Test post 25.8升级

简介

先决条件

要求

使用的组件

配置

网络图

配置

验证

故障排除

本高级故障排除指南可帮助工程师了解如何对ASR9000上的流量丢弃问题进行故障排除。它可能未涵盖所有场景，但我们已尝试对最常见的情况进行归纳总结。

《行话捕手》

- GDPlane :通用数据平面
- CEF:Cisco 快速转发
- RFD接收帧描述符
- PLU:前缀查找单位
- PHU:PLU提示单元
- TBM:树位映射
- BUM:广播/未知单播/L2组播
- LC -线卡
    - 基于Tomahawk的线路卡

第三代ASR 9000系列以太网线卡通常称为基于Tomahawk的线卡。该术语来自这些线卡上使用的NP。

    - 基于光速的线卡

第四代ASR 9000系列以太网线卡通常称为基于光速的线卡。该术语来自这些线卡上使用的NP。它们有时被称为LSQ。

- 基于Lightspeed-Plus的线卡

第五代ASR 9000系列以太网线卡通常称为基于Lightspeed-Plus的线卡。该术语来自这些线卡上使用的NP。它们有时称为LSP。

了解ASR 9000系列线卡类型

- VNI:已识别VxLAN
  - L2VNI：第2层Vxlan标识符
  - L3VNI:第3层Vxlan标识符
- 泛洪 — 通常单播数据包将只传出到一个出口端口。但是，如果交换机不知道将数据包发送到何处（由于MAC丢失），我们将将该数据包发送到传入vlan的所有成员端口。这叫做洪水。
- FGID — 交换矩阵组标识符
- MGID — 组播组标识符

简介

本文档列出了各种丢包场景和逐步调试这些情况的方法。

R9K — 数据包的生存期

入口功能订购

出口功能订购

数据包处理中涉及的模块

“针对我们”的流量

“for us”数据包可以发往LC或RSP，具体取决于应用。

- 用于从Punt到LC CPU
  来自线路的数据包 → NP <->分支交换机<-> SPP(LC CPU)<-> Netio/Spio客户端<->应用
- 用于从Punt到RP CPU
  来自*Wire* →*NP <-> LC FIA <-> Crossbar <-> RSP FIA <-> Punt/Dao/Cha FPGA <-> SPP(RSP CPU)<-> Netio/Spio*客户端的数据包

中转流量

- **来自有线的**→据包(入口*NP <-> LC FIA <->*交叉开关<->出口*NP*数据→**发送到有线的数据包**

注入流量

- 从LC CPU
  - 出口注入

    应用<-> Netio/Spio客户端<-> SPP(LC CPU)<->传送交换机<->出口NP数据→传出到线

  - 向内注入

    应用<-> SRPM <->分支交换机<->入口NP <-> LC FIA <->纵横制<->出口NP →**数据包连线**

- 从RP CPU
  - 出口注入

    应用<-> Netio/Spio客户端<-> SPP(RP CPU)<-> RSP FIA <-> Crossbar <-> LC FIA <->出口NP地→ **数据包去线**

- LC CPU到RSP CPU

  Netio/Spio客户端<-> SPP(LC CPU)<->分支交换机<-> NP <-> LC Fia <->交叉开关<-> RSP Fia <-> Punt/Dao/Cha FPGA <-> SPP(RSP CPU)<-> Netio/Spio客户端

- RSP CPU到LC CPU

  Netio/Spio客户端<-> SPP(RSP CPU)<-> Punt/Dao/Cha FPGA <-> RSP Fia <-> Crossbar <-> LC Fia <-> NP <->Punt交换机<-> SPP(LC CPU)<-> Netio/Spio客户端

识别有问题的设备：

1. 对流量问题进行分类

   找出问题的类型。确定是完全丢弃、部分数据包丢弃、静默丢弃还是其他情况。

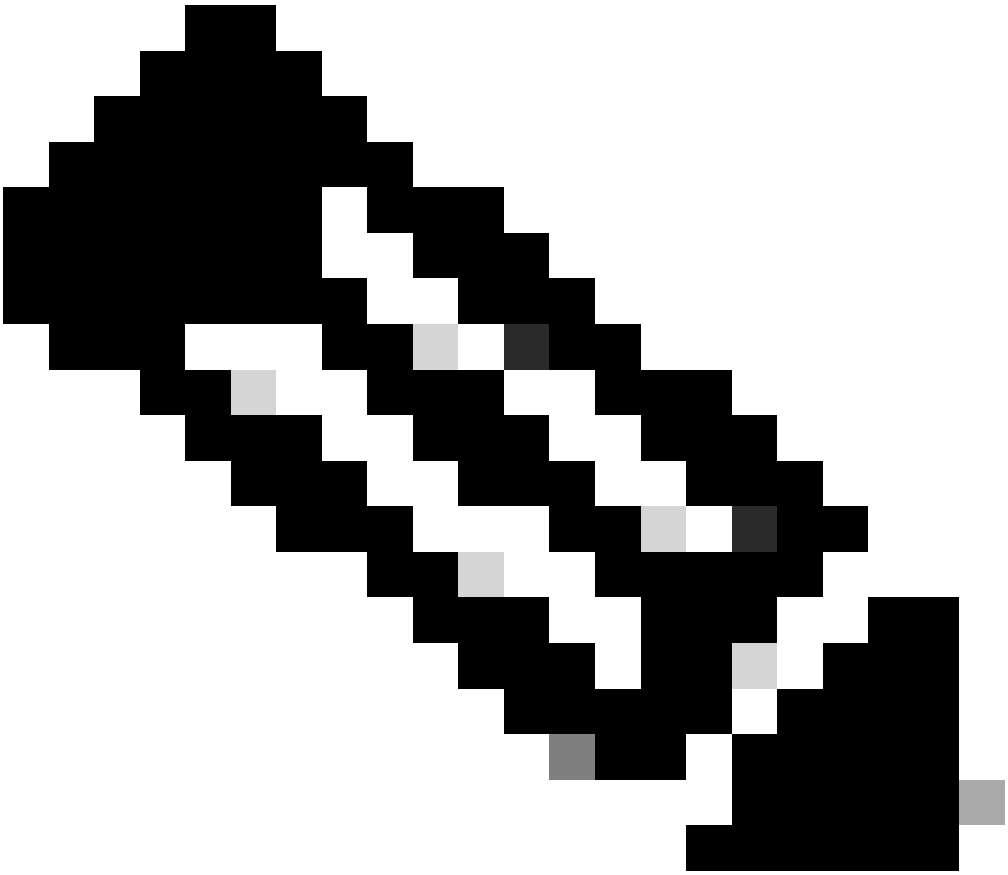
2. 确定流量类型

   L2/L3/单播/BUM/组播

3. 识别单个受害者流

   尽可能从IXIA向下钻取并找到单个流，我们将使用该流进一步进行分类

4. 跟踪单一流并缩小设备（可疑设备）范围，从而丢弃/启动复制



注意：使用拓扑图和show interface counters命令获取数据包的实际路径

1. 在IXIA上，停止所有流量并创建一个新的流量流“DEBUG”，该流量流具有我们在步骤2中选择的单个流量，并将流量速率设置为某个较高的速率（例如，如果它的数据流量，为ARP/其他受管控制平面将保持其通过速率限制器/copp时的较低速率）

