717812        NruTxByteGroupStats:  txBytes
588911286106332

slot_id 2 : oci_enable Enabled    Link Status 0 (UP)
            asic_id 0 core_id 0 oci_port 1 mac_id 1
            NruRxByteGroupStats:  rxBytes 417938235716344        NruTxByteGroupStats:  txBytes
588917607864892

slot_id 5 : oci_enable Enabled    Link Status 0 (UP)
            asic_id 1 core_id 0 oci_port 4 mac_id 1
            NruRxByteGroupStats:  rxBytes 53195855717244         NruTxByteGroupStats:  txBytes
588915422236932

slot_id 6 : oci_enable Enabled    Link Status 1 (DOWN)
            asic_id 2 core_id 0 oci_port 6 mac_id 0
            NruRxByteGroupStats:  rxBytes 0                      NruTxByteGroupStats:  txBytes 0

slot_id 7 : oci_enable Enabled    Link Status 1 (DOWN)
            asic_id 0 core_id 0 oci_port 2 mac_id 2
            NruRxByteGroupStats:  rxBytes 0                      NruTxByteGroupStats:  txBytes 0
```

线卡统计信息 — 管理引擎到线卡数据路径

检查与特定前面板接口关联的线卡线卡末节ASIC统计信息。在本例中，接口Gig1/0/13是重点。

输出示例：

- 从Gig 1/0/13接收的数据包，进入网络接口接收端口并通过IQS进入堆栈接口。
- 从那里，数据包要么从堆栈接口发出到另一个Supervisor ASIC，要么通过SQS、AQM、EQC、ESM、RWE返回，然后从网络接口发送Gig 1/0/13。
- 从Gig 1/0/13出口的其他Supervisor ASIC接口发送的数据包进入Sif，然后通过SQS、AQM、EQC、ESM、RWE，然后通过Gig 1/0/13的NifTx。
- 对于AQM，有8个Tx队列。如果从这些队列中看到丢包，可以使用此命令确定哪个队列遇到丢包：show platform hardware fed active goes queue stats interface Gig 1/0/13

```
C9400#show platform hardware iomd 1/0 data-path 13 detail ----> slot 1, interface 13

lcportmap.xml: ---> Line Card (lc) ASIC instance 0 is associated with interface Gig1/0/13
id 13 asic 0 asicport 12 mac 23 contextid 12 intl_port_sup0 9 intl_port_sup1 1 maxspeed
DEV_PORT_SPEED_1G asic_subport 4

fp_portmap.xml: ---> Supervisor ASIC 1, core 0 is associated with front panel (fp) interface
Gig1/0/13
id 13 asic 1 core 0 port 12 mac 0 subport 4 contextid 0 maxspeed DEV_PORT_SPEED_1G gpn 113
active 1
data path:
slot 3 +--ACTIVE SUP--+ | | ---> Supervisor ASIC 1, core 0 on the slot 3 active Supervisor
associated with interface Gig1/0/13
           |   ASIC 1     |
           |   Core 0     |
           | Asic Port 12 |
           |              |
           |   (Mac  0)   |
           |Nif_Rx   NifTx|
           +--------------+
                 |      |
                 |      |
 SLI MAC  9      |      |
           +---------------+
           | SLI_Tx  SLI_Rx| ---> Line Card 1. The statistic output below is only for this Line
card ASIC
           |               |
           |    ASIC 0     |
           | Asic  Port 12 |
           |               |
           |   (Mac 23)    |
           | NIF_Rx  NIF_Tx|
           +---------------+
             Front Port 1/0/13
               ^       |
               |       |
               |       |
               |       V

===============================================
Nif MAC 23 Inforation:
NifRxByteGroupStats:                          NifTxByteGroupStats:
 rxBytes                    4457854            txBytes                    6440428
NifRxByteDestinationGroupStats:               NifTxByteDestinationGroupStats:
```

