

驗證Catalyst 9000系列交換器上的第2層硬體

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簡介

本文說明如何驗證Catalyst 9400系列交換器上的第2層硬體程式設計和轉送。

必要條件

需求

本文件沒有特定需求。

採用元件

本檔案中的資訊是根據Catalyst 9400(UADP 2.0)系列交換器。

附註:本檔案使用的軟體版本為16.6.1，但此版本仍適用於Cisco IOS-XE的較新版本。

註:您可以將此文檔用於其他型別的Catalyst 9000交換機，但忽略任何引用線路卡的命令。

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

背景資訊

- Catalyst 9400 Supervisor1(C9400-SUP-1)具有3個UADP 2.0轉發ASIC(0、1、2)。
- 每個UADP 2.0轉發ASIC具有：雙核(0、1) — 在之前的UADP 2.0 ASICs中不存在此功能。SIF（堆疊介面）— 用於通過內部堆疊環連線到其他2個UADP 2.0 ASIC。NIF（網路介面）— 用於通過背板連線到1個或多個線卡。
- 線卡和Supervisor上行鏈路介面的所有資料包轉發決策都是由活動Supervisor上的3個UADP 2.0轉發ASIC做出的。
- 本示例中使用的線卡具有1個線卡單核心末節ASIC，該核心末節不參與資料包轉發決策。
- 線卡上的線卡末節ASIC通過背板連線到Supervisor上的3個UADP 2.0轉發ASIC中的1個或多個。
- Supervisor上的3個UADP 2.0轉發ASIC會做出所有資料包轉發決策。

技術

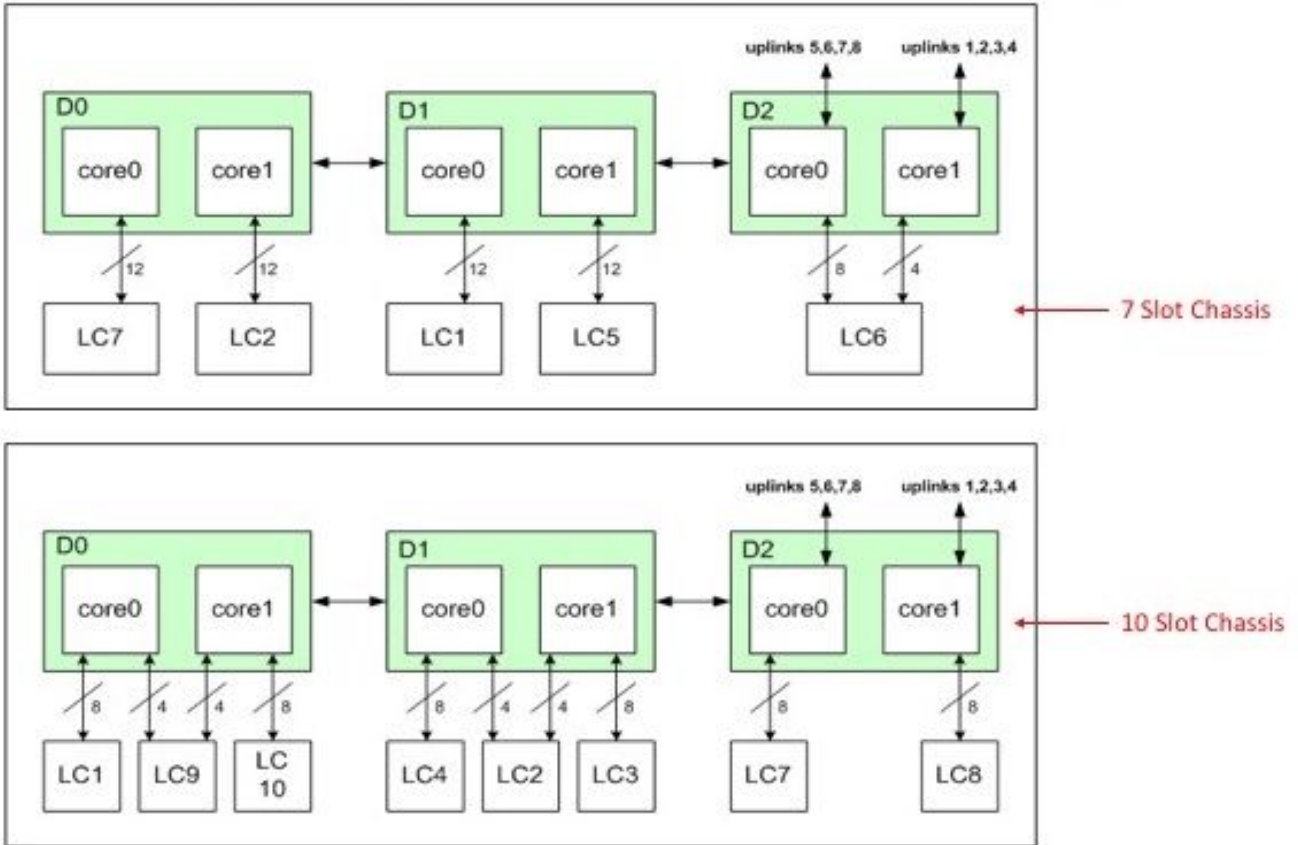
縮寫	定義
RP	路由處理器
FP	轉送處理器
美聯儲對象管理器	轉發引擎驅動程式。對Supervisor Forwarding ASIC進程式設計的軟體過程。作為非同步對象儲存在對象資料庫中的FP軟體MAC條目。
LSMPI	Linux共用記憶體Punt介面。資料平面（硬體 — UADP 2.0）和控制平面（軟體 — CPU）之傳輸。
IFM	Interface Manager軟體進程。
IF_ID	介面Identifier是表示特定介面的唯一值。它用於交換機內部程式設計期間。
Inst	例項。指示介面所連線的UADP 2.0 Asic/Core:0=Asic0/Core0,1=Asic0/Core1,2=Asic1/Core0,3=Asic1/Core1,4=Asic2/Core0,5=/Core1。
Asic	指定介面與哪個UADP 2.0關聯：0=UADP 2.0 #0,1=UADP 2.0 #1,2= UADP 2.0 #2。
核心	指定UADP 2.0介面上與哪個核心關聯：0=core0,1=core1。
連接埠	插槽中埠的序號例項編號。在同一插槽中，所有埠號都是唯一的。

