排除ASR 1000系列服务路由器上的丢包故障

目录

简介

本文档介绍如何对Cisco ASR 1000系列汇聚多业务路由器上的丢包问题进行故障排除。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- 所有Cisco ASR 1000系列聚合服务路由器，包括1002、1004和1006
- 支持Cisco ASR 1000系列聚合服务路由器的Cisco IOS® XE软件版本2.3.x及更高版本

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

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

ASR 1000系列路由器的数据包流

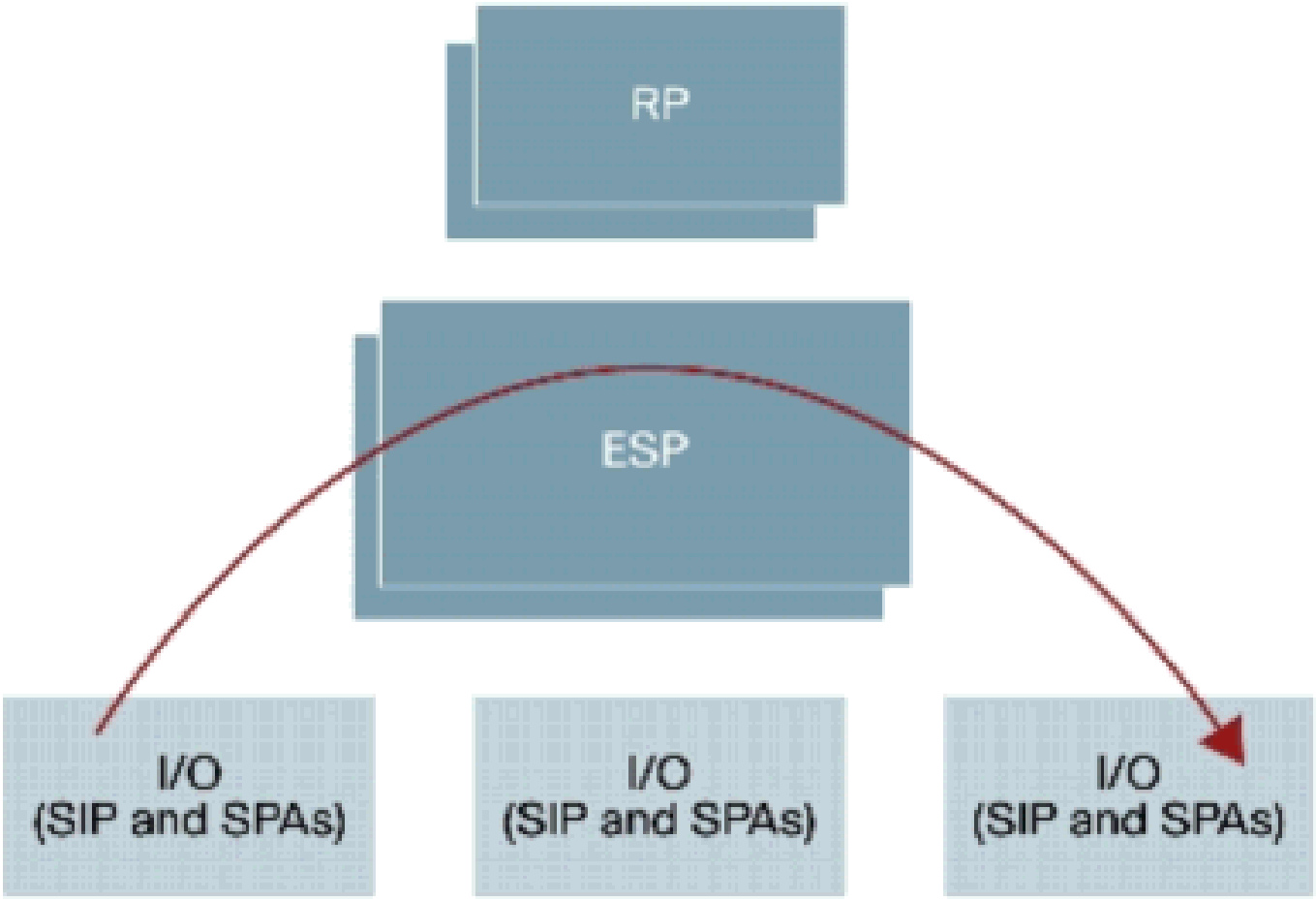
高级数据包流

Cisco ASR 1000系列路由器在系统中包括以下功能元素：

- 思科ASR 1000系列路由处理器1 (RP1)
- Cisco ASR 1000系列嵌入式服务处理器(ESP)
- Cisco ASR 1000系列SPA接口处理器(SIP)

Cisco ASR 1000系列路由器引入思科QuantumFlow处理器(QFP)作为其硬件架构。在基于QFP的架构中，所有数据包都通过ESP转发，因此，如果ESP出现问题，转发将停止。