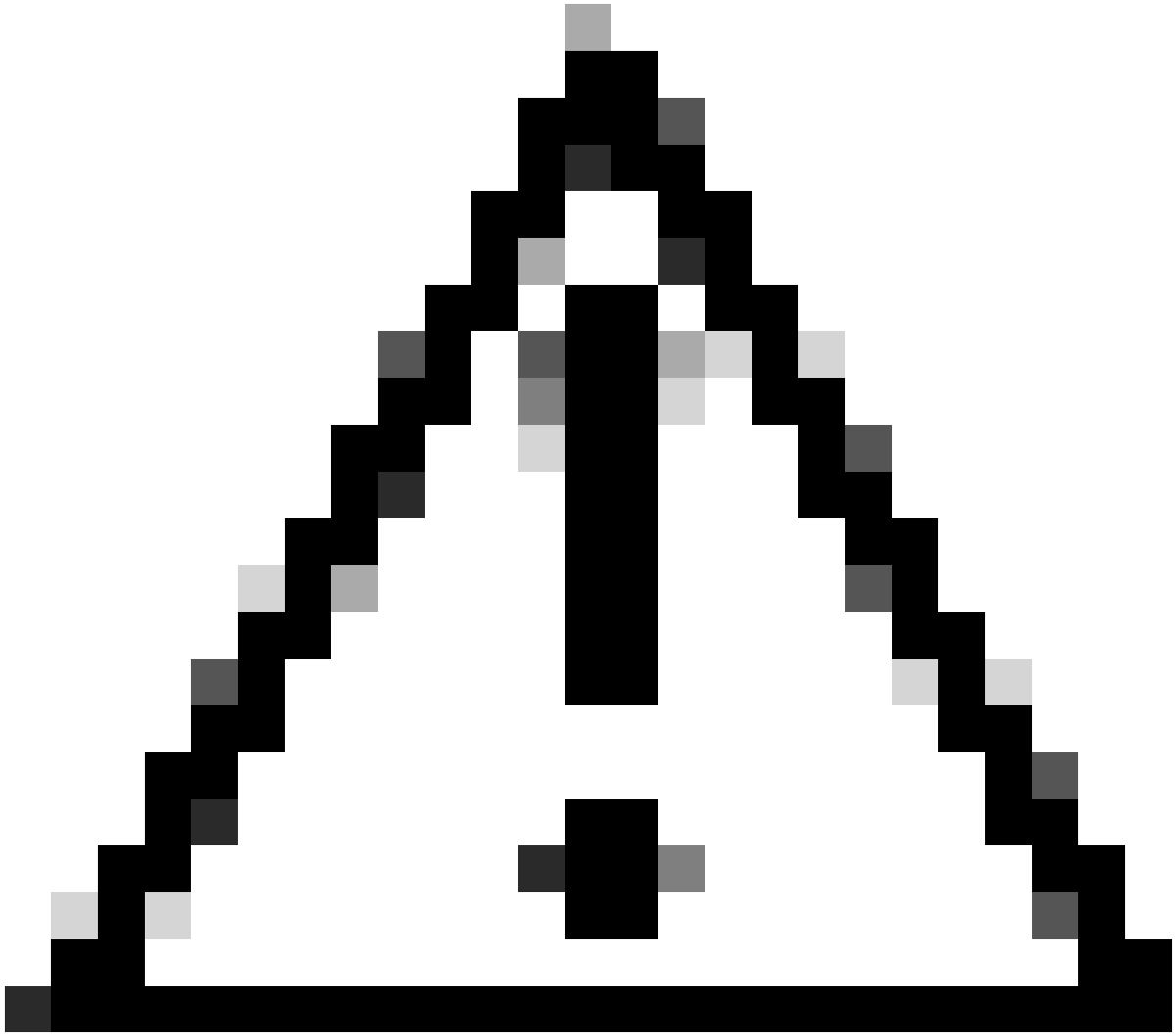
2. 在IXIA上，仅启动新的流量项，并从入口设备开始，使用“sh int counters brief”查找问题在哪台设备上开始（丢弃/重复）

5. 获取以下流程详细信息并记下它，以便更轻松地进行故障排除
    1. 源 MAC
    2. 目的 MAC
    3. 源 IP
    4. 目的 IP
    5. 源Vlan
    6. 目标Vlan（如果其路由流量）
    7. 源和目标的VRF信息（如果其L3路由流量）
    8. VNI信息
        1. L2VNI（如果L2流量）

2. L3VNI（如果其L3路由流量）

6. 缩小流量范围后，请使用以下方法查找有问题的路由器/设备。
   1. Traceroute/Ping/MPLS Ping/Ethernet Ping
   2. ACL — 检查流量是否真正到达设备的入口端口
   3. 接口计数器
   4. 接口控制器统计信息
   5. 标签交换统计信息
7. 验证没有与配置相关的问题
   请参阅一些常见配置错误部分。

从可疑设备开始实际调试



警告：尽管可疑设备正在丢弃/泛洪流量，但这并不意味着肇事者。在某些情况下，向可疑设备发送流量的设备可能是罪魁祸首。

丢弃流量的位置/模块：

接口级别丢弃

- show interface <interface>

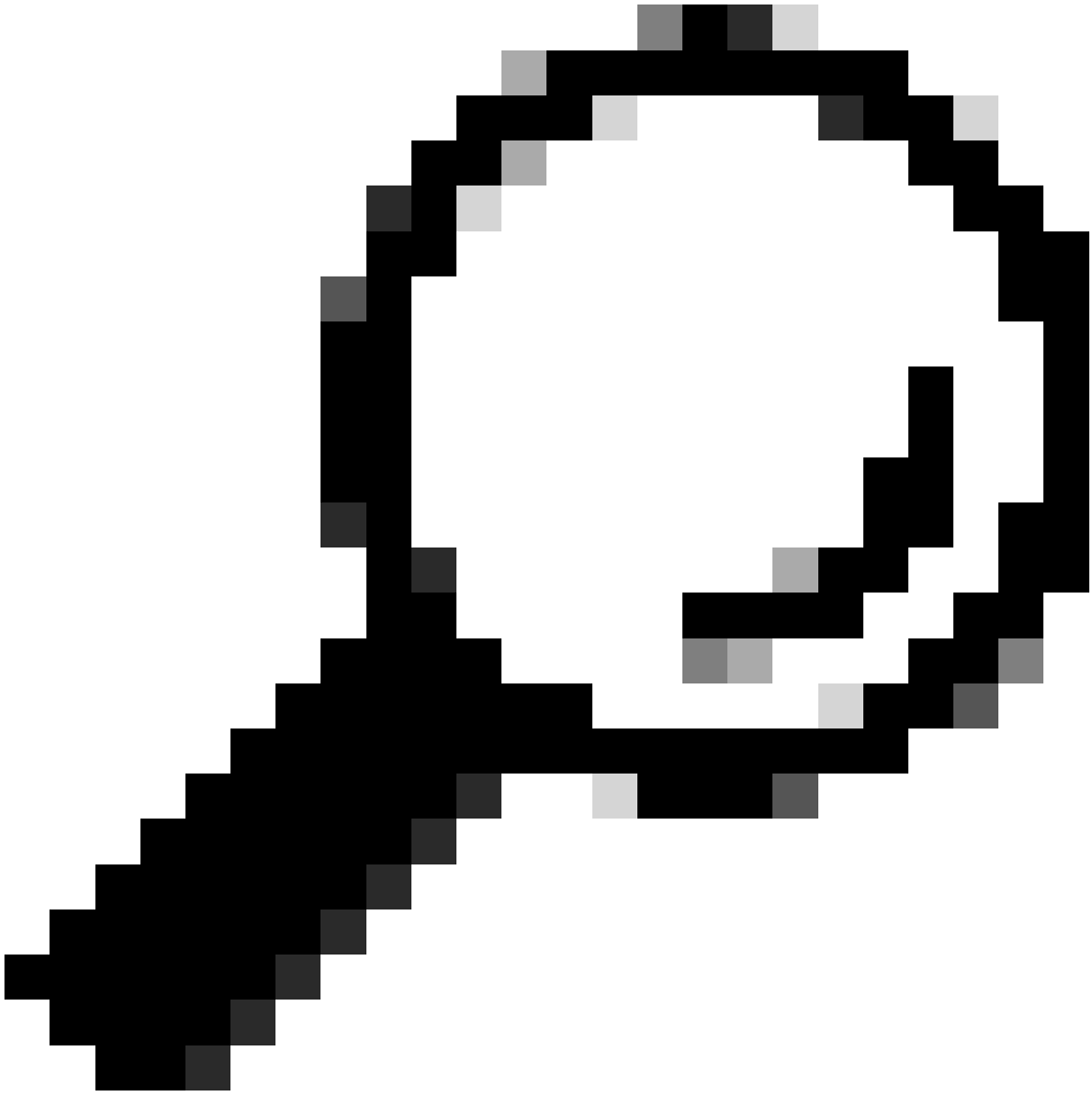
RP/0/RSP0/CPU0:YOG-CDCT-CN2-C9910# show interface Bundle-Ether602.3048 Thu May 11 13:16:40.091 WIB Bundle-Ether602.3048 is up, line protocol is up Interface state transitions: 1 Dampening enabled: penalty 0, not suppressed half-life: 1 reuse: 750 suppress: 2000 max-suppress-time: 4 restart-penalty: 0 Hardware is VLAN sub-interface(s), address is ecce.13c9.d8c5 Description: ABIS_MCBSC_CDC4_NSN_VLAN3048 Internet address is 10.17.191.179/28 MTU 9216 bytes, BW 2000000 Kbit (Max: 2000000 Kbit) reliability 255/255, txload 0/255, rxload 0/255 Encapsulation 802.1Q Virtual LAN, VLAN Id 3048, loopback not set, Last link flapped 36w1d ARP type ARPA, ARP timeout 04:00:00 Last input 00:00:00, output never Last clearing of "show interface" counters 135y46w 30 second input rate 4000 bits/sec, 9 packets/sec 30 second output rate 0 bits/sec, 0 packets/sec 85212564 packets input, 5396765891 bytes, 2493252749 total input drops 0 drops for unrecognized upper-level protocol Received 20089331 broadcast packets, 39963824 multicast packets 70999919503 packets output, 7186711514645 bytes, 0 total output drops Output 309 broadcast packets, 57 multicast packets