子埠	標識作為子埠的前面板埠的埠組(Cntx)中的埠 (Cntx和SubPort一起標識作為子埠的唯一埠)
Mac	介面運行MACsec (安全身份驗證和加密) 時使用的介面識別符號。
Cntx	上下文。當前面板介面為子埠時，埠所屬的組號 (Cntx和SubPort一起標識為子埠的唯一埠)
LPN	與介面關聯的邏輯埠號。
GPN	與介面關聯的全域性埠號。
鍵入NIF	網路介面；NRU =網路冗餘上行鏈路
IF_IS	介面IDentifier。這是一個表示特定介面的唯一值。它用於交換機內部的各種程式設計。
Port_LE	埠邏輯實體。這是介面組態。
AOM	非同步對象管理器。FP將資訊作為對象程式設計到對象資料庫中。
副總裁	虛擬連線埠
MATM	MAC位址表管理員
RP	路由處理器
OM_PTR	對象管理器指標
Tbl_ID	表識別符號= vlan
CMAN	機箱管理員
FP	轉送處理器
fp_port	前面板埠。
Sif	堆疊介面 (向其他2個UADP 2.0轉發Supervisor上的ASIC) 。
Nif	網路介面 (朝向前面板介面)
IGR/EGR	輸入/輸出
IQS	輸入佇列排程器
SQS	堆疊佇列排程器
PBC	封包緩衝區複雜性
AQM	活動隊列管理。這將執行擁塞管理檢查。
AQMRed	主動隊列管理隨機早期檢測。
EQC	輸出佇列控制器
ESM	輸出排程器管理
RWE	重寫引擎。從資料包中新增或刪除報頭資訊。
IOMD	輸入輸出模組驅動程式
fp_port	前面板埠。
Nif	網路介面 (朝向前面板介面)
SLI	系統連結介面 (指向Supervisor)
IGR/EGR =	輸入/輸出
AQMRed	主動隊列管理隨機早期檢測。
OCI	帶外控制介面=線卡與主用Supervisor之間的內部通訊通道
MATM	MAC位址表管理員
MAC移動計	這是在新介面上移動 (獲知) MAC地址時的計數。當終端主機從一個介面物理移動到另一個