图1带有双路由处理器、双ESP和三个SIP的Cisco ASR 1006系统



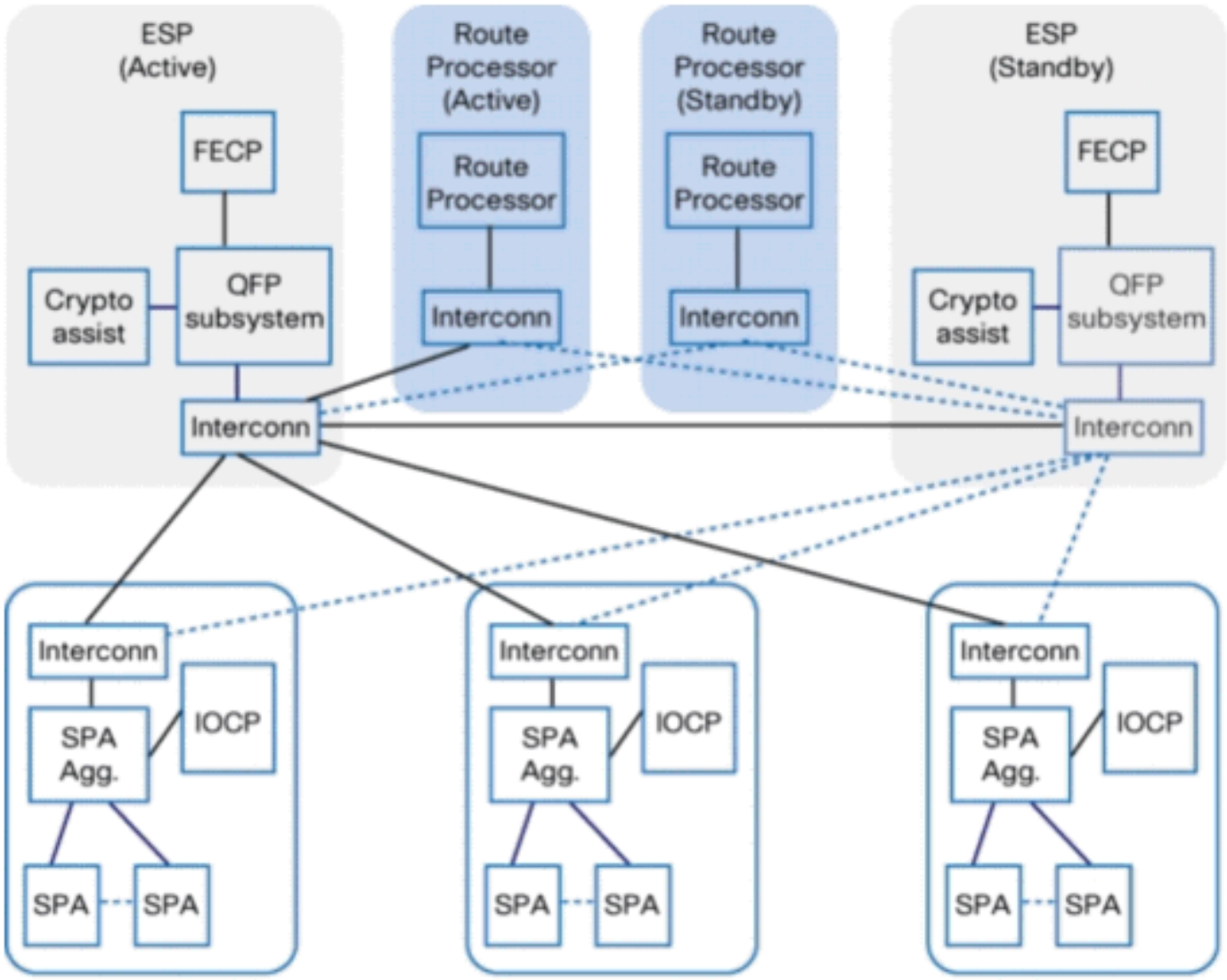
有关详细信息，请参阅Cisco ASR 1000系列聚合服务路由器。

Cisco ASR 1000系列服务路由器丢包故障排除的步骤

丢包点

Cisco ASR 1000系列路由器基于路由处理器(RP)、嵌入式服务处理器(ESP)、SPA接口处理器(SIP)和共享端口适配器(SPA)。所有数据包均通过每个模块上的ASIC转发。

图2 Cisco ASR 1000系列系统的数据路径图



Cisco ASR 1000系列路由器上的表1中显示了多个数据包丢弃点。

表1数据包丢弃点

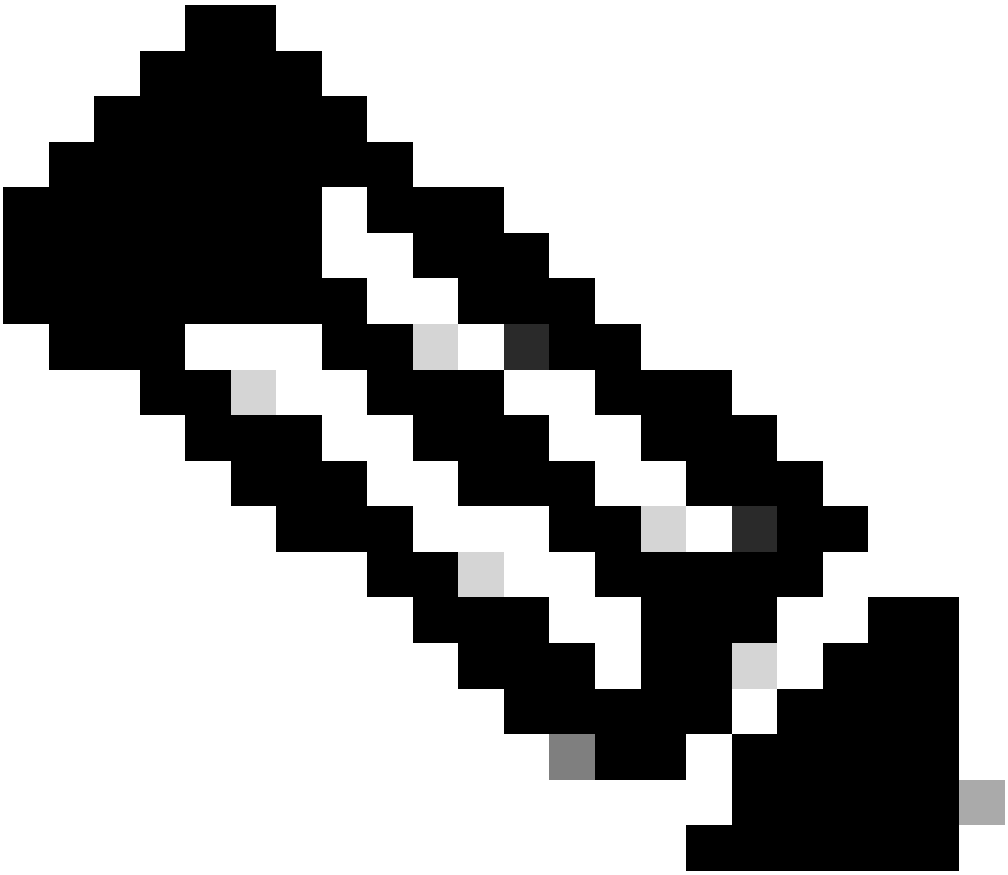
module	功能组件
SPA	取决于接口类型
SIP	IO控制处理器(IOCP) SPA汇聚ASIC互联ASIC
ESP	思科QuantumFlow处理器(QFP)转发控制处理器(FECP)互联ASIC QFP子系统。QFP子系统由以下组件组成： • 数据包处理器引擎(PPE) • 缓冲、排队和调度(BQS)

	• 输入数据包模块(IPM) • 输出数据包模块(OPM) • 全局数据包内存(GPM)
RP	Linux共享内存传送接口(LSMPI)互联ASIC

获取有关数据包丢弃的信息

如果遇到意外的丢包，您必须确保控制台输出、数据包计数器的差异以及再现步骤可用于故障排除。为了确定原因，第一步是尽可能多的获取该问题的大量信息。此信息是必要的以确定问题的原因：

- 控制台日志 - 有关详细信息，请参阅为控制台连接应用正确的终端仿真器设置。
- Syslog信息 —如果已设置路由器以向Syslog服务器发送日志，则可以获取有关发生了什么的信息。有关详细信息，请参阅如何针对系统日志配置Cisco设备。
- show platform — show platform命令显示RP、ESP、SPA和电源的状态。
- show tech-support — show tech-support是许多不同命令的集合，包括show version和show running-config。 当路由器遇到问题时，思科技术支持中心(TAC)工程师通常会要求提供此信息来排除硬件问题。执行重新加载或重新通电前，必须收集show tech-supports，因为这些操作可能导致有关该问题的信息丢失。



注意：show tech-support命令不包括show platform或show logging命令。

- 重现步骤（如果可用）-重现问题的步骤。如果无法复制，请检查丢弃数据包时的条件。
- SPA计数器信息— 请参阅SPA计数器部分。
- SIP计数器信息— 请参阅SIP计数器部分。
- ESP计数器信息— 请参阅ESP计数器部分。
- RP计数器信息— 请参阅RP计数器部分。

用于收集计数器信息的命令列表

有许多特定于平台的命令可用于排除数据包转发故障。如果打开TAC服务请求，请收集这些命令。为了确定计数器的差异，请多次收集这些命令。粗体字符命令对于开始故障排除特别有用。exclude _0_ 选项能有效地导致计数器排除0。

SPA

<#root>

show interfaces <interface-name>

show interfaces <interface-name> accounting
show interfaces <interface-name> stats

SIP

show platform hardware port <slot/card/port> plim statistics
show platform hardware subslot {slot/card} plim statistics
show platform hardware slot {slot} plim statistics
show platform hardware slot {0|1|2} plim status internal
show platform hardware slot {0|1|2} serdes statistics