- show controllers <interface> stats

```
RP/0/RSP0/CPU0#show controller hundredGigE0/3/0/40 stats Wed Oct 18 16:54:04.904 WEST
Statistics for interface HundredGigE0/3/0/40 (cached values): Ingress: Input total bytes =
16850796039449085 Input good bytes = 16850796039449085 Input total packets = 13769166661248
Input 802.1Q frames = 0 Input pause frames = 0 Input pkts 64 bytes = 257446881559 Input pkts
65-127 bytes = 1285971034813 Input pkts 128-255 bytes = 401173319511 Input pkts 256-511
bytes = 261817914140 Input pkts 512-1023 bytes = 323254550402 Input pkts 1024-1518 bytes =
6444289537421 Input pkts 1519-Max bytes = 4795213423402 Input good pkts = 13769166661248
Input unicast pkts = 13769157512691 Input multicast pkts = 9147481 Input broadcast pkts =
1076 Input drop overrun = 0 Input drop abort = 0  Input drop invalid VLAN = 0 Input drop
invalid DMAC = 0 Input drop invalid encap = 0 Input drop other = 0 Input error giant = 0
Input error runt = 0 Input error jabbers = 0 Input error fragments = 0 Input error CRC = 0
Input error collisions = 0 Input error symbol = 0 Input error other = 0 Input MIB giant =
4795213423402 Input MIB jabber = 0 Input MIB CRC = 0  Egress: Output total bytes =
3150799484820437 Output good bytes = 3150799484820437 Output total packets = 5987194620610
Output 802.1Q frames = 0 Output pause frames = 0 Output pkts 64 bytes = 59685948036 Output
pkts 65-127 bytes = 3272599163757 Output pkts 128-255 bytes = 477536708073 Output pkts 256-
511 bytes = 150420175953 Output pkts 512-1023 bytes = 191150155497 Output pkts 1024-1518
bytes = 999535758139 Output pkts 1519-Max bytes = 836266711152 Output good pkts =
5987194446122 Output unicast pkts = 5987180721273 Output multicast pkts = 13724849 Output
broadcast pkts = 0 Output drop underrun = 0 Output drop abort = 0 Output drop other = 0
Output error other = 174488
```

早期快速丢弃

如何检查EFD是否丢弃数据包？



提示：请注意，Tomahawk EFD丢弃不会显示在“show controller np counters <>”命令输出中，也不会显示在“show drops”命令输出中。系统会打开新的增强请求，以在“show drops”命令中包含EFD丢弃。参考

RP/0/RP0/CPU0:asr9k-1# sh controllers np fast-drop np0 location 0/0/CPU0 Fri Jan 27 12:17:57.333 PST Node: 0/0/CPU0: ---------- ---------- All fast drop counters for NP 0: TenGigE0/0/0/1/0-TenGigE0/0/0/1_9:[Priority1] 0 TenGigE0/0/0/1/0-TenGigE0/0/0/1_9:[Priority2] 0 TenGigE0/0/0/1/0-TenGigE0/0/0/1_9:[Priority3] 0 HundredGigE0/0/0/0-TenGigE0/0/0_1_9:[Priority1] 0 HundredGigE0/0/0/0-TenGigE0/0/0_1_9:[Priority2] 0 HundredGigE0/0/0/0-TenGigE0/0/0_1_9:[Priority3] 123532779 <=== Priority 3 packets dropped ---------- RP/0/RP0/CPU0:asr9k-1#

要收集哪些数据？

ASR9000 Tomahawk和Lightspeed线卡上的np_perf功能用于排除NP快速丢包故障

NP丢弃

1.根据入口端口信息确定相关的NP。以下命令可用于标识NP

show controllers np portmap all location < >

```
RP/0/RSP0/CPU0:SRv6-R5# show controllers np portmap all location 0/1/CPU0 Wed May 17
05:30:40.389 EDT Node: 0/1/CPU0: ----------------------------------------------------
--------- Show Port Map for NP: 0, and RX Unicast Ports phy port num interface desc
uiMappedSourcePort 0 HundredGigE0_1_0_0 0 10 HundredGigE0_1_0_1 10 20 HundredGigE0_1_0_2
20 30 HundredGigE0_1_0_3 30 Show Port Map for NP: 1, and RX Unicast Ports phy port num
interface desc uiMappedSourcePort 0 HundredGigE0_1_0_4 0 10 TenGigE0_1_0_5_0 10 11
TenGigE0_1_0_5_1 11 12 TenGigE0_1_0_5_2 257 (bundle) 13 TenGigE0_1_0_5_3 13 20
HundredGigE0_1_0_6 20 30 TenGigE0_1_0_7_0 30 31 TenGigE0_1_0_7_1 31 32 TenGigE0_1_0_7_2
256 (bundle) 33 TenGigE0_1_0_7_3 33 RP/0/RSP0/CPU0:SRv6-R5#
```

2.检查步骤(a)中识别的NP的np计数器统计信息。

show controller np counters <npnum>/all > location < >

RP/0/RSP0/CPU0:SRv6-R5# show controller np counters all location 0/3/CPU0 Wed Oct 18 16:54:46.557 WEST Node: 0/3/CPU0: ---------- Show global stats counters for NP0, revision v0 Last clearing of counters for this NP: 2543:27:1 Read 0 non-zero NP counters: Offset Counter FrameValue Rate (pps) ---------- 104 BFD discriminator zero packet 2 0 158 IPv4 PIM all routers detected 31878304 3 170 IPv6 LL hash lookup miss on egress 1 0 192 L2 MAC learning source MAC lookup miss 53 0 193 L2 MAC move on egress NP 55 0 194 L2 MAC notify delete 15 0 195 L2 MAC notify delete no entry 2 0 198 L2 MAC notify learn complete 2520170 0 200 L2 MAC notify received 21518947 3 201 L2 MAC notify reflection filtered 113082 0 202 L2 MAC notify refresh complete 18885133 3 205 L2 MAC notify update with bridge domain flush 366 0 206 L2 MAC notify update with port flush 30 0 208 L2 MAC update via reverse MAC notify skipped 2 0 220 L2 aging scan delete from BD key mismatch 108 0 221 L2 aging scan delete from XID invalid 3 0 223 L2 aging scan delete from entry aging out 2516745 0 227 L2 egress MAC modify 18885584 3 246 L2 ingress MAC bridge domain flush 2 0 250 L2 ingress MAC learn 53 0 251 L2 ingress MAC modify 113027 0 253 L2 ingress MAC move 2 0 256 L2 ingress MAC refresh update 113025 0 266 L2 on demand scan delete from BD key mismatch 3060 0 267 L2 on demand scan delete from XID invalid 49 0 292 MAPT - TBPG Event 1562667425 171 349 TBPG L2 mailbox events 1376253865 150 350 TBPG MAC scan events 22942615 3 351 TBPG stat events 88080247335 9620 361 VPLS egress MAC notify MAC lock retry 607 0 363 VPLS egress MAC notify entry lock retry 176 0 372 VPLS ingress entry lock not acquired 4758 0 373 VPLS ingress entry lock retry 1362180 0 400 DMAC mismatch MY_MAC or MCAST_MAC for L3 intf 1 0 420 GRE IPv4 decap qualification failed 34389 0 431 GRE IPv6 decap qualification failed 34 0 460 IP multicast route drop flag enabled 10985 0 463 IPv4 BFD SH packet TTL below min 2705 0 464 IPv4 BFD SH packet invalid size 2294 0 486 IPv4 multicast egress no route 1363073 0 488 IPv4 multicast fail RPF drop 222733 0 550 L2 VNI info no hash entry drop 7 0 562 L2 egress VLAN tag missing drop 97 0 576 L2 ingress LAG no match drop 172286 0 592 L2 ingress flood null FGID drop 62617 0 602 L2 on L3 ingress unknown protocol 4577940 0 617 LAC subscribers L2TP version mismatch drop 404 0 623 LSM dropped due to egress drop flag on label 3 0 635 MPLS over UDP decap is disabled 5 0 650 P2MP carries more than two labels 27398 0 652 P2MP with invalid v4 or v6 explicit null label 60273 0 671 Queue tail drops due to queue buffer limit 67132 0 728 VPWS ingress DXID no match drop 5 0 729 WRED curve probability drops 22229 0 734 CLNS multicast from fabric pre-route 1502161 0 738 IPv4 from fabric 984281239 206 739 IPv4 from fabric pre-route 4472288 0 740 IPv4 inward 18133144 2 742 IPv4 multicast from fabric pre-route 3293512 0 745 IPv6 from fabric 2412441 0 747 IPv6 link-local from fabric pre-route 281239 0 749 IPv6 multicast from fabric pre-route 529 0 753 Inject to fabric 406582755 151 754 Inject to port 199262152 106 755 MPLS from fabric 295962479 30 759 Pre-route punt request 101423 0 1410 Drop due to