數

，無線主機從一個接入點(AP)漫遊到另一個連線到不同介面的AP，或者生成樹路徑發生更改時，可能會發生移動計數。

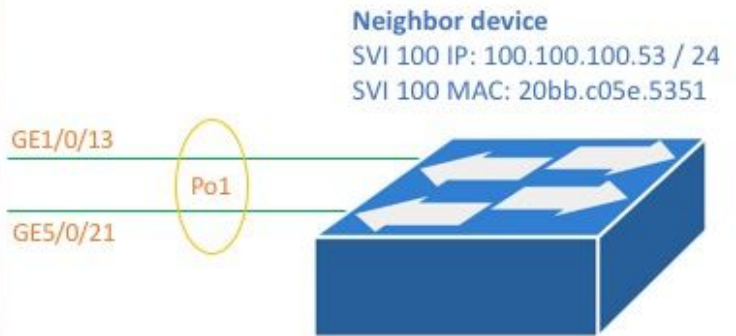
Line Card (LC) to UADP 2.0 Mapping



線卡到UADP

拓撲

Catalyst 9400 - Macallan
 SVI 100 IP: 100.100.100.1 / 24
 SVI 100 MAC: 2c5a.0f1c.28e1



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)
```

附註：show platform命令可能要求語句中包含service internal global configuration命令。

介面程式設計

UADP 2.0例項對映介面

介面程式設計命令顯示所有線卡到活動Supervisor上3個UADP 2.0轉發ASIC之一的前面板介面對映。

輸出示例

此示例顯示：

- 介面Gig1/0/3連線到：Supervisor上的UADP 2.0例項2 (UADP 2.0 Asic 1，核心0)。
- Gig5/0/21介面連線到Supervisor上的UADP 2.0例項3 (UADP 2.0 Asic 1，核心1)。

```
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--
```

物理介面程式設計

show platform命令根據上一個命令示例中的IF_ID值顯示Gig1/0/3的軟體配置詳細資訊。

```
C9400#show platform software fed active ifm if-id 0x13
Interface IF_ID : 0x00000000000000013
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

```

此命令根據上一個命令的PORT_LE值顯示Gig1/0/3的硬體配置詳細資訊。

價值	定義
值0	未設定值。
值1	在大多數情況下設定的值。

```

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程式設計

在這些EtherChannel程式設計示例輸出中，RP對FP程式設計，FP對FED程式設計，FED隨後對Supervisor轉發ASIC硬體程式設計。RP軟體條目作為對象儲存在對象資料庫中，FP軟體條目作為非同步對象儲存在對象資料庫中。

```

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

```

在此輸出中，「組掩碼」為非零。雜湊過程中會使用它來確定任何流量流從EtherChannel中溢位的鏈路。

```

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

此命令顯示Port-channel 1的組態：

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

```

此命令顯示對映介面的配置。

縮寫/例項	定義
IFM	介面管理員
例項	Gig1/0/13位於介面ID為0x13的ASIC例項2 (UADP 2.0 ASIC 1 , 核心0) 上
例項	Gig5/0/21位於介面ID 0x8f的ASIC例項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--

```

全域Etherchannel組態

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程式設計

```
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
---------	-------	-----------	------------	--------------	-----------

```
-----
100      0x00000000000420011 0x00007fe5c4616ef8 0x00007fe5c4617778 0x00007fe5c50dac28
0x000000000000002ea 10
```