```
 rxUnicastBytes             1163684              txUnicastBytes             1164528
 rxMulticastBytes           3294170              txMulticastBytes           5250491
 rxBroadcastBytes           0                    txBroadcastBytes           25409
NifRxPortStatusGroupStats:                     NifTxFrameDestinationGroupStats:
 rxUnicastFrames            18155                txUnicastFrames            18158
 rxMulticastFrames          21235                txMulticastFrames          24625
 rxBroadcastFrames          0                    txBroadcastFrames          51
 rxPauseFrames              0                    txPauseFrames              0
 rxCos0PauseFrames          0                    txCos0PauseFrames          0
 rxCos1PauseFrames          0                    txCos1PauseFrames          0
 rxCos2PauseFrames          0                    txCos2PauseFrames          0
 rxCos3PauseFrames          0                    txCos3PauseFrames          0
 rxCos4PauseFrames          0                    txCos4PauseFrames          0
 rxCos5PauseFrames          0                    txCos5PauseFrames          0
 rxCos6PauseFrames          0                    txCos6PauseFrames          0
 rxCos7PauseFrames          0                    txCos7PauseFrames          0
 rxOamProcessedFrames       0                    txOamFrames                0
NifRxPortStatusGroupStats:                     NifTxPortStatusGroupStats:
 rxCollisionFragments       0                    txLateCollisionFrames      0
 rxFcsErrorFrames           0                    txsystemFcsErrorFrames     0
 rxInvalidOversizeFrames    0                    txOversizeFrames           0
 rxMacOverrunFrames         0                    txMacUnderrunFrames        0
 rxIpgViolationFrames       0                    txDeferredFrames           0
 rxOamDroppedFrames         0                    txExcessiveDeferralFrames  0
 rxSymbolErrorFrames        0                    txOkMultipleCollisionFrames  0
 rxValidOversizeFrames      0                    txOkSingleCollisionFrames  0
 rxValidUndersizeFrames     0                    goldFramesTruncated        0
NifRxSizeGroupStats:                           NifTxSizeGroupStats:
 rx32768toMtuFrames         0                    tx32768toMtuFrames         0
 rx16384to32767ByteFrames   0                    tx16384to32767ByteFrames   0
 rx8192to16383ByteFrames    0                    tx8192to16383ByteFrames    0
 rx4096to8191ByteFrames     0                    tx4096to8191ByteFrames     0
 rx2048to4095ByteFrames     0                    tx2048to4095ByteFrames     0
 rx1519to2047ByteFrames     51                   tx1519to2047ByteFrames     0
 rx1024to1518ByteFrames     15                   tx1024to1518ByteFrames     0
 rx512to1023ByteFrames      17                   tx512to1023ByteFrames      186
 rx256to511ByteFrames       3374                 tx256to511ByteFrames       9318
 rx128to255ByteFrames       6505                 tx128to255ByteFrames       6518
 rx65to127ByteFrames        11237                tx65to127ByteFrames        8526
 rx64ByteFrames             18191                tx64ByteFrames             18286
============================================== ----------------------------------------------
--> Input queue (Igr = Ingress)
IgrPacketCounters:                             EgrPacketCounters:
 packetsIn                  97078                packetsIn                  576307
 packetsOut                 97078                packetsEnqueueFcd_val      0
 packetsDropped             0                    packetsMarkedForDrop       0
 fpsSourcedPadErrorCount    0                    padErrorPacketsIn          0
 igrSourcedPadErrorCount    0                    padErrorPacketsOut         0
==============================================
For aqmRedQueueStats for asic port 12:
                                               AqmRedQueueStats:          (sum of all queues)
--> Output queue (Agm = Active queue management)
                                                acceptByteCnt0             0
                                                acceptFrameCnt0            0
                                                acceptByteCnt1             0
                                                acceptFrameCnt1            0
                                                acceptByteCnt2             6440428
                                                acceptFrameCnt2            42834
                                                dropByteCnt0               0
                                                dropFrameCnt0              0
                                                dropByteCnt1               0
                                                dropFrameCnt1              0
                                                dropByteCnt2               0
                                                dropFrameCnt2              0
```

```
                                                 outOfSoftBufDropByteCnt    0
                                                 outOfSoftBufDropFrameCnt   0
                                                 maxQebDropByteCnt          0
                                                 maxQebDropFrameCnt         0
==========================================
SLI MAC 9 - SUP 0: ( an ACTIVE sup in slot 3 )
SliTxByteGroupStats:                            SliRxByteGroupStats:
 txBytes                    4457854              rxBytes                    6440428

SLI MAC 1 - SUP 1:
SliTxByteGroupStats:                            SliRxByteGroupStats:
 txBytes                    0                    rxBytes                    0
```

从线卡的角度检查前面板接口的流量控制状态。这有助于识别接口上的任何拥塞。

- 如果没有流控制，则值为“ — ”，否则将指示遇到流控制（拥塞）的队列编号。
- 接口收到的流量控制从线卡上的线卡ASIC传递到Supervisor上的Supervisor ASIC，在Supervisor ASIC上通常可以看到AQM丢弃。OCI（带外控制接口）是线卡和活动Supervisor之间的内部通信通道，用于向Supervisor发送从线卡到Supervisor的流控制信号。