invalid table content 9 0 1418 IPv4 egress null route 1 0 1423 IPv4 invalid length in ingress 21 0 1443 MPLS MTU exceeded 3512168 0 1466 MPLS invalid payload when disposing all labels 85 0 1468 MPLS leaf with no control flags set 13281 0 1470 MPLS receive adjacency 1 0 1503 ARP 65599 0 1518 Bundle protocol 27441792 3 1524 Diags 152495 0 1572 IPv4 options 188 0 1587 ICMP generation needed 33 0 1599 TTL exceeded 173434294 21 1600 Punt policer: TTL exceeded 7506 0 1602 IPv4 fragmentation needed 213116 12 1605 IPv4 BFD 1288 0 1611 IFIB 466671481 157 1612 Punt policer: IFIB 413684 0 1632 IPv6 hop-by-hop 1285 0 1635 IPv6 TTL error 2230163 0 1695 Diags RSP active 152501 0 1698 Diags RSP standby 152559 0 1701 NetIO RP to LC CPU 78667597 8 1716 SyncE 9155455 1 1749 MPLS fragmentation needed 16 0 1752 MPLS TTL exceeded 194 0 1755 IPv4 adjacency null route 9760672 0 1756 Punt policer: IPv4 adjacency null route 1673465 0 1809 PTP ethernet 516895376 56 1899 DHCP broadcast 891 0 1995 IPv4 incomplete Rx adjacency 64643796 6 1996 Punt policer: IPv4 incomplete Rx adjacency 26014 0 1998 IPv4 incomplete Tx adjacency 9143978 1 1999 Punt policer: IPv4 incomplete Tx adjacency 13053 0 2013 IPv6 incomplete Tx adjacency 206 0 2022 MPLS incomplete Tx adjacency 339606 0 2028 Remote punt BFD 31 0 HW Received from Line 29024842290654 3235969 HW Transmit to Fabric 29024410231530 3235922 HW Received from Fabric 23530268012585 2664187 HW Transmit to Line 23530333637629 2664266 HW Host Inject Received 605997250 257 HW Host Punt Transmit 980248296 225 HW Local Loopback Received at iGTR 1081176162 309 HW Local Loopback Transmit by iGTR 1081176162 309 HW Local Loopback Received at Egress 1081176162 309 HW Transmit to TM from eGTR 23531332324079 2664493 HW Transmit to L2 23531313885879 2664491 HW Received from Service Loopback 18438204 2 HW Transmit to Service Loopback 18438204 2 HW Internal generated by PDMA 214940487672 23474

a.L3特定计数器

对于Drops，您应查看以下Wiki以查找原因。查看它是否属于L3类别。

如果是L3类别，请获取与流相关的所有L3相关输出。
L3 CEF Chain输出和其他show命令

show cef [ipv4 | ipv6 | mpls]硬件[入口 | egress] detail location <LC>

show mpls forwarding labels <LABEL> hardware egress detail location <LC>

show cef vrf <vrf> <IP> internal location <LC>

show cef vrf <vrf> <IP> hardware [ingres | egress] location <LC>

show cef mpls local-label <LABEL> EOS

show cef mpls local-label <LABEL> non-eos location <LC>

show mpls forwarding labels <LABEL> det hardware [ingres | egress] location <LC>

与接口级别输出相关的show命令[子接口、捆绑包及其成员……]

show uidb im database and its chain related to the interface。

如果调用了捆绑包，则显示捆绑包<>相关命令。

sh controllers pm vqi location <LC

PI命令：

sh cef <IP> internal location <LC>

sh cef <IP> detail location <LC>

show cef unresolved loc <>

show cef adjacency loc <>

show cef [drops | exception] loc <>

show cef [misc | summary] loc <>

show cef [ipv4 | ipv6 | mpls] trace [error | eve | table] loc <>

show cef interface <> loc <>

show mpls forwarding [..] loc <>

b. L2特定计数器

对于Drops，您应查看以下Wiki以查找原因。查看它是否属于L2类别。
LSP所有计数器详细信息
如果是L2类别，请获取与流相关的所有L2相关输出。
L2VPN链输出和其他show命令

show l2vpn forwarding hardware ingress detail location <LC>

show l2vpn forwarding hardware egress detail location <LC>

show l2vpn forwarding bridge-domain <BD Group:BD Name>硬件入口详细位置<LC>

show l2vpn forwarding bridge-domain <BD Group:BD Name>硬件出口详细位置<LC>

show l2vpn forwarding bridge-domain mac-address hardware ingress location <LC>

show l2vpn forwarding interface pw-ether <PW> hard detail location <LC>

show l2vpn xconnect interface pw-ether <PW> detail

show l2vpn forwarding main-port pwhe interface pw-ether600 hardware ingress detail location <LC>

show l2vpn mstp port msti 0

show l2vpn mstp port msti 1

与接口级别输出相关的show命令[子接口、捆绑包及其成员……]

show uidb im database and its chain related to the interface。

如果调用了捆绑包，则显示捆绑包<>相关命令。

sh controllers pm vqi location < >

show l2vpn forwarding bridge-domain mac-address internal private first 1000 location 0/RP0/CPU0

show evpn internal-label private location 0/RP0/CPU0

show evpn internal-label path-list private location 0/RP0/CPU0

show evpn internal-id private location 0/RP0/CPU0

show l2vpn forwarding bridge-domain mac-address internal private first 1000 location 0/RP1/CPU0

show evpn internal-label private location 0/RP1/CPU0

show evpn internal-label path-list private location 0/RP1/CPU0

3.在丢弃计数器上捕获monitor np计数器。

示例：要对计数器<DROP_COUNTER_NAME>进行监视，请执行

monitor np counter <DROP_COUNTER_NAME> <np> location <LC>

RP/0/RP0/CPU0:agg03.rjo# monitor np counter PARSE_DROP_IPV4_CHECKSUM_ERROR np0 location 0/1/cpu0 Tue Oct 5 10:49:30.349 BRA Usage of NP monitor is recommended for cisco internal use only. Please use instead 'show controllers np capture' for troubleshooting packet drops in NP and 'monitor np interface' for per (sub)interface counter monitoring Warning: Every packet captured will be dropped! If you use the 'count' option to capture multiple protocol packets, this could disrupt protocol sessions (eg, OSPF session flap). So if capturing protocol packets, capture only 1 at a time. Warning: A mandatory NP reset will be done after monitor to clean up. This will cause ~150ms traffic outage. Links will stay Up. Proceed y/n [y] > y Monitor PARSE_DROP_IPV4_CHECKSUM_ERROR on NP0 ... (Ctrl-C to quit) Tue Oct 5 10:49:33 2021 -- NP0 packet From HundredGigE0_1_0_0: 86 byte packet 0000: b0 26 80 67 3c bd bc 16 65 5e 2c 04 08 00 45 00 0&.g<=<.e^,...E. 0010: 00 48 cb b9 40 00 38 11 53 7f b3 e8 5e 74 08 08 .HK9@.8.S.3h^t.. 0020: 08 08 b5 a6 00 35 00 34 e5 22 d0 f0 01 00 00 01 ..5&.5.4e"Pp.... 0030: 00 00 00 00 00 00 0e 6e 72 64 70 35 31 2d 61 70 ....nrdp51-ap 0040: 70 62 6f 6f 74 07 6e 65 74 66 6c 69 78 03 63 6f pboot.netflix.co 0050: 6d 00 00 01 00 01 m.....