此命令顯示VLAN 100的硬體配置設定詳細資訊。

價值	定義
值0	未設定值。
值1	在大多數情況下設定的值。

```
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 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
```


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					

接下來的命令顯示VLAN 100的生成樹硬體轉發狀態。

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
--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)

檢查生成樹穩定性。確保不經常看到拓撲更改通知(TCN)。

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轉發程式設計

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

```

軟體程式設計

在下一個輸出示例中，RP對FP程式設計，FP對FED程式設計，FED最後對Supervisor轉發的ASIC硬體程式設計，RP軟體MAC條目作為對象儲存在對象資料庫中，FP軟體MAC條目作為非同步對象儲存在對象資料庫中。

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
```

硬體程式設計 — 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_MSRRP_ADDR 0x400000 MAT_LISP_LOCAL_ADDR 0x800000
MAT_LISP_REMOTE_ADDR 0x1000000 MAT_VPLS_ADDR 0x2000000
```

macHandle程式設計

縮寫/術語 定義

vlan:10 MVID 10。VLAN 100在交換機內部使用對映的VLAN ID(MVID)10。
gpn:1104 Port-channel 1的全域性埠號。
mac:0x20bbc05e5351 MAC address 20bb.c05e.5351

以下是macHandle程式設計輸出示例：

```
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_si/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

Table with 6 columns: Vlan Id, IF Id, LE Handle, STP Handle, L3 IF Handle, SVI IF ID. Row 1: 100, 0x0000000000420011, 0x00007fe5c4616ef8, 0x00007fe5c4617778, 0x00007fe5c50dac28, 0x000000000000002ea 10

C9400#show platform software fed active ifm mappings etherchannel

Mappings Table

Table with 3 columns: Chan, Interface, IF_ID. Row 1: 1, Port-channel1, 0x000002ec

C9400#show platform software fed active ifm if-id 0x000002ec <-- IF_ID from previous output

Interface IF_ID : 0x000000000000002ec
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--

附註：mac獲知的介面是單個介面而不是埠通道，此命令用於確定GPN到介面的對映


```
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程式設計

縮寫/術語 定義

siHandle 站台索引控制代碼。資料包重寫資訊 (RI =重寫索引) 和傳出介面資訊 (DI =目標索引)。

單Supervisor ASIC上雙核的複製點陣圖：

縮寫/術語	定義
本地ASIC (LD =本地資料)	位於同一ASIC上的目標，與源相同。
核心複製 (CD =核心資料)	位於同一ASIC (另一個核心) 上的目的地。
遠端ASIC (RD =遠端資料)	另一個ASIC上的目的地。

```
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 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 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)
cmil = 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)
cmil = 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	4	1	101	NIF	Y
GigabitEthernet1/0/2	0x8	2	1	0	1	1	4 4	4	2	102	NIF	Y
--snip--												
GigabitEthernet1/0/13	0x13	2	1	0	12	4	0 0	0	13	1105	NIF	Y
--snip--												
GigabitEthernet5/0/21	0x8f	3	1	1	20	4	5 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)
```

沒有預期的MAC重寫資訊，因為這是第2層MAC轉發條目。

```
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程式設計

縮寫

diHandle

定義

目標索引控制代碼。這是傳出介面資訊。

```
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)
cmil = 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)
cmil = 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 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)

```

硬體程式設計 — 方法2

縮寫/術語

vlan:10
gpn:1104

定義

MVID 10。VLAN 100在交換機內部使用對映的VLAN ID(MVID)10。
Port-channel 1的全域性埠號。

mac:0x20bbc05e5
351 MAC address 20bb.c05e.5351

硬體程式設計方法2示例輸出：

```
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       0x00000000000420011 0x00007fe5c4616ef8 0x00007fe5c4617778 0x00007fe5c50dac28
0x000000000000002ea 10
```

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

Chan    Interface            IF_ID
-----
1       Port-channell        0x000002ec
--snip--
```