ESP

<#root>

show platform hardware slot {f0|f1} serdes statistics
show platform hardware slot {f0|f1} serdes statistics internal
show platform hardware qfp active bqs 0 ipm mapping
show platform hardware qfp active bqs 0 ipm statistics channel all
show platform hardware qfp active bqs 0 opm mapping
show platform hardware qfp active bqs 0 opm statistics channel all

show platform hardware qfp active statistics drop | exclude _0_

show platform hardware qfp active interface

if-name

 <Interface-name> statistics

show platform hardware qfp active infrastructure punt statistics type per-cause | exclude _0_
show platform hardware qfp active infrastructure punt statistics type punt-drop | exclude _0_
show platform hardware qfp active infrastructure punt statistics type inject-drop | exclude _0_
show platform hardware qfp active infrastructure punt statistics type global-drop | exclude _0_
show platform hardware qfp active infrastructure bqs queue output default all
show platform hardware qfp active infrastructure bqs queue output recycle all

!--- The if-name option requires full interface-name

RP

show platform hardware slot {r0|r1} serdes statistics
show platform software infrastructure lsmpi

SPA计数器

对SPA和其他平台使用通用丢包故障排除。clear counters命令可用于查找计数器的差异。

为了显示路由器上配置的所有接口的统计信息，请使用以下命令：

<#root>

Router#

show interfaces TenGigabitEthernet 1/0/0

```
TenGigabitEthernet1/0/0 is up, line protocol is up
  Hardware is SPA-1X10GE-L-V2, address is 0022.5516.2040 (bia 0022.5516.2040)
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 10000Mbps, link type is force-up, media type is 10GBase-LR
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:59, output 00:00:46, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/375/415441/0 (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
     510252 packets input, 763315452 bytes, 0 no buffer
     Received 3 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     55055 packets output, 62118229 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

要显示根据协议的数据包的统计信息，请使用以下命令：

<#root>

Router#

show interfaces TenGigabitEthernet 1/0/0 accounting

```
TenGigabitEthernet1/0/0
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
                   Other         15        900      17979    6652533
                      IP     510237  763314552      37076   55465696
                 DEC MOP          0          0       1633     125741
                     ARP         15        900         20       1200
                     CDP          0          0      16326    6525592
```

要显示经过进程交换、快速交换或分布式交换的数据包的统计信息，请使用以下命令：

<#root>

```
Router#

show interfaces TenGigabitEthernet 1/0/0 stats

TenGigabitEthernet1/0/0
          Switching path     Pkts In   Chars In   Pkts Out  Chars Out
               Processor          15        900      17979    6652533
            Route cache           0          0          0          0
      Distributed cache      510252  763315452      55055   62118229
                  Total      510267  763316352      73034   68770762
```

SIP计数器

Cisco ASR 1000系列SIP不参与数据包转发。它将SPA置于系统中。SIP为来自SPA的入口数据包提供数据包优先级，并为等待传输到ESP以进行处理的入口数据包提供大型入口突发吸收缓冲区。出口缓冲在流量管理器上集中进行，并且在SIP上以出口队列的形式提供。Cisco ASR 1000系列路由器不仅可以在ESP级别确定流量的优先级，而且可以通过配置入口和出口分类确定整个系统的优先级。系统中提供缓冲（入口和出口）以及进出ESP的背压，以处理超订用。

图3 Cisco ASR 1000系列路由器入口队列

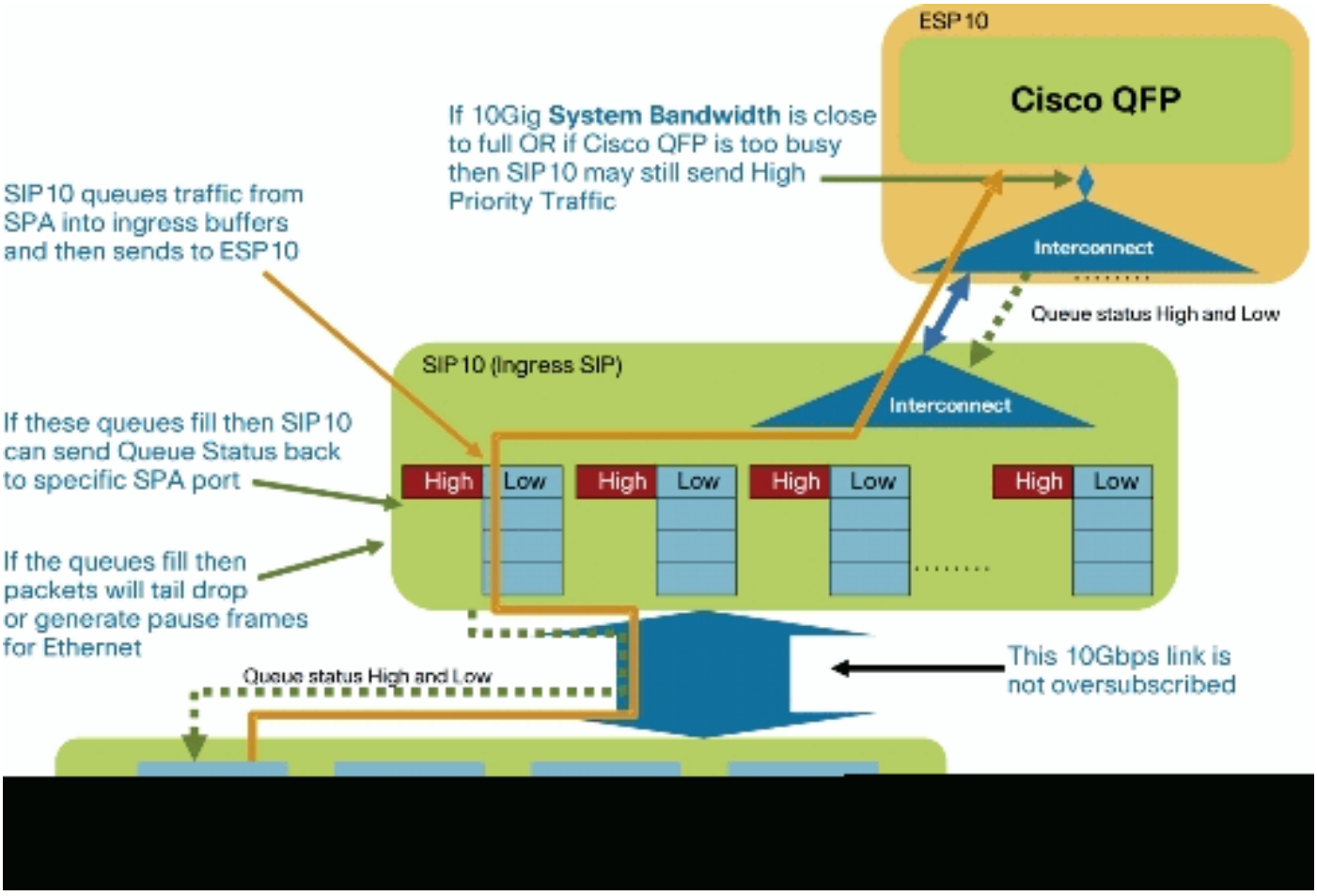
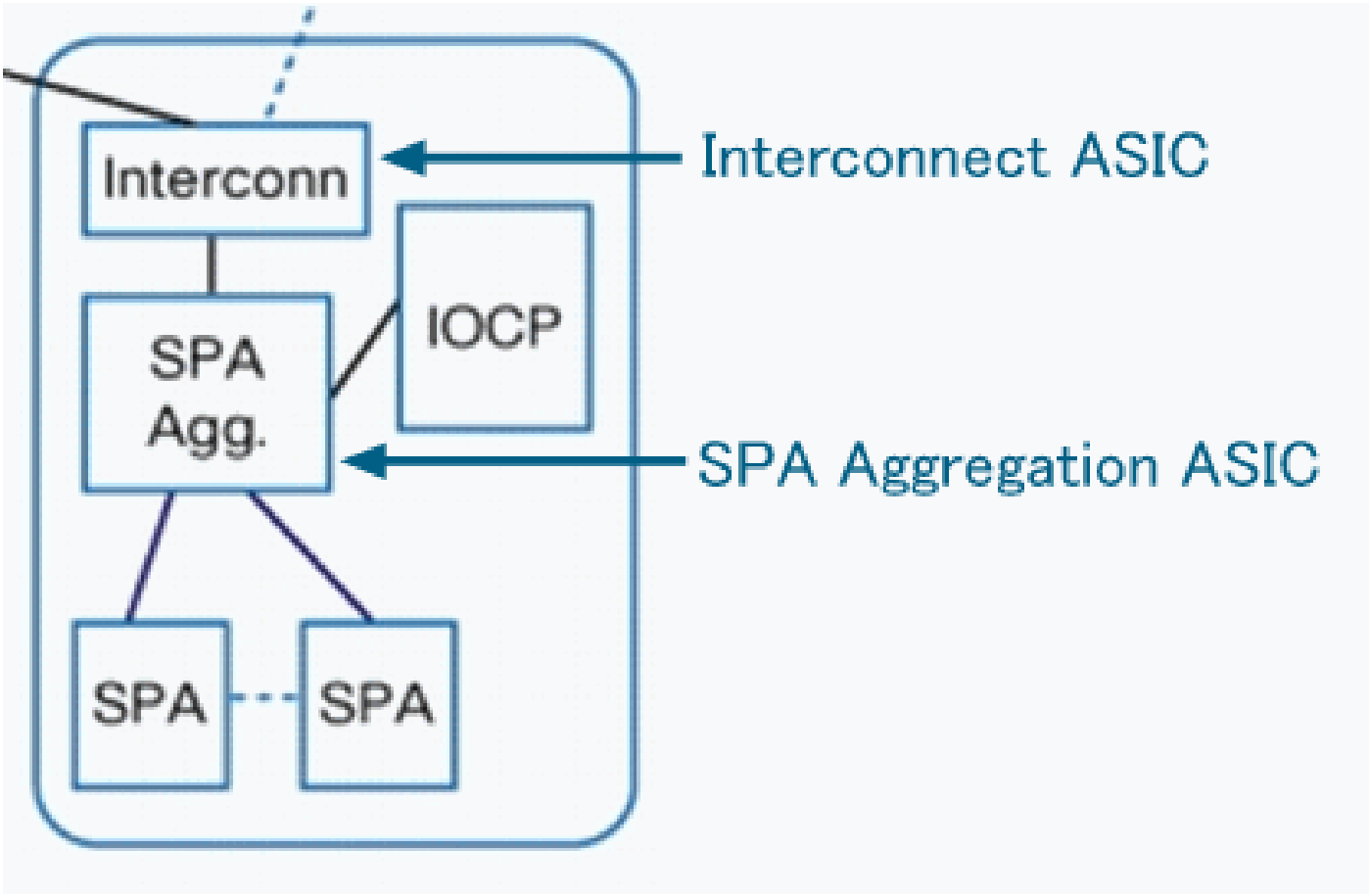


图4 SIP框架图



要显示SPA汇聚ASIC上的每个端口队列丢弃计数器，请使用此命令：

<#root>