monitor np counter <DROP_COUNTER_NAME> <np> detail location <LC>

RP/0/RP0/CPU0:PE23#monitor np counter 12 np3 detail location 0/0/CPU0 Mon Mar 11 18:20:49.180 IST Usage of NP monitor is recommended for cisco internal use only. Warning: Using monitor will cause brief traffic loss twice for setup and takedown. Each outage could exceed ? ms. After a packet is monitored, it will resume normal handling (i.e. forward, punt, drop, etc). Setup ... ready for traffic outage? [enter] Monitoring NP3 for NP counter 12 [Invalid stats pointer 12] ... (Ctrl-C to quit) Mon Mar 11 18:21:25 2024 -- NP3 packet 150 bytes ---------- NPU 03: Cluster 11: PPE 15: Thread 00 Ptrace 00 Received from : Fabric GPM Pkt Dump Contents: 00 04 08 0C 10 14 18 1C G 000: 70e42225 e554f86b d9a39247 88470057 80049000 0054004a 00000000 00000000 G 020: 00000000 9424118c 05000400 000000a6 c024400f 00000001 248c80c1 cd000004 G 040: 000186a0 000186a0 00000000 dad4994e 00200000 20c80318 000101ba 00060296 G 060: 0111bef8 64001700 7f000001 c0000ec8 03e83cff 064eddff 45c00034 00000000 G 080: 801318e5 044420b0 0000fc00 00000020 0000ff00

0000ff80 0000fd00 00000000 G 0a0: c040401d 82000201 080e0000 000e0000 eb190080 00000004 053942d2 00d20048 G 0c0: 003bbbff 0001f86b d9a3923f 810003e9 08004500 00640000 0000ff01 8bd21764 G 0e0: 00fe1764 00010800 b4ee1a25 0000abcd abcdabcd abcdabcd abcdabcd abcdabcd G 100: abcdabcd abcdabcd abcdabcd abcdabcd abcdabcd abcdabcd abcdabcd abcdabcd G 120: abcdabcd abcdabcd abcdabcd abcdabcd abcdabcd abcd49d6 79520000 00000000 DMEM Contents: 00 04 08 0C 10 14 18 1C 000: 40000256 009609c0 00000000 00000000 deadbeef deadbeef deadbeef deadbeef 020: f0000010 05000172 40000000 00000000 00000000 810003e9 00000000 0004fc49 040: 70000000 01004c1b 64000300 00000000 02000000 00000000 0000000e 000992a1 060: 00000000 00000000 00000000 01800000 00000000 f0000000 00000000 06d035fb 080: 000f0109 00711ef0 00000046 06d035fb 41800000 01000001 64000b00 00064ed1 0a0: 8200f86b d9a39247 1e01f25f 00009003 00000000 00000000 00000000 00000000 0c0: c0000000 00018c00 001e0000 00000000 000f0109 0077e248 00000076 00000000 0e0: 8200f86b d9a39247 1e01f25f 00009003 00000000 00000000 00000000 00000000 100: 83211001 00000000 0d94001b 0992a096 07aa60a2 1e000fa0 1c000001 00000000 120: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 140: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 160: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 180: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 1a0: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 1c0: deadbeef deadbeef deadbeef deadbeef 28010100 00000000 00000000 0000004b 1e0: d0000000 00000000 00002000 0000004b 90004031 800019d3 00000000 00000000 200: 00000004 00000004 01000000 0a000000 b8008810 01010003 00000000 00000000 220: 00000000 00000000 00000000 010423de deadbeef deadbeef deadbeef deadbeef 240: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 260: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 280: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 2a0: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef 2c0: 000f0108 004aea60 deadbeef deadbeef 001e0003 80000000 00000008 deadbeef 2e0: deadbeef deadbeef deadbeef deadbeef deadbeef deadbeef dead0096 00021000 300: 00008008 0992a004 04fc49ef deadbeef deadbeef deadbeef 000001ef deadbeef 320: 083961ef 03e83cff 061addff deadbeef deadbeef deadbeef deadbeef deadbeef 340: deadbeef deadbeef deadbeef deadbeef c0000ec8 000011ef deadbeef 00000172 360: deadbeef 0d00beef 00000000 0000000e 00000000 000210c0 a2961b00 000210d2 380: 00000084 deadbeef 000210ec 03e83cff deadbeef deadbeef 00009000 0001f250 3a0: 800019d3 000210a0 deadbeef deadbeef 00000000 02000000 deadbeef 00000000 3c0: 00680d8f 01d20000 deadbeef 00ffbeef deadbe00 000000ef deadbeef deadbeef 3e0: 02000000 05800010 00040004 00000000 00020390 3195f8fe 04441100 044422c0 Register Contents: r00: 800980b9 00000001 0000000c 0000000c 004aea60 3c084204 00000032 18000004 r08: 04442200 044421d0 00000008 00000003 000210a0 00000004 00000001 00000001 r16: 80119bab 04442170 0000fc00 fffff000 000210a0 000210c0 000000ff 00ffffff r24: 80125faf 04442140 0000fc00 000210c0 000210a0 00000001 00000001 00500000 = = Above Register Contents are from windowbase = 3 = = = = Easy-to-read Register Contents (windowbase: 0) = = a00 000210a0 | a08 000210a0 | a16 004aea60 | a24 000210a0 a01 000210c0 | a09 00000001 | a17 3c084204 | a25 00000004 a02 000000ff | a10 00000001 | a18 00000032 | a26 00000001 a03 00ffffff | a11 00500000 | a19 18000004 | a27 00000001 a04 80125faf | a12 800980b9 | a20 04442200 | a28 80119bab a05 04442140 | a13 00000001 | a21 044421d0 | a29 04442170 a06 0000fc00 | a14 0000000c | a22 00000008 | a30 0000fc00 a07 000210c0 | a15 0000000c | a23 00000003 | a31 fffff000 Special Registers: sar = 0000001a window_start = 0000008a window_base = 00000003 epc = 00040250 exccause = 00000001 (SycallCause) ps = 00020330 sse_cop_errorcode = 00000000 h3ta = deb4cf17 h3tb = deadbf03 h3tc = deadbef7 h3tr = 2609d946 timestamp_high_1 = 00095a09 timestamp_low_1 = 19f84b99 cycle_count_high_1 = 0000008c cycle_count_low_1 = 1a732982 ppe_id = 6bc60d7e uidb_ext0 = 3195f8fe uidb_ext1 = 00020390 uidb_ext2 = 00000000 uidb_ext3 = 00000000 uidb_ext4 = 00000000 uidb_ext5 = 00000000 softerr_misc = 00000034 timestamp_high_2 = 00095a09 timestamp_low_2 = 19f8609a cycle_count_high_2 = 0000008c cycle_count_low_2 = 1a732ae8 css = 00000001 ci_count_1 = 000003a8 thread_stop = 00000000 ci_count_2 = 000003a8 memctrl = 00000000 softerr_dmem0 = 60411000 softerr_dmem1 = 67f15000 code_segment0 = 08000000 code_segment1 = 08000000 l1t_data_sbe_log = 00000000 l1t_mshr_sbe_log = 00000000 random_1 = 19382747 stall_control = 00000003 l1t_tag_parity_log = 6bc60d7e random_2 = 697de1cb depc = 00000000 timeout_control =

00000008 rtb0 = 00000000 rtb1 = 0000000f invalidate = 00000000 tlu_cmd_hdr = 6bc60d7e l1t_enables = 00000003 l1t_replacement_way = 00000007 excvaddr = 00060330 l1t_data_mbe_log = 00000000 l1t_mshr_mbe_log = 00000000 sse_cop_seedh = 356c9a7b sse_cop_tlu_cnt1_rw = 00000000 sse_cop_lock = 800034a7 sse_cop_tlu_perr = 00000000 sse_cop_tlu_cnte1_rw = 00000000 sse_cop_tps_tpd_parity_log = 00000000 sse_cop_tps_tpt_parity_log = 00000000 sse_cop_tmu_parity_log_rw = 00000000 sse_cop_tmu_sram_mbe_log_rw = 00000000 sse_cop_tmu_sram_sbe_log_rw = 00000000 sse_cop_tlu_cnte0_rw = 00000000 sse_cop_tlu_cntp_rw = 00000000 sse_cop_tlu_cnt0_rw = 00000000 rtt_index = 00000000 rtt_data0 = 00000000 rtt_data1 = 00000000 ppe_lock = 8000000c stack_limit = 04441400 stack_limit_enable = 00000001 sse_cop_dma_mem_access = 00000000 sse_cop_dma_mem_data = 000000a0 error_code = 00000000(No Error)