```
C9400#show platform software fed active ifm if-id 0x000002ec
Interface IF_ID : 0x00000000000002ec
Interface Name : Port-channell
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--
```

附註：如果mac獲知的介面是單個介面而不是埠通道，則使用下一命令確定gpn到介面的對映：

```
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

檢查每個Supervisor ASIC例項上MAC地址條目的TCAM利用率，確保交換機不會耗盡在硬體中儲存條目的TCAM空間。

```
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--

成功的硬體程式設計

所有功能（無論是mac地址、介面、vlan等等）都儲存在對象資料庫中，並作為對象程式設計到硬體中。

RP對FP進程式設計，FP對FED進程式設計，FED最終對Supervisor進程式設計以轉發ASIC硬體。RP軟體條目作為對象資料庫中的對象儲存，FP軟體條目作為非同步對象儲存在對象資料庫中。

當FP對FED（FED進而對Supervisor轉發ASIC程式設計）進程式設計時，FED會向FP傳送確認。然後FP將其轉發到RP以指示硬體程式設計已成功完成。如果FED硬體程式設計丟失或不正確，您可以使用此下一命令檢查問題和/或確認。

```
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
```

如果上一個命令顯示非零對象處於掛起的問題狀態，則使用此命令查詢相關的對象編號：

```
C9400#show platform software object-manager fp active pending-issue-update
然後使用以下命令確定與對象編號相關聯的停滯進程：
```

```
C9400#show platform software object-manager fp active object {object#}
在RP端，使用此命令檢查FP未確認對象的刪除掛起（刪除）。
```

```
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_dpodb 164 0 10 CHANNEL_DPIDB
channel_dpodb 0 0 12 VIRTUAL_DPIDB virtual_dpodb 503 0 13 SW_DPIDB sw_dpodb 0 0 17 VLAN vlan 0 0
19
--snip--
```

運行狀況檢查

控制平面流量和策略

檢查硬體 — UADP 2.0中的CoPP（控制平面策略）丟棄，查詢發往軟體 — CPU的流量。這可能會影響MAC學習和生成樹穩定性。

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
```

與先前的範例相同的CoPP輸出在此以更精細和更簡單的讀取 (壓縮) 格式顯示。

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

CPU Queue Statistics

```
=====
                                (default) (set)
QId PlcIdx Queue Name           Enabled Rate Rate Queue Queue
                                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/

從軟體(CPU)的角度檢查CPU分支路徑 (硬體 — UADP 2.0到軟體 — CPU) 統計資訊。

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					
IPv4 Options		0	0	0	0
0					
Layer2 control and legacy		0	0	0	0
0					
PPP Control		0	0	0	0
0					
CLNS IS-IS Control		0	0	0	0
0					
HDLC keepalives		0	0	0	0
0					

--snip--

從軟體(CPU)的角度檢查CPU注入路徑 (軟體 — CPU到硬體 — 管理引擎) 統計資訊。

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

```

從FED(UADP 2.0)角度檢查CPU輸出/注入路徑統計資訊。

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 -----

從FED(Supervisor)角度檢查CPU點數路徑 (硬體 — Supervisor到軟體 — CPU) 統計資訊。

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

從FED(Supervisor)角度檢查31個單個CPU分支隊列的運行狀況。

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-

從FED(Supervisor)角度檢查CPU注入路徑 (軟體 — CPU到硬體 — Supervisor) 統計資訊。

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

從FED(UADP 2.0)角度檢查兩個單個CPU注入隊列的運行狀況。

```
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表事件統計資訊