```
C9400#show platform hardware iomd 1/0 flowcontrol status ---> slot 1

Slot 1 - number of ports 48

slot  1:   Port 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
           IsmF  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
           IqmC  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
           Port 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
           IsmF  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
           IqmC  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
```

检查控制流量是否从线卡上的线卡末节ASIC和主用和备用Supervisor上的Supervisor转发ASIC之间通过OCI接口从线卡末节ASIC角度流动。

- OCI =带外控制接口=线路卡与主用和备用Supervisor之间的内部通信通道

```
C9400#show platform hardware iomd 1/0 oci status ---> slot 1

Asic 0, Mac 10, Tx OCI Config 0, OCI Merge FALSE, OCI Enabled, Link Status 0 (UP)
Network Port Range 0---47, Local Port Range 0---47
NifRxByteGroupStats:  rxBytes 177402572782108        NifTxByteGroupStats:  txBytes
141925777717156

Asic 0, Mac 11, Tx OCI Config 0, OCI Merge FALSE, OCI Enabled, Link Status 0 (UP)
Network Port Range 0---47, Local Port Range 0---47
NifRxByteGroupStats:  rxBytes 963489284              NifTxByteGroupStats:  txBytes 770809988
```

检查线卡上的哪些接口属于同一端口组，该端口组从线卡上的线卡末节ASIC共享8 Gbps的带宽到主用Supervisor上的Supervisor转发ASIC。每个端口组都与指向Supervisor的线卡末节ASIC上的一个SLI（系统链路接口）关联。

```
C9400#show platform hardware iomd 1/0 portgroups ---> slot 1
```

Port Interface Status Interface **Group Max <-- aggregate bandwidth for 8 ports**
Group Bandwith **Bandwidth**

1	**TenGigabitEthernet1/0/1**	**up**	**1G**	
1	**TenGigabitEthernet1/0/2**	**down**	**1G**	
1	**TenGigabitEthernet1/0/3**	**admindown**	**1G**	
1	**TenGigabitEthernet1/0/4**	**down**	**1G**	
1	**TenGigabitEthernet1/0/5**	**down**	**1G**	**8G**
1	**TenGigabitEthernet1/0/6**	**down**	**1G**	
1	**TenGigabitEthernet1/0/7**	**down**	**1G**	
1	**TenGigabitEthernet1/0/8**	**down**	**1G**	
2	TenGigabitEthernet1/0/9	down	1G	
2	TenGigabitEthernet1/0/10	down	1G	
2	TenGigabitEthernet1/0/11	down	1G	
2	TenGigabitEthernet1/0/12	down	1G	
2	TenGigabitEthernet1/0/13	up	1G	8G
2	TenGigabitEthernet1/0/14	down	1G	
2	TenGigabitEthernet1/0/15	down	1G	
2	TenGigabitEthernet1/0/16	down	1G	
3	TenGigabitEthernet1/0/17	down	1G	
3	TenGigabitEthernet1/0/18	down	1G	
3	TenGigabitEthernet1/0/19	down	1G	
3	TenGigabitEthernet1/0/20	down	1G	
3	TenGigabitEthernet1/0/21	down	1G	8G
3	TenGigabitEthernet1/0/22	down	1G	
3	TenGigabitEthernet1/0/23	down	1G	
3	TenGigabitEthernet1/0/24	down	1G	
4	TenGigabitEthernet1/0/25	down	1G	
4	TenGigabitEthernet1/0/26	down	1G	
4	TenGigabitEthernet1/0/27	down	1G	
4	TenGigabitEthernet1/0/28	down	1G	
4	TenGigabitEthernet1/0/29	down	1G	8G
4	TenGigabitEthernet1/0/30	down	1G	
4	TenGigabitEthernet1/0/31	down	1G	
4	TenGigabitEthernet1/0/32	down	1G	
5	TenGigabitEthernet1/0/33	down	1G	
5	TenGigabitEthernet1/0/34	down	1G	
5	TenGigabitEthernet1/0/35	down	1G	
5	TenGigabitEthernet1/0/36	down	1G	
5	TenGigabitEthernet1/0/37	down	1G	8G
5	TenGigabitEthernet1/0/38	down	1G	
5	TenGigabitEthernet1/0/39	down	1G	
5	TenGigabitEthernet1/0/40	down	1G	
6	TenGigabitEthernet1/0/41	down	1G	
6	TenGigabitEthernet1/0/42	down	1G	
6	TenGigabitEthernet1/0/43	down	1G	
6	TenGigabitEthernet1/0/44	down	1G	
6	TenGigabitEthernet1/0/45	down	1G	8G
6	TenGigabitEthernet1/0/46	down	1G	
6	TenGigabitEthernet1/0/47	down	1G	
6	TenGigabitEthernet1/0/48	up	1G	