4.HW编程详细信息 — 可以使用以下内容收集有关转发HW结构编程的详细信息。（对NP团队进一步调试非常有用）

L3

show controller np struct R-LDI insafe det all location <LC>
show controller np struct NR-LDI insafe det all location <LC>

show controller np struct TE-NH-ADJ insafe det all location <LC>

show controller np struct RX-ADJ insafe det all location <LC>

show controller np struct TX-ADJ insafe det all location <LC>

show controller np struct NHINDEX insafe det all location <LC>

show controller np struct LAG insafe det all location <LC>

show controller np struct LAG-Info insafe det all location <LC>

L2

show controller np struct UIDB-EGR-EXT insafe det all location <LC>

show controller np struct UIDB-Ext insafe det all location <LC>

show controller np struct UIDB-ING-EXT insafe det all location <LC>

show controller np struct EGR-UIDB insafe det all location <LC>

show controller np struct XID insafe det all location <LC>

show controller np struct XID-EXT insafe det all location <LC>

show controller np struct BD insafe det all location <LC>

show controller np struct BD-EXT insafe det all location <LC>

show controller np struct BD-LEARN-COUNT insafe det all location <LC>

show controller np struct L2-BRGMEM insafe det all location <LC>

show controller np struct l2-fib unsafe det all location <LC>
LSP:运行ssh lc0_xr /pkg/bin/show_l2ufib <Collect in all active LCs>

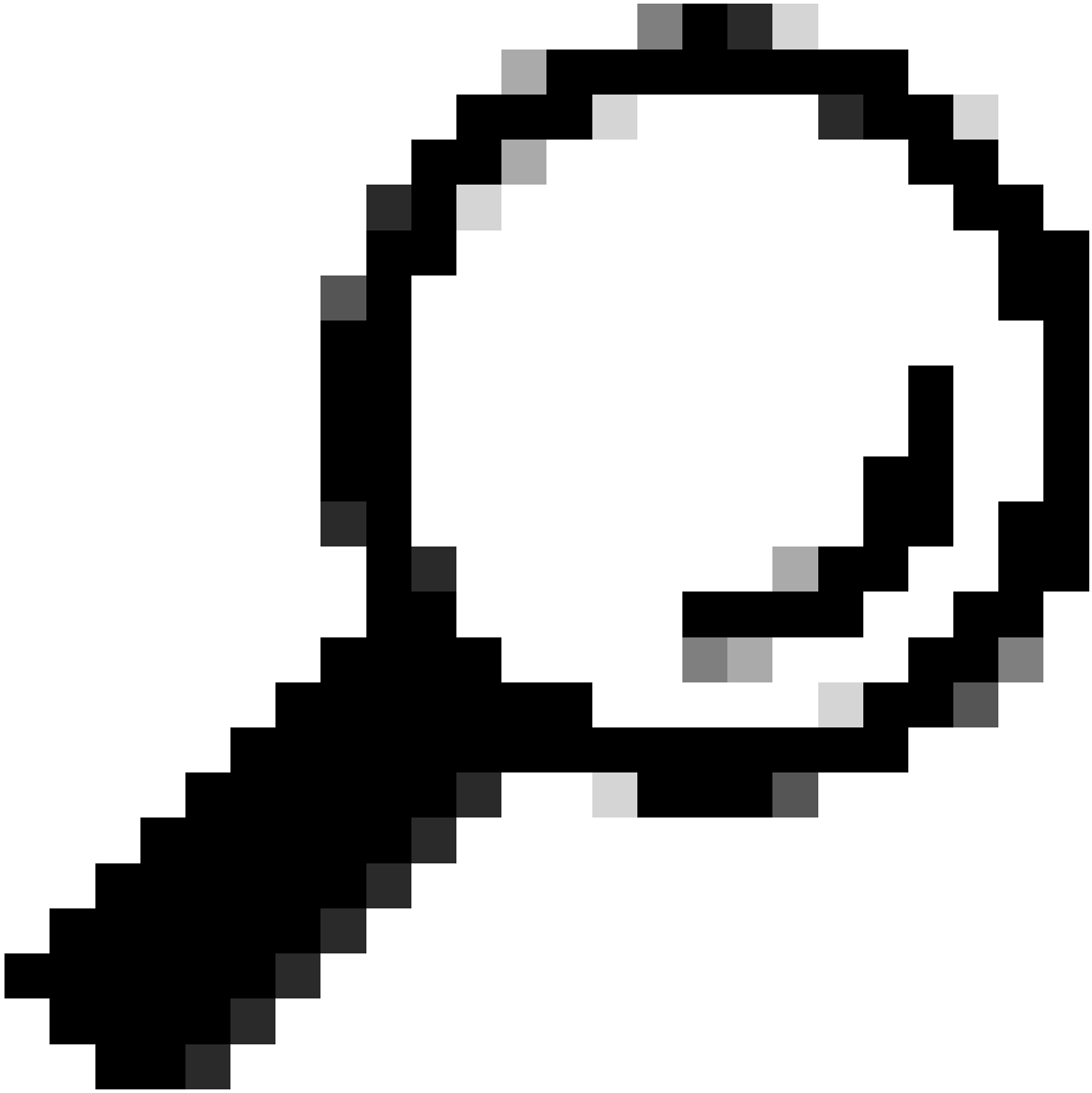
show controller np struct L2-MAILBOX insafe det all location <LC>

show controller np struct L2-MBX-HOST-TO-NP unsafe det all location <LC>

show controller np struct L2-MBX-NP-TO-HOST insafe det all location <LC>

SPP

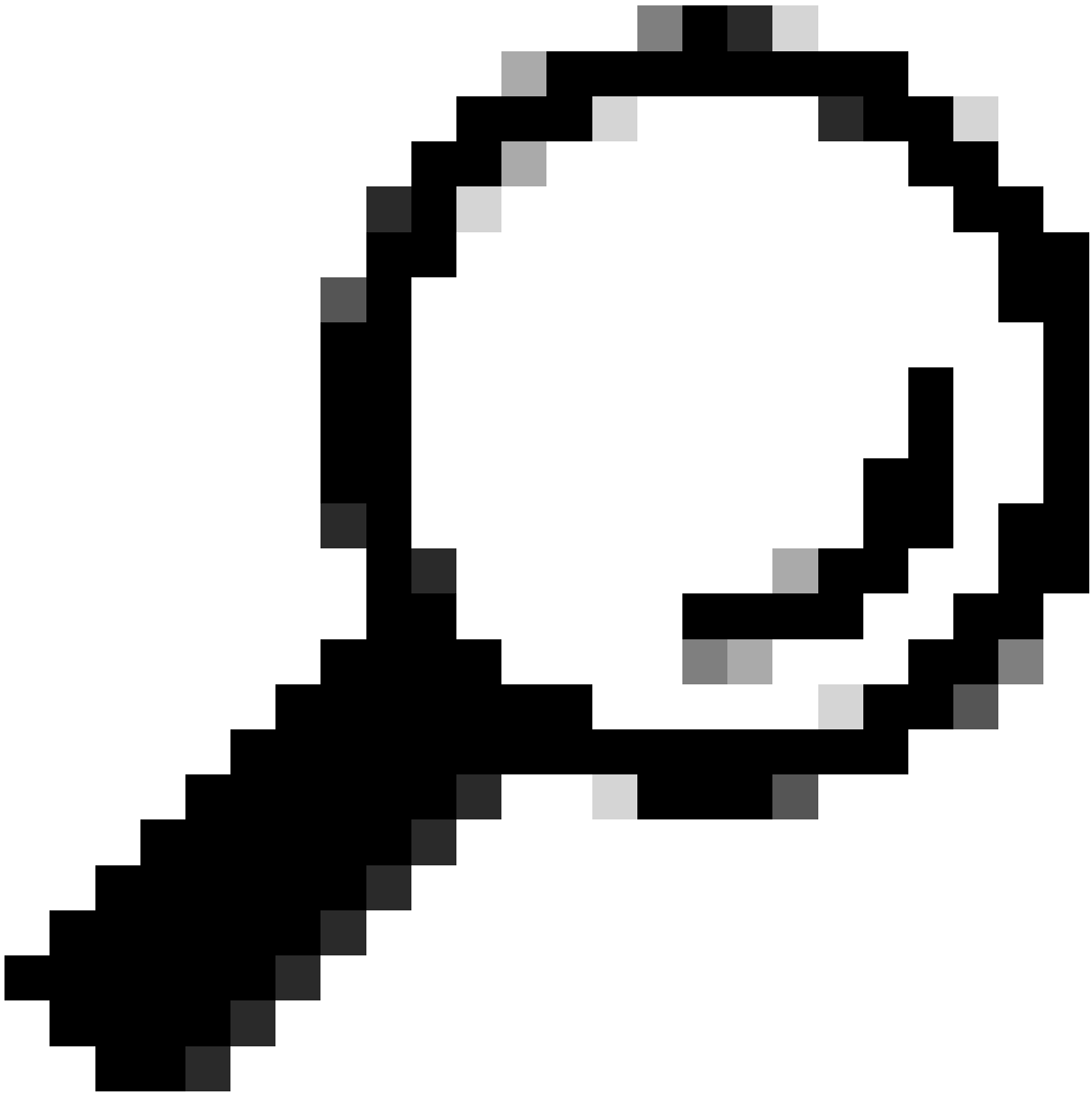
show spp sid stats location < >
show spp node-counters location < >