```
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異常捨棄率

此命令詳細介紹UADP 2.0轉發ASIC丟棄資料包的所有原因：

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 IPV4_CHECKSUM_ERROR 0 0 0 0 ROUTED_AND_IP_OPTIONS_EXCEPTION 0 0 0 0
CTS_FILTERED_EXCEPTION 0 0 0 0 SIA_TTL_ZERO 0 0 0 0 ALLOW_NATIVE_EXCEPTION_COUNT 0 0 0 0
ALLOW_DOT1Q_EXCEPTION_COUNT 0 0 0 0 ALLOW_PRIORITY_TAGGED_EXCEPTION_COUNT 0 0 0 0
ALLOW_UNKNOWN_ETHER_TYPE_EXCEPTION 0 0 0 0 IP_SOURCE_GUARD_VIOLATION 0 0 0 0
SECURE_L3IF_LEARNING_VIOLATION 0 0 0 0 AUTH_DRIVEN_DROP 0 0 0 0 VLAN_LOADBALANCE_GROUP_DENY
0 0 0 0 RPF_UNICAST_FAIL 0 0 0 0 RPF_UNICAST_FAIL_SUPPRESS 0 0 0 0
RPF_UNICAST_CHECK_INCOMPLETE 0 0 0 0 RPF_MULTICAST_FAIL 0 0 0 0 PKT_DROP_COUNT 0 0 0 0
SOURCE_ROUTE_EXCEPTION 0 0 0 0 IGR_MISC_FATAL_ERROR 0 0 0 0 BLOCK_FORWARD 0 0 0 0
POLICER_DROP 0 0 0 0 DENY_ROUTE 0 0 0 0 DENY_BRIDGE 0 0 0 0 STATIC_MAC_VIOLATION 0 0 0 0
STATIC_IP_VIOLATION 0 0 0 0 FPM_DROP_PACKET 0 0 0 0 IGR_EXCEPTION_L4_ERROR 0 0 0 0
IGR_EXCEPTION_L5_ERROR 0 0 0 0 IGR_EXCEPTION_HARDWARE_PARSE_EXCEPTION 0 0 0 0
IGR_EXCEPTION_INVALID_VLAN_DROP 0 0 0 0 IGR_EXCEPTION_31 0 0 0 0
FRAGMENTING_IPV4_WITH_OPTIONS 0 0 0 0 FRAGMENTING_IPV6_WITH_EXTENSIONS 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
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--

```

Supervisor統計資訊 — Supervisor到線卡資料路徑

檢查與特定前面板介面相關的活動Supervisor UADP 2.0轉發ASIC統計資訊。在本示例中，使用介面Gig1/0/13。

輸出示例：

- 檢查線卡上的哪些介面屬於同一個埠組。
- 每個埠組共用從線卡末節ASIC到Supervisor轉發ASIC的8 Gbps頻寬。
- 每個埠組與線卡末節ASIC上指向Supervisor轉發ASIC的一個SLI (系統鏈路介面) 相關聯。

```

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:

rxBytes 4495494

NifRxByteDestinationGroupStats:

rxUnicastBytes 1174628

rxMulticastBytes 3320866

rxBroadcastBytes 0

NifRxPortStatusGroupStats:

rxUnicastFrames 18326

rxMulticastFrames 21387

rxBroadcastFrames 0

rxPauseFrames 0

rxCos0PauseFrames 0

rxCos1PauseFrames 0

rxCos2PauseFrames 0

rxCos3PauseFrames 0

rxCos4PauseFrames 0

rxCos5PauseFrames 0

rxCos6PauseFrames 0

rxCos7PauseFrames 0

rxOamProcessedFrames 0

NifRxPortStatusGroupStats:

rxCollisionFragments 0

rxFcsErrorFrames 0

rxInvalidOversizeFrames 0

rxMacOverrunFrames 0

rxIpgViolationFrames 0

rxOamDroppedFrames 0

rxSymbolErrorFrames 0

rxValidOversizeFrames 0

rxValidUndersizeFrames 0

NifRxSizeGroupStats:

rx32768toMtuFrames 0

rx16384to32767ByteFrames 0

rx8192to16383ByteFrames 0

rx4096to8191ByteFrames 0

rx2048to4095ByteFrames 0

rx1519to2047ByteFrames 51

rx1024to1518ByteFrames 15

rx512to1023ByteFrames 17

rx256to511ByteFrames 3406

rx128to255ByteFrames 6567

rx65to127ByteFrames 11295

rx64ByteFrames 18362

NifTxByteGroupStats:

txBytes 6499427

NifTxByteDestinationGroupStats:

txUnicastBytes 1175536

txMulticastBytes 5298482

txBroadcastBytes 25409

NifTxFrameDestinationGroupStats:

txUnicastFrames 18330

txMulticastFrames 24834

txBroadcastFrames 51

txPauseFrames 0

txCos0PauseFrames 0

txCos1PauseFrames 0

txCos2PauseFrames 0

txCos3PauseFrames 0

txCos4PauseFrames 0

txCos5PauseFrames 0

txCos6PauseFrames 0

txCos7PauseFrames 0

txOamFrames 0

NifTxPortStatusGroupStats:

txLateCollisionFrames 0

txsystemFcsErrorFrames 0

txOversizeFrames 0

txMacUnderrunFrames 0

txDeferredFrames 0

txExcessiveDeferralFrames 0

txOkMultipleCollisionFrames 0

txOkSingleCollisionFrames 0

goldFramesTruncated 0

NifTxSizeGroupStats:

tx32768toMtuFrames 0

tx16384to32767ByteFrames 0

tx8192to16383ByteFrames 0

tx4096to8191ByteFrames 0

tx2048to4095ByteFrames 0

tx1519to2047ByteFrames 0

tx1024to1518ByteFrames 0

tx512to1023ByteFrames 187

tx256to511ByteFrames 9407

tx128to255ByteFrames 6580

tx65to127ByteFrames 8583

tx64ByteFrames 18458

---> Input queue (Igr = Ingress)

IgrPacketCounters:

packetsIn 97777

packetsOut 97777

packetsDropped 3383

fpsSourcedPadErrorCount 0

igrSourcedPadErrorCount 0

EgrPacketCounters:

packetsIn 580324

packetsEnqueueFcd_val 0

packetsMarkedForDrop 278

padErrorPacketsIn 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:

-----> Output queue (Aqm = Active queue management)

AqmRedQueueStats:		(sum of all queues)
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:		SifSifPbcCnt0:	
Count		Count	81302675
SifSifPbcCnt1:		SifSifPbcCnt1:	
Count		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

從管理引擎的角度檢查前面板介面的流量控制狀態。這麼做可協助識別介面上是否出現任何擁塞。

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
```

檢查控制流量是否從管理引擎轉發ASIC的角度通過OCI介面在活動Supervisor上的管理引擎轉發ASIC和線卡上的線卡末節ASIC之間流動。

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
```

線卡統計資訊 — 管理引擎到線卡資料路徑

檢查與特定前面板介面關聯的線卡線卡末節ASIC統計資訊。在本示例中，重點介紹介面 Gig1/0/13。

輸出示例：

- 從Gig 1/0/13接收的資料包，進入網路介面接收埠，然後通過IQS進入堆疊介面。
- 從這裡開始，一個資料包要麼從堆疊介面傳到另一個Supervisor ASIC，要麼通過SQS、AQM、EQC、ESM、RWE返回，然後從Gig 1/0/13的網路介面傳輸傳出。
- 從出自Gig 1/0/13的其他Supervisor ASIC介面傳送的資料包進入Sif，然後通過SQS、AQM、EQC、ESM、RWE，然後退出Gig 1/0/13的NifTx。
- 對於AQM，有8個Tx隊列。如果看到這些隊列中的丟包，可以使用此命令確定哪個隊列正在經歷丟包：`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
```

```
lcpportmap.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:

rxBytes 4457854

NifRxByteDestinationGroupStats:

rxUnicastBytes 1163684
rxMulticastBytes 3294170
rxBroadcastBytes 0

NifRxPortStatusGroupStats:

rxUnicastFrames 18155
rxMulticastFrames 21235
rxBroadcastFrames 0
rxPauseFrames 0
rxCos0PauseFrames 0
rxCos1PauseFrames 0
rxCos2PauseFrames 0
rxCos3PauseFrames 0
rxCos4PauseFrames 0
rxCos5PauseFrames 0
rxCos6PauseFrames 0
rxCos7PauseFrames 0
rxOamProcessedFrames 0