```
Router#

show platform hardware port 1/0/0 plim statistics

Interface 1/0/0
  RX Low Priority
    RX Drop Pkts 0           Bytes 0
    RX Err  Pkts 0           Bytes 0
  TX Low Priority
    TX Drop Pkts 0           Bytes 0
  RX High Priority
    RX Drop Pkts 0           Bytes 0
    RX Err  Pkts 0           Bytes 0
  TX High Priority
    TX Drop Pkts 0           Bytes 0
```

要显示SPA汇聚ASIC上的每个SPA计数器，请使用此命令：

<#root>

```
Router#
```

```
show platform hardware subslot 1/0 plim statistics

1/0, SPA-1XTENGE-XFP-V2, Online
  RX Pkts 510252      Bytes 763315452
  TX Pkts 55078       Bytes 62126783
  RX IPC Pkts 0           Bytes 0
  TX IPC Pkts 0           Bytes 0
```

要显示SPA汇聚ASIC上的所有SPA计数器，请使用此命令：

```
<#root>

Router#

show platform hardware slot 1 plim statistics

1/0, SPA-1XTENGE-XFP-V2, Online
  RX Pkts 510252      Bytes 763315452
  TX Pkts 55078       Bytes 62126783
  RX IPC Pkts 0           Bytes 0
  TX IPC Pkts 0           Bytes 0

1/1, SPA-5X1GE-V2, Online
  RX Pkts 42          Bytes 2520
  TX Pkts 65352       Bytes 31454689
  RX IPC Pkts 0           Bytes 0
  TX IPC Pkts 0           Bytes 0

1/2, Empty

1/3, Empty
```

要显示SPA汇聚ASIC上互联ASIC之间的汇聚rx/tx计数器，请使用此命令。Rx计数器表示来自SPA的输入数据包；Tx计数器表示发送到SPA的输出数据包。

```
<#root>

Router#

show platform hardware slot 1 plim status internal

FCM Status
  XON/XOFF 0x0000000F00000000
ECC Status
Data Path Config
  MaxBurst1 256, MaxBurst2 128, DataMaxT 32768
  Cal Length RX 0x0002, TX 0x0002
  Repetitions RX 0x0010, TX 0x0010
Data Path Status
  RX in sync, TX in sync
  Spi4 Channel 0, Rx Channel Status Starving, Tx Channel Status Starving
  Spi4 Channel 1, Rx Channel Status Starving, Tx Channel Status Starving
  RX Pkts 510294      Bytes 765359148
  TX Pkts 120430      Bytes 94063192
Hypertransport Status
  RX Pkts 0           Bytes 0
```

```
  TX Pkts 0           Bytes 0
```

要显示SIP互联ASIC上ESP互联ASIC的rx计数器，请使用此命令：

<#root>