提示：如何在SPP捕获/过滤数据包？参考

NETIO

show netio drops location < >



提示：您可以参考

SRPM

ip maddr show eth-srpm（用于检查接口的组播条目）

ip maddr show eth-srpm.1283（用于检查接口的组播条目）

ifconfig（检查接口的数据包统计信息，以查看RX和TX是否正确运行）

[xr-vm_node0_0_CPU0:~]$ip maddr show eth-srpm.1283 9: eth-srpm.1283 link 33:33:00:00:00:01 users 2 link 01:00:5e:00:00:01

users 2 link 33:33:ff:50:4e:52 users 2 link 01:56:47:50:4e:30 users 2 static link 33:33:00:01:00:03 users 2 inet 224.0.0.1 inet6 ff02::1:3 inet6 ff02::1:ff50:4e52 inet6 ff02::1 inet6 ff01::1 [xr-vm_node0_0_CPU0:~]$ifconfig eth-srpm.1283: flags=4163

mtu 9700 metric 1 inet6 fe80::544b:47ff:fe50:4e52 prefixlen 64 scopeid 0x20

ether 56:4b:47:50:4e:52 txqueuelen 1000 (Ethernet) RX packets 0 bytes 0 (0.0 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 828560 bytes 138041161 (131.6 MiB) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

LPTS

show lpts pifib hardware entry statistics loc <>
show lpts pifib hard police loc <>
show lpts pifib hardware static-police loc <>
show lpts pifib ha entry stats location <>

交换矩阵

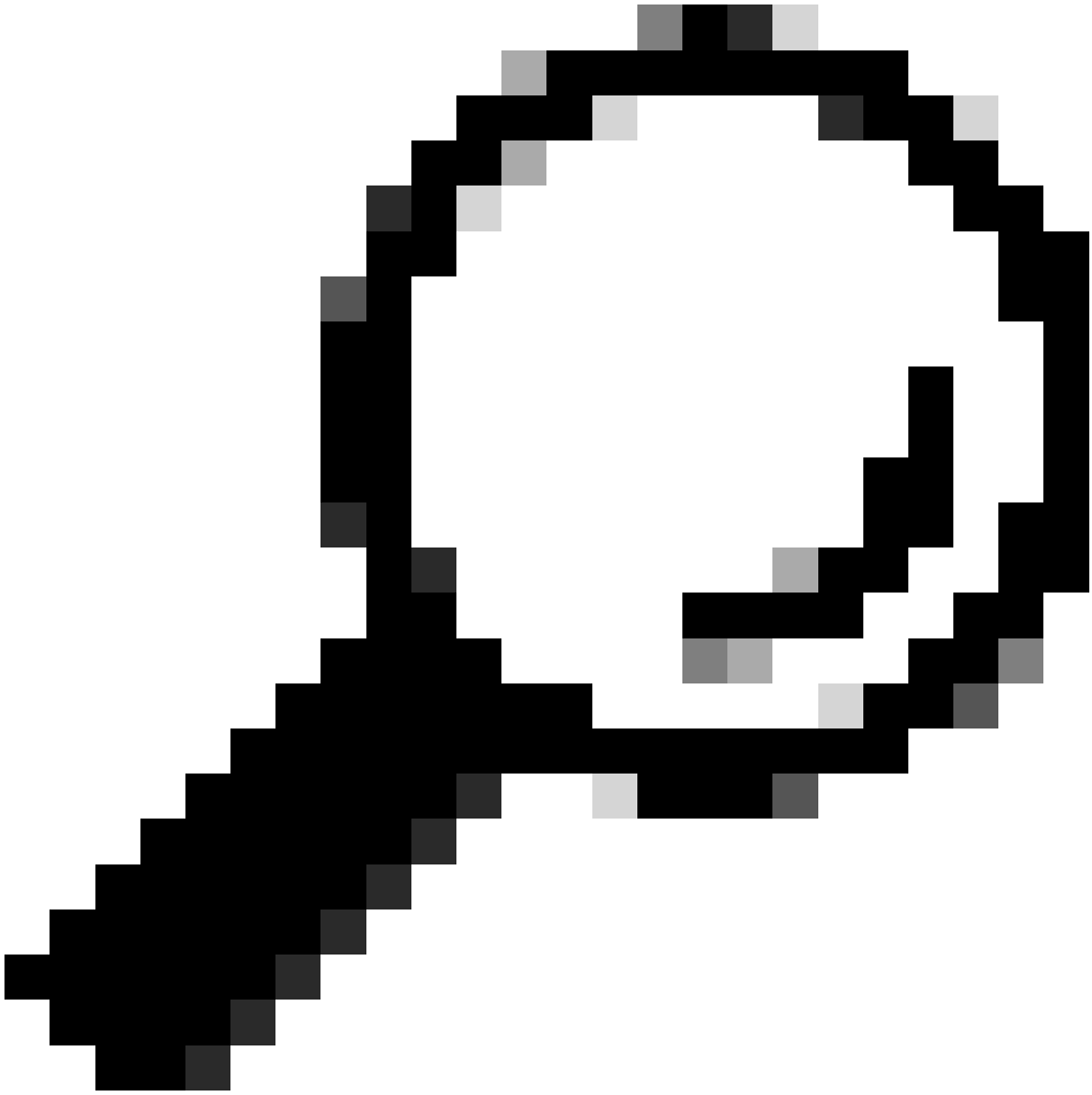
show controller fabric fia stats location <>
show controllers fabric fia drops ingress location <>
show controllers fabric fia drops egress location <>
show controller fabric fia status location <>
show controller pm vqi location <LC>
show controllers fabric vqi assignment location location <>
show tech fabric
show_sm15_ltrace -s 2 fab_xbar | grep "sm15_pcie_read_fpoe"

应用

show ipv4 traffic brief location < >

静默丢弃

如果没有记帐，我们不会丢弃任何数据包，但生产设置中会增加多个计数器，并且计数器名称可能不是直接指向丢弃。在某些情况下，很难判断传入数据包是被丢弃还是转发。因此，使用数据包跟踪，我们可以观察设置中的数据包流，并验证是否正在传输数据包。以下是数据包跟踪输出示例。



提示：嵌入式Packet Tracer，PRM嵌入式Packet Trace的更多信息。
(https://xrdocs.io/asr9k//tutorials/xr-embedded-packet-tracer/)

CLI命令摘要

命令语法	描述
clear packet-trace conditions all	清除所有缓冲的数据包跟踪条件。仅当数据包跟踪处于非活动状态时，才允许使用命令。
clear packet-trace counters all	将所有数据包跟踪计数器重置为零。
packet-trace条件接口接口	指定您希望接收要通过路由器跟踪的数据包的接口。
packet-trace条件 noffsetoffsetvaluevaluemaskmask	指定用于定义关注流的偏移/值/掩码的集。

命令语法	描述
packet-trace start	开始数据包跟踪。
packet-trace stop	停止数据包跟踪。
show packet-trace description	查看注册到Packet Tracer框架的所有计数器及其说明。
show packet-trace status[detail]	查看活动RP上运行的pkt_trace_master进程缓冲的条件和Packet Tracer状态（活动/不活动）。 命令的详细选项显示哪些进程已注册到路由器每个卡上的Packet Tracer框架中。如果Packet Tracer状态为Active，输出还会显示哪些条件已成功编程在数据路径中。
show packet-trace result	参见非零Packet Tracer计数器。
show packet-trace result countername[sourcesource] [locationlocation]	请参阅特定数据包跟踪计数器的最新1023增量。