NifRxPortStatusGroupStats:

rxCollisionFragments 0
rxFcsErrorFrames 0
rxInvalidOversizeFrames 0
rxMacOverrunFrames 0
rxIpgViolationFrames 0
rxOamDroppedFrames 0
rxSymbolErrorFrames 0
rxValidOversizeFrames 0
rxValidUndersizeFrames 0

NifRxSizeGroupStats:

rx32768toMtuFrames 0
rx16384to32767ByteFrames 0
rx8192to16383ByteFrames 0
rx4096to8191ByteFrames 0
rx2048to4095ByteFrames 0
rx1519to2047ByteFrames 51
rx1024to1518ByteFrames 15
rx512to1023ByteFrames 17
rx256to511ByteFrames 3374
rx128to255ByteFrames 6505
rx65to127ByteFrames 11237
rx64ByteFrames 18191

NifTxByteGroupStats:

txBytes 6440428

NifTxByteDestinationGroupStats:

txUnicastBytes 1164528
txMulticastBytes 5250491
txBroadcastBytes 25409

NifTxFrameDestinationGroupStats:

txUnicastFrames 18158
txMulticastFrames 24625
txBroadcastFrames 51
txPauseFrames 0
txCos0PauseFrames 0
txCos1PauseFrames 0
txCos2PauseFrames 0
txCos3PauseFrames 0
txCos4PauseFrames 0
txCos5PauseFrames 0
txCos6PauseFrames 0
txCos7PauseFrames 0
txOamFrames 0

NifTxPortStatusGroupStats:

txLateCollisionFrames 0
txsystemFcsErrorFrames 0
txOversizeFrames 0
txMacUnderrunFrames 0
txDeferredFrames 0
txExcessiveDeferralFrames 0
txOkMultipleCollisionFrames 0
txOkSingleCollisionFrames 0
goldFramesTruncated 0

NifTxSizeGroupStats:

tx32768toMtuFrames 0
tx16384to32767ByteFrames 0
tx8192to16383ByteFrames 0
tx4096to8191ByteFrames 0
tx2048to4095ByteFrames 0
tx1519to2047ByteFrames 0
tx1024to1518ByteFrames 0
tx512to1023ByteFrames 186
tx256to511ByteFrames 9318
tx128to255ByteFrames 6518
tx65to127ByteFrames 8526
tx64ByteFrames 18286

---> Input queue (Igr = Ingress)

IgrPacketCounters:

packetsIn 97078
packetsOut 97078
packetsDropped 0
fpsSourcedPadErrorCount 0
igrSourcedPadErrorCount 0

EgrPacketCounters:

packetsIn 576307
packetsEnqueueFcd_val 0
packetsMarkedForDrop 0
padErrorPacketsIn 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

```

從線卡角度檢查前面板介面的流量控制狀態。這有助於識別介面上的任何擁塞。

- 如果不存在流量控制，則值為「—」，否則將顯示遇到流量控制（擁塞）的隊列數。
- 介面接收的流量控制從線卡上的線卡ASIC傳遞到Supervisor上的Supervisor ASIC，其中 AQM丟棄通常在Supervisor Supervisor ASIC上可見。OCI（帶外控制介面）是線卡與主用 Supervisor之間的內部通訊通道，用於將流量控制從線卡發訊號到Supervisor。

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  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -

```

檢查控制流量是否從線卡末節ASIC視角通過OCI介面線上卡上的線卡末節ASIC與主用和備用 Supervisor上的轉發ASIC之間流動。

- OCI =帶外控制介面=線卡與主用和備用管理引擎之間的內部通訊通道

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

```

檢查線卡上的哪些介面屬於同一個埠組，該埠組共用從線卡上的線卡末節ASIC到活動Supervisor上

的Supervisor轉發ASIC的8 Gbps頻寬。每個埠組都與通向Supervisor的線卡末節ASIC上的SLI (系統鏈路介面) 之一相關聯。

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

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

Port Group	Interface	Status	Interface	Group	Max	Aggregate 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	