```
Router#

show platform hardware slot 1 serdes statistics

From Slot F0
  Pkts  High: 0          Low: 120435     Bad: 0          Dropped: 0
  Bytes High: 0          Low: 94065235   Bad: 0          Dropped: 0
  Pkts  Looped: 0          Error: 0
  Bytes Looped 0
  Qstat count: 0          Flow ctrl count: 196099
```

ESP计数器

ESP提供集中转发引擎，负责大多数数据平面处理任务。所有通过Cisco ASR 1000系列路由器的网络流量都会流经ESP。

图5 ESP框架图

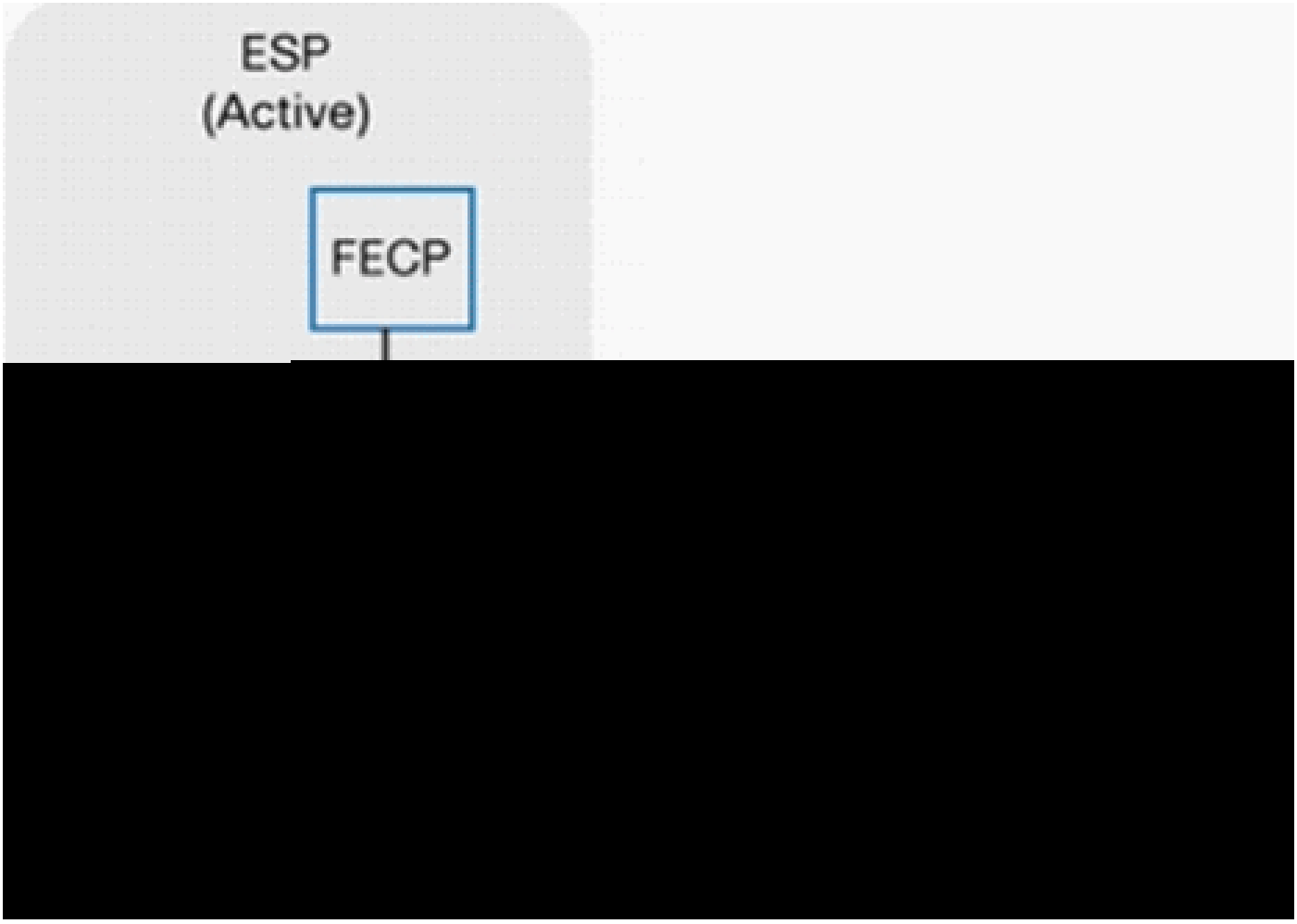
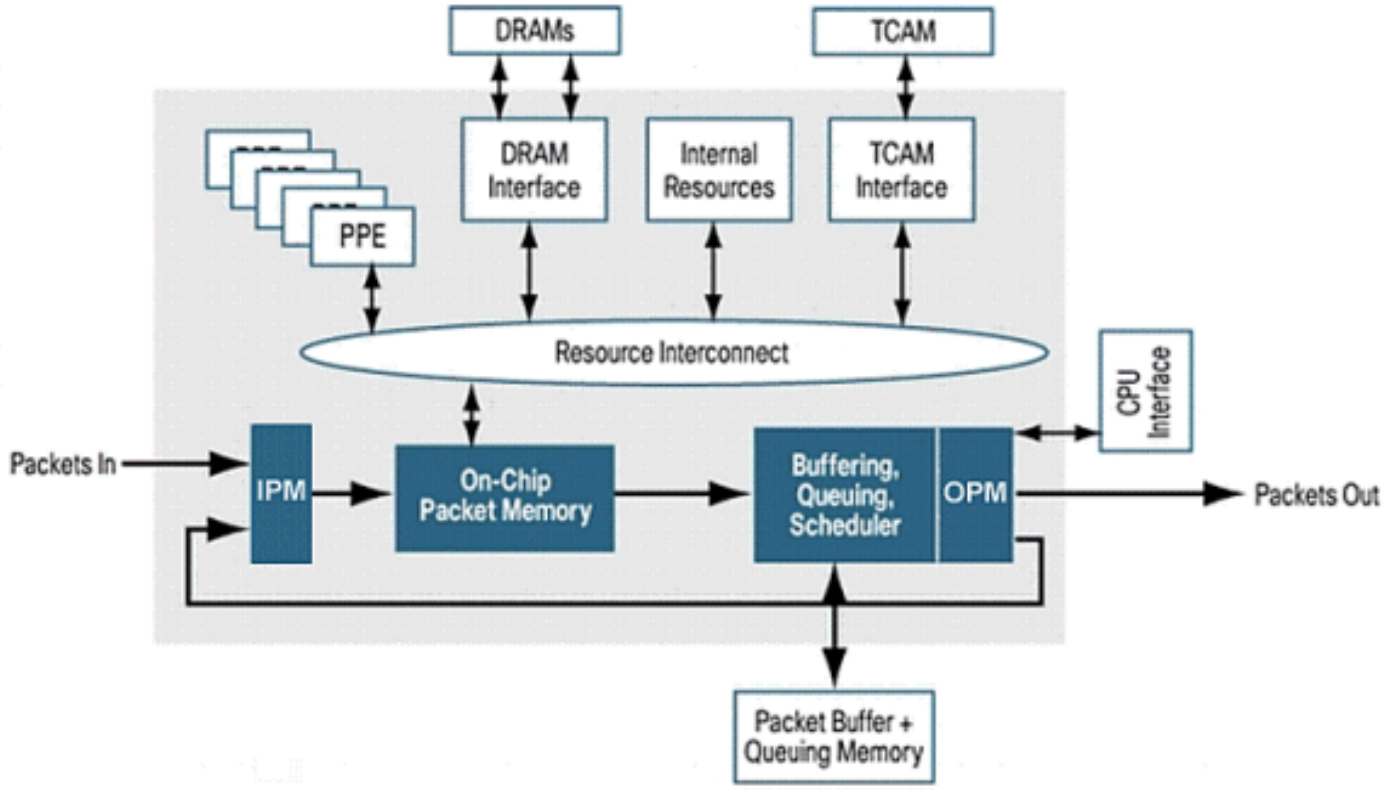


图6 Cisco QuantumFlow处理器基本架构



有关详细信息，请参阅Cisco 1000系列聚合服务路由器。

要显示RP、ESP互联ASIC上的SIP互联ASIC的接收计数器，请使用以下命令：

<#root>

```
Router#

show platform hardware slot F0 serdes statistics

From Slot R0
  Pkts  High: 70328      Low: 13223      Bad: 0          Dropped: 0
  Bytes High: 31049950   Low: 10062155   Bad: 0          Dropped: 0
  Pkts  Looped: 0          Error: 0
  Bytes Looped 0
  Qstat count: 0          Flow ctrl count: 311097
From Slot 2

<snip>
```

要显示内部链路数据包计数器和错误计数器，请使用此命令：

<#root>

```
Router#

show platform hardware slot F0 serdes statistics internal
```

```
Network-Processor Link:
  Local TX in sync, Local RX in sync
  From Network-Processor    Packets:      421655  Bytes:   645807536
  To Network-Processor      Packets:       83551  Bytes:    41112105