RP/0/RSP1/CPU0:ios#sh packet-trace results Tue Jan 24 19:28:56.151 UTC T: D - Drop counter; P - Pass counter Location | Source | Counter | T | Last-Attribute | Count ---------- ---------- ---------- ---------- - ---------- 0/0/CPU0 NP1 PACKET_MARKED P FortyGigE0_0_1_0 1522128420 0/0/CPU0 NP1 PACKET_ING_DROP D 2000908208 0/0/CPU0 NP1 PACKET_TO_FABRIC P 1522238547 0/0/CPU0 NP1 PACKET_TO_PUNT P 296246 0/0/CPU0 NP1 PACKET_INGR_TOP_LOOPBACK P 1000371630 0/0/CPU0 NP1 PACKET_INGR_TM_LOOPBACK P 1000375084 0/0/CPU0 spp-LIB ENTRY_COUNT P SPP PD Punt: stage1 299311 0/0/CPU0 NP1 PACKET_FROM_FABRIC P 1522238531 0/0/CPU0 NP1 PACKET_EGR_TOP_LOOPBACK P 1000371546 0/0/CPU0 NP1 PACKET_EGR_TM_LOOPBACK P 1000375020 0/0/CPU0 NP1 PACKET_TO_INTERFACE P FortyGigE0_0_1_0 1522241940

分类流：

首先多次检查“show drops， show drops all ongoing location all”输出，以确定看到丢弃的模块/代码组件。

一旦识别，就可以使用组件/模块特定的命令来进一步隔离问题。

show drops all ongoing location all →这会提供NP/FIA/LPTS/CEF的实时丢弃信息

```
RP/0/RP1/CPU0:R1# show drops all location 0/7/CPU0
世界协调时2009年5月20日星期五09点31分58秒
=====================================
检查0/7/CPU0上的丢包
=====================================
```

```
show arp traffic:
[arp:ARP]节点0/7/CPU0的IP数据包丢弃计数：265
show cef drops:
[cef:0/7/CPU0]无路由丢弃数据包：30536808
show spp node-counters:
[spp:pd_utility]卸载丢弃：接口关闭:1
[spp:port3/classify]无效：已登录已丢弃：10
[spp:client/punt]客户端配额丢弃：445639
show spp client detail:
[spp:ASR9K SPIO客户端流ID 50,JID 253(pid 7464)]当前：0，限制：20000，可用：0，已排队：0，丢弃：445639
RP/0/RP1/CPU0:R1#
```

show drops

RP/0/RP1/CPU0:R1# show drops all location 0/7/CPU0 Fri May 20 09:31:34.585 UTC ========== Checking for drops on 0/7/CPU0 ========== show arp traffic: [arp:ARP] IP Packet drop count for node 0/7/CPU0: 265 show cef drops: [cef:0/7/CPU0] No route drops packets : 30536808 show spp node-counters: [spp:pd_utility] Offload Drop: Interface Down: 1 [spp:port3/classify] Invalid: logged n dropped: 10 [spp:client/punt] client quota drop: 445639 show spp client detail: [spp:ASR9K SPIO client stream ID 50, JID 253 (pid 7464)] Current: 0, Limit: 20000, Available: 0, Enqueued: 0, Drops: 445639 RP/0/RP1/CPU0:R1#

show pfm location all →提供系统相关警报，如ASIC错误、Punt_data_path_failed等

RP/0/RP0/CPU0:l51#show pfm location all Mon Apr 1 10:02:49.952 UTC node: node0_0_CPU0 ---------- CURRENT TIME: Apr 1 10:02:50 2024 PFM TOTAL: 0 EMERGENCY/ALERT(E/A): 0 CRITICAL(CR): 0 ERROR(ER): 0 ---------- ---------- Raised Time |S#|Fault Name |Sev|Proc_ID|Dev/Path Name |Handle ----------+--+----------+---+-------+----------+---------- Mon Jan 01 00:00:000|--|NONE |NO |0000000|NONE |0x00000000 node: node0_RP0_CPU0 ---------- CURRENT TIME: Apr 1 10:02:50 2024 PFM TOTAL: 0 EMERGENCY/ALERT(E/A): 0 CRITICAL(CR): 0 ERROR(ER): 0 ---------- ---------- Raised Time |S#|Fault Name |Sev|Proc_ID|Dev/Path Name |Handle ----------+--+----------+---+-------+----------+---------- Mon Jan 01 00:00:000|--|NONE |NO |0000000|NONE |0x00000000 RP/0/RP0/CPU0:l51#

“对于我们”数据包丢弃

检查接口统计信息

检查NP计数器

检查SPP计数器

检查网络计数器

检查SRPM端口统计信息

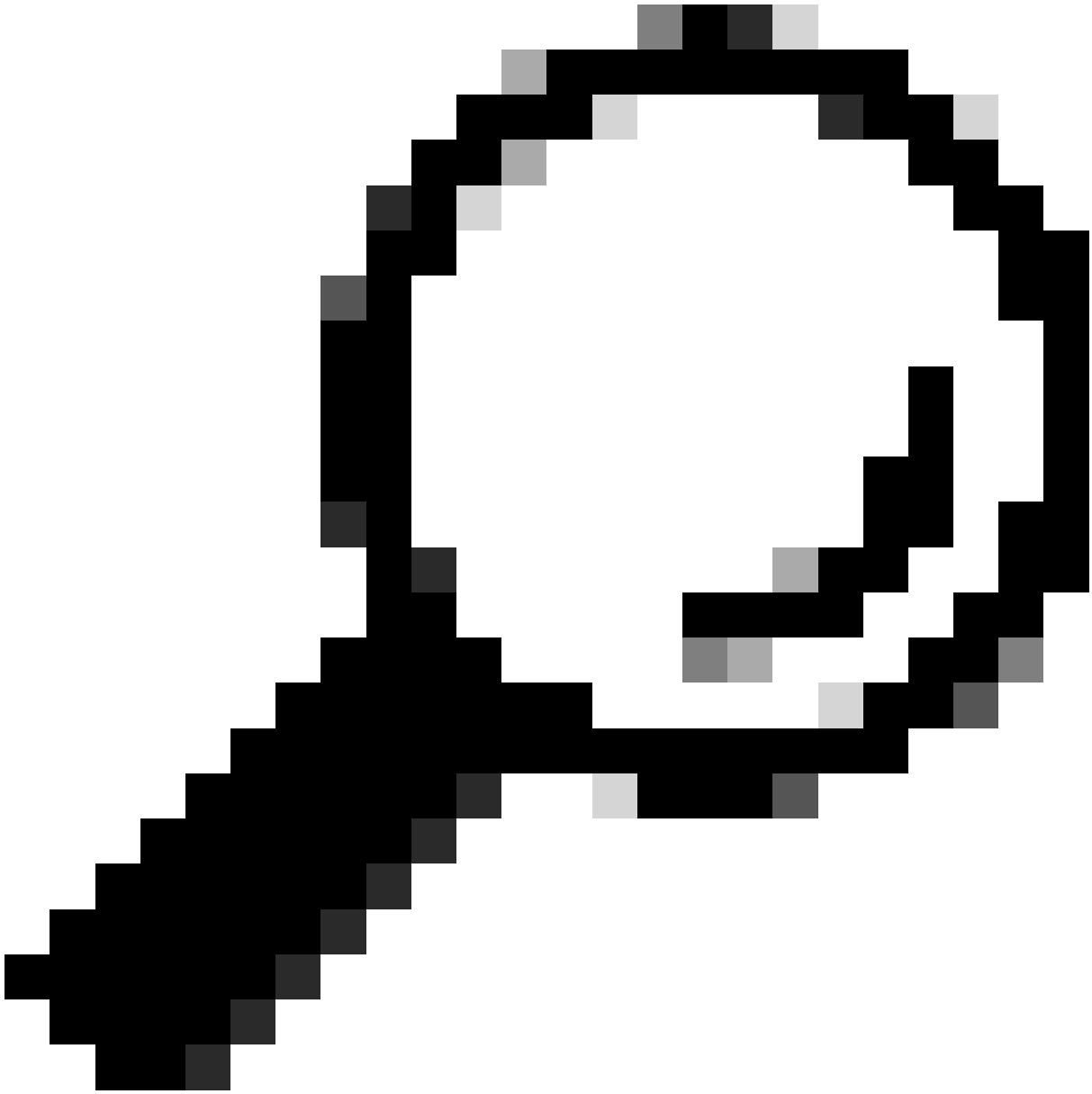
检查交换矩阵统计信息

检查应用级别统计信息

传输数据包丢弃

检查接口统计信息
检查NP计数器
检查交换矩阵统计信息

注入的流量丢弃



提示：参考

检查应用级别统计信息
enable debug punt-inject l3/l2-packets <protocol> location <>

检查网络计数器
检查SPP计数器
检查SRPM端口统计信息
检查NP计数器
检查接口统计信息

其他有用链接：

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