RP/ESP Link:
  Local TX in sync, Local RX in sync
  Remote TX in sync, Remote RX in sync
  To RP/ESP                 Packets:      421650  Bytes:   645807296
    Drops                   Packets:           0  Bytes:           0
  From RP/ESP               Packets:       83551  Bytes:    41112105
    Drops                   Packets:           0  Bytes:           0

<snip>
```

要检查输入数据包模块(IPM)信道和其他组件的映射，请使用此命令：

<#root>

```
Router#

show platform hardware qfp active bqs 0 ipm mapping

BQS IPM Channel Mapping

Chan   Name                Interface      Port     CFIFO

 1     CC3 Low             SPI1           0        1
 2     CC3 Hi              SPI1           1        0
 3     CC2 Low             SPI1           2        1

<snip>
```

为了显示输入数据包模块(IPM)中每个信道的统计信息，请使用此命令：

<#root>

```
Router#

show platform hardware qfp active bqs 0 ipm statistics channel all

BQS IPM Channel Statistics

Chan   GoodPkts  GoodBytes    BadPkts   BadBytes

 1 - 0000000000 0000000000 0000000000 0000000000
 2 - 0000000000 0000000000 0000000000 0000000000
 3 - 0000000000 0000000000 0000000000 0000000000

<snip>
```

要检查输出数据包模块(OPM)信道和其他组件的映射，请使用此命令：

<#root>

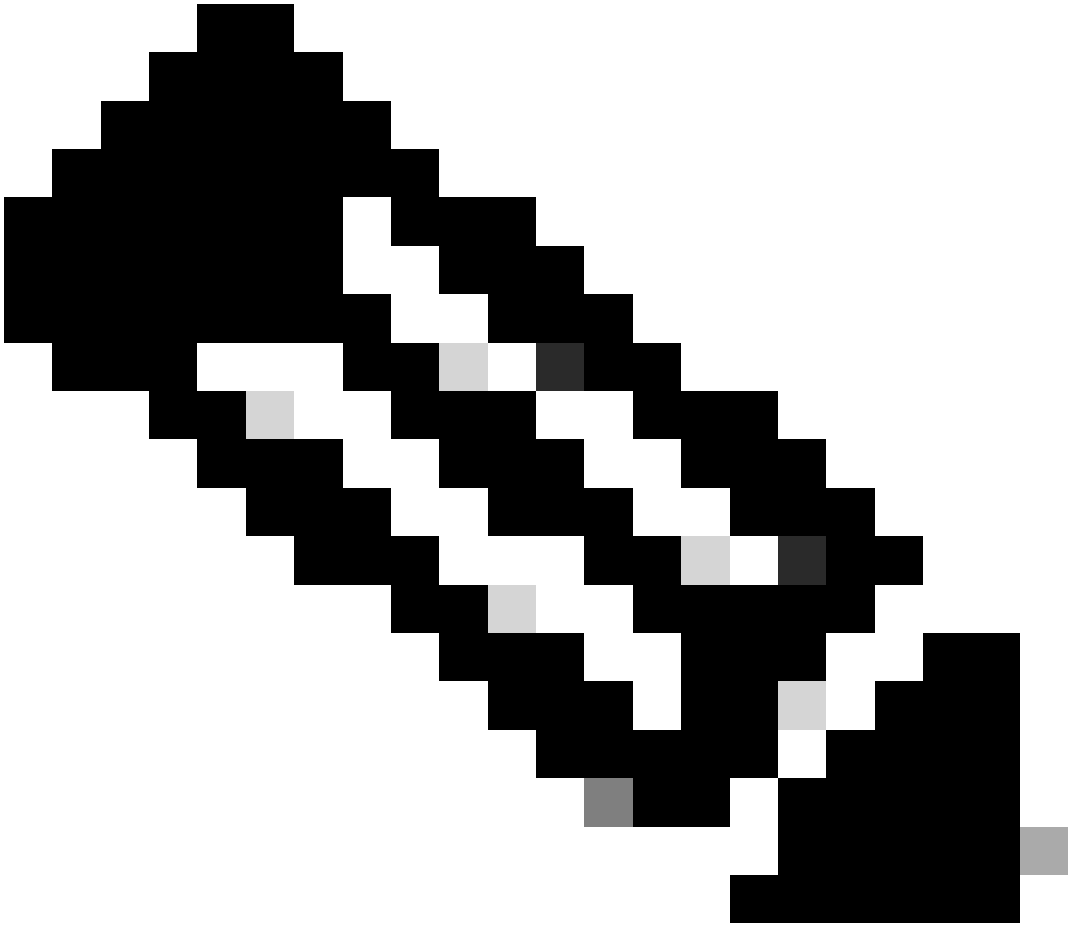
```
Router#

show platform hardware qfp active bqs 0 opm mapping

BQS OPM Channel Mapping

Chan     Name                           Interface      LogicalChannel

 0       CC3 Low                        SPI1            0
 1       CC3 Hi                         SPI1            1
 2       CC2 Low                        SPI1            2

<snip>
```

为了显示输出数据包模块(OPM)中每个信道的统计信息，请使用以下命令：

<#root>

```
Router#

show platform hardware qfp active bqs 0 opm statistics channel all

BQS OPM Channel Statistics

Chan   GoodPkts  GoodBytes    BadPkts   BadBytes

 0 - 0000000000 0000000000 0000000000 0000000000
 1 - 0000000000 0000000000 0000000000 0000000000
 2 - 0000000000 0000000000 0000000000 0000000000

<snip>
```

要显示数据包处理器引擎(PPE)中所有接口的丢弃统计信息，请使用此命令。



注意：此命令在用于排除故障时非常有用。

<#root>

```
Router#

show platform hardware qfp active statistics drop

-------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-------------------------------------------------------------
  AttnInvalidSpid                               0               0
  BadDistFifo                                   0               0
  BadIpChecksum                                 0               0

<snip>
```

要清除数据包处理器引擎(PPE)中所有接口的丢弃统计信息，请使用此命令。此命令在显示计数器

后会被清除。

<#root>

```
Router#
show platform hardware qfp active statistics drop clear

-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------
  AttnInvalidSpid                             0               0
  BadDistFifo                                 0               0
  BadIpChecksum                               0               0

<snip>
```

要显示数据包处理器引擎(PPE)中每个接口的丢弃统计信息，请使用此命令。此计数器每10秒清除一次。

<#root>

```
Router#
show platform hardware qfp active interface if-name TenGigabitEthernet1/0/0 statistics


Platform Handle 6
-----------------------------------------------------------------
Receive Stats                              Octets         Packets
-----------------------------------------------------------------
  Ipv4                                        0               0
  Ipv6                                        0               0

<snip>


!--- The if-name option requires full interface-name
```

要检查数据包被传送到RP的原因，请使用以下命令：

<#root>

```
Router#
show platform hardware qfp active infrastructure punt statistics type per-cause

Global Per Cause Statistics

  Number of punt causes =   46
```

```
  Per Punt Cause Statistics
                                                 Packets       Packets
  Counter ID  Punt Cause Name                    Received      Transmitted
  ------------------------------------------------------------------------
  00          RESERVED                           0             0
  01          MPLS_FRAG_REQUIRE                  0             0
  02          IPV4_OPTIONS                       0             0

<snip>
```

要显示传送数据包（ESP到RP）的丢弃统计信息，请使用以下命令：

```
<#root>

Router#

show platform hardware qfp active infrastructure punt statistics type punt-drop

Punt Drop Statistics


  Drop Counter ID   0     Drop Counter Name PUNT_NOT_ENABLED_BY_DATA_PLANE

  Counter ID  Punt Cause Name                    Packets
  ------------------------------------------------------------
  00          RESERVED                           0
  01          MPLS_FRAG_REQUIRE                  0
  02          IPV4_OPTIONS                       0

<snip>
```

要显示注入数据包（RP到ESP）的丢弃统计信息，请使用此命令。注入数据包从RP发送到ESP。其中大多数由IOSD生成。它们是L2保活、路由协议、管理协议（如SNMP）等。

```
<#root>

Router#

show platform hardware qfp active infrastructure punt statistics type inject-drop

Inject Drop Statistics


  Drop Counter ID   0     Drop Counter Name INJECT_NOT_ENABLED_BY_DATA_PLANE

  Counter ID  Inject Cause Name                     Packets
  ------------------------------------------------------------
  00          RESERVED                             0
  01          L2 control/legacy                    0
  02          CPP destination lookup               0

<snip>
```

要显示全局丢弃数据包的统计信息，请使用以下命令：

<#root>

```
Router#
show platform hardware qfp active infrastructure punt statistics type global-drop
Global Drop Statistics


  Counter ID  Drop Counter Name                          Packets
  ------------------------------------------------------------------
  00          INVALID_COUNTER_SELECTED                  0
  01          INIT_PUNT_INVALID_PUNT_MODE               0
  02          INIT_PUNT_INVALID_PUNT_CAUSE              0

<snip>
```

要显示每个接口的缓冲、排队和调度(BQS)的默认队列/调度的统计信息，请使用以下命令：

<#root>

```
Router#
show platform hardware qfp active infrastructure bqs queue output default all

Interface: internal0/0/rp:0, QFP if_h: 1, Num Queues/Schedules: 2
  Queue specifics:
    Index 0 (Queue ID:0x2f, Name: )
      Software Control Info:
        (cache) queue id: 0x0000002f, wred: 0x88b002d2, qlimit (bytes): 6250048
        parent_sid: 0x232, debug_name:
        sw_flags: 0x00000011, sw_state: 0x00000001
        orig_min  : 0                    ,      min: 0
        orig_max  : 0                    ,      max: 0
        share     : 1
      Statistics:
        tail drops (bytes): 77225016            ,          (packets): 51621
        total enqs (bytes): 630623840           ,          (packets): 421540
        queue_depth (bytes): 0

<snip>
```

要显示每个接口的循环队列/缓冲、排队和调度(BQS)的统计信息，请使用此命令。循环队列保存QFP多次处理的数据包。例如，分段数据包和组播数据包放置在此处。

<#root>

```
Router#
```

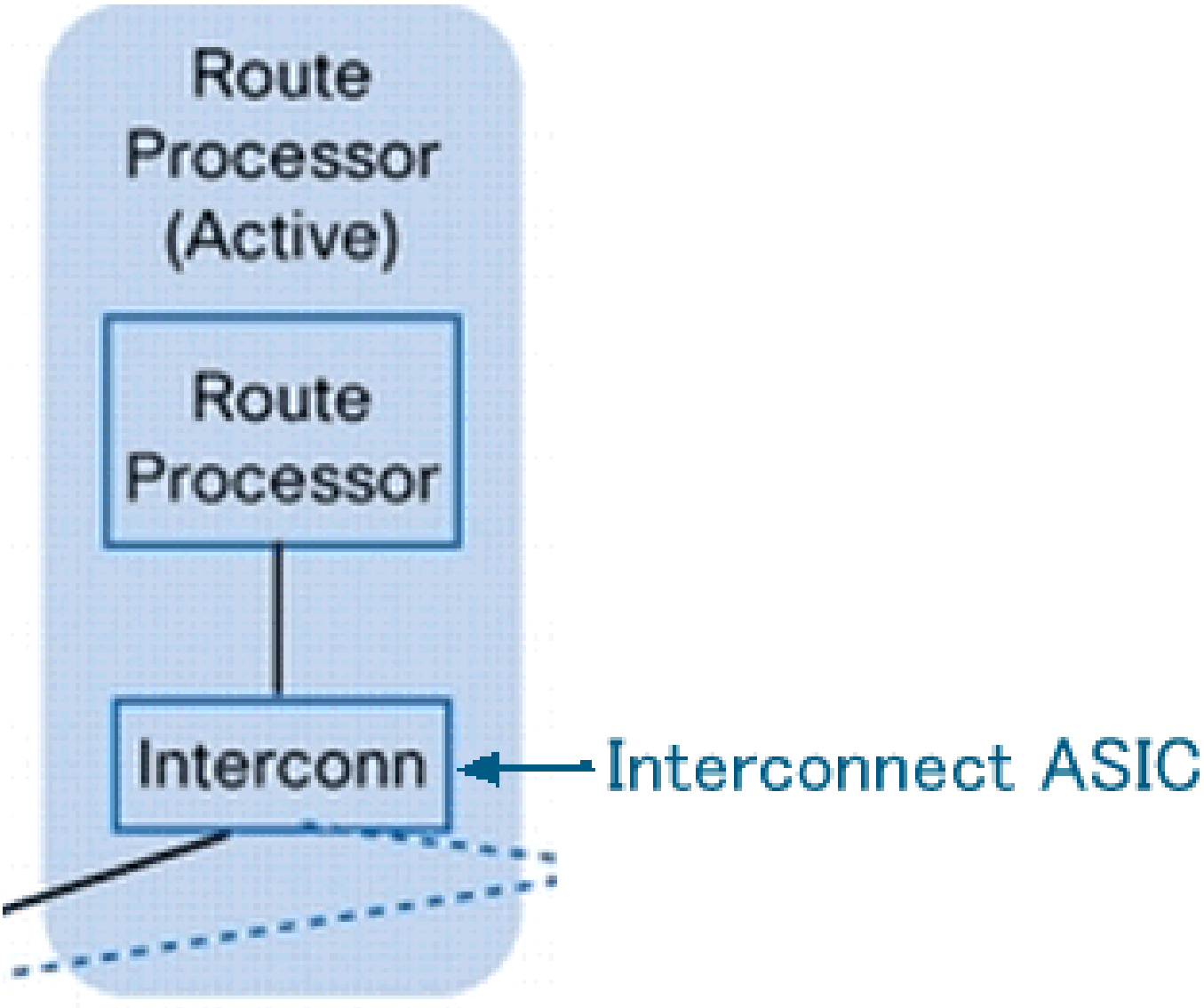
```
show platform hardware qfp active infrastructure bqs queue output recycle all

Recycle Queue Object ID:0x3  Name:MulticastLeafHigh   (Parent Object ID: 0x2)
  plevel: 1, bandwidth: 0                    , rate_type: 0
  queue_mode: 0, queue_limit: 0, num_queues: 36
  Queue specifics:
    Index 0 (Queue ID:0x2, Name: MulticastLeafHigh)
      Software Control Info:
        (cache) queue id: 0x00000002, wred: 0x88b00000, qlimit (packets): 2048
        parent_sid: 0x208, debug_name: MulticastLeafHigh
        sw_flags: 0x00010001, sw_state: 0x00000001
        orig_min  : 0                    ,      min: 0
        orig_max  : 0                    ,      max: 0
        share     : 0
      Statistics:
        tail drops (bytes): 0                    ,          (packets): 0
        total enqs (bytes): 0                    ,          (packets): 0
        queue_depth (packets): 0

<snip>
```

RP计数器

RP处理以下类型的流量：

- 通过路由处理器上的千兆以太网管理端口的管理流量。
- 在系统中传送流量（通过ESP），其中包括在任何SPA上接收的所有控制平面流量。
- 旧协议流量、DECnet、互联网分组交换(IPX)等。

图7 RP的框图



这是Cisco ASR 1000系列路由器的传送/注入路径：

<#root>

QFP

<==>

RP Kernel

<==>

LSMPI

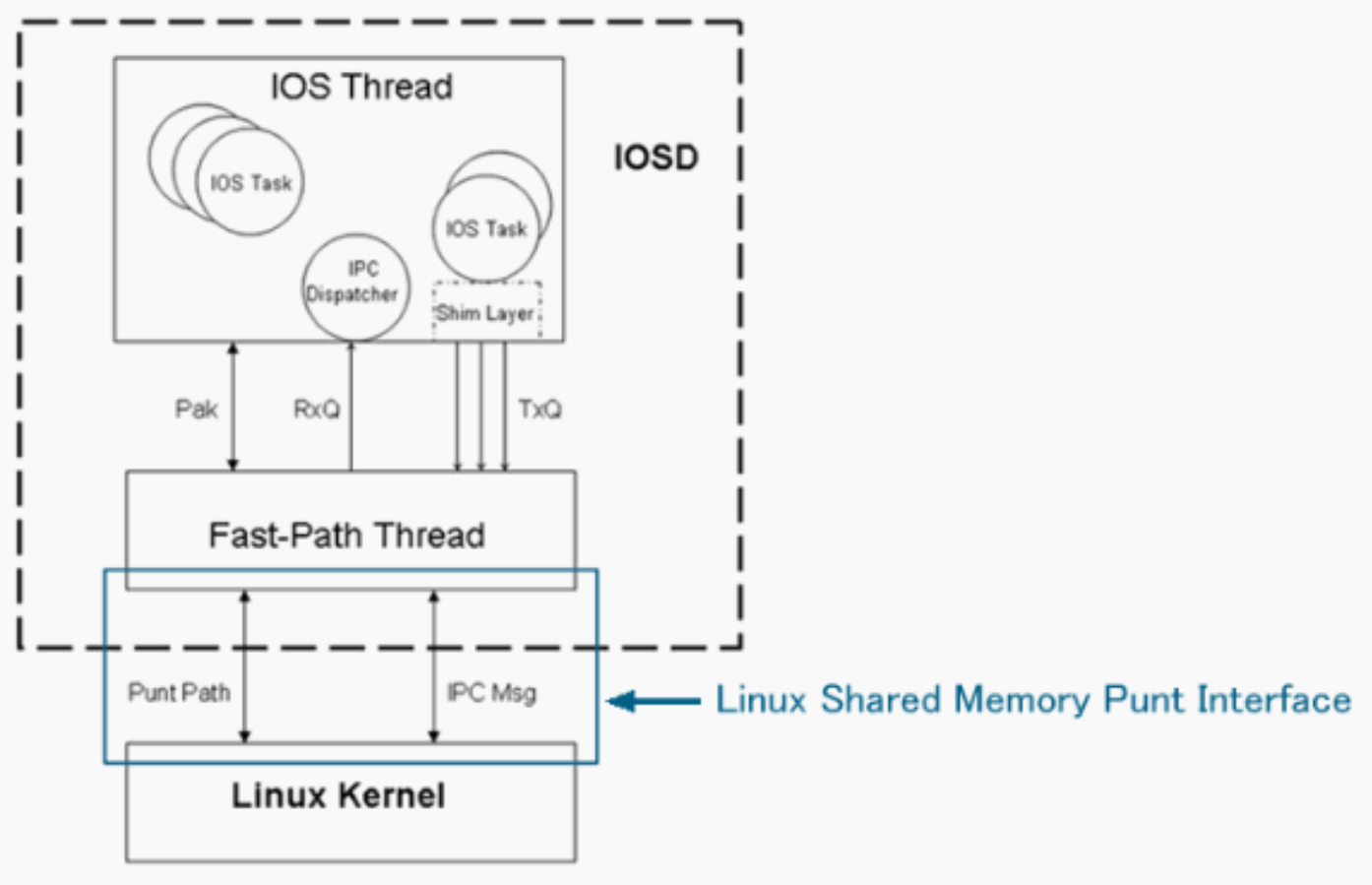
<==>

Fast-Path Thread

<==>

Cisco IOS Thread

图8 Linux共享内存传送接口(LSMPI)的位置



要显示RP互联ASIC上ESP互联ASIC的rx计数器，请使用以下命令：

<#root>

```
Router#

show platform hardware slot r0 serdes statistics

From Slot F0
  Pkts  High: 57          Low: 421540      Bad: 0          Dropped: 0
  Bytes High: 5472        Low: 645799280   Bad: 0          Dropped: 0
  Pkts  Looped: 0           Error: 0
  Bytes Looped 0
  Qstat count: 0           Flow ctrl count: 196207
```

要显示路由器上Linux共享内存传送接口(LSMPI)的统计信息，请使用此命令。LSMPI提供了一种在网络和IOSd之间实现数据包零拷贝传输的方法，以实现高性能。为了实现此目的，在Linux内核虚拟内存中在LSMPI模块和IOSd之间共享（内存映射）一个区域。

<#root>

```
Router#

show platform software infrastructure lsmpi
```

```
LSMPI interface internal stats:
enabled=0, disabled=0, throttled=0, unthrottled=0, state is ready
Input Buffers = 8772684
Output Buffers = 206519
rxdone count = 8772684
txdone count = 206515

<snip>

ASR1000-RP Punt packet causes:
      421540 IPV4_OPTIONS packets
     7085686 L2 control/legacy packets
          57 ARP packets
         774 FOR_US packets
Packet histogram(500 bytes/bin), avg size in 172, out 471:
 Pak-Size      In-Count        Out-Count
      0+:       7086514            95568
    500+:             1                0
   1000+:             2                0
   1500+:        421540             6099

Lsmpi0 is up, line protocol is up
  Hardware is LSMPI
  MTU 1500 bytes, BW 1000000 Kbit, 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

<snip>

     7508057 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
     101667 packets output, 47950080 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

案例研究

SPA上的数据包丢弃

错误数据包

如果数据包出错，则在SPA上丢弃这些数据包。这是常见的行为，不仅在Cisco ASR 1000系列路由器上，而且在所有平台上。

<#root>

```
Router#

show interfaces TenGigabitEthernet 1/0/0

TenGigabitEthernet1/0/0 is up, line protocol is up
```

```
  Hardware is SPA-1X10GE-L-V2, address is 0022.5516.2040 (bia 0022.5516.2040)
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
     reliability 250/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 10000Mbps, link type is force-up, media type is 10GBase-LR
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:45:13, output 00:00:08, output hang never
  Last clearing of "show interface" counters 00:00:26
  Input queue: 0/375/0/0 (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
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
```

419050 input errors, 419050 CRC

```
, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     1 packets output, 402 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

SIP上的数据包丢弃

QFP利用率高

如果QFP使用率较高，QFP的反压会使SIP上的每个接口队列丢弃数据包。在这种情况下，也会从接口发送暂停帧。

<#root>

```
Router#
```

show platform hardware port 1/0/0 plim statistics

```
Interface 1/0/0
  RX Low Priority
```

RX Drop Pkts 21344279   Bytes 1515446578

```
    RX Err  Pkts 0           Bytes 0
  TX Low Priority
    TX Drop Pkts 0           Bytes 0
  RX High Priority
    RX Drop Pkts 0           Bytes 0
    RX Err  Pkts 0           Bytes 0
  TX High Priority
    TX Drop Pkts 0           Bytes 0
```

ESP上的数据包丢弃

超订用

如果发送的数据包超过接口的线速，数据包将在出口接口被丢弃。

<#root>

```
Router#
```

show interfaces GigabitEthernet 1/1/0

```
GigabitEthernet1/1/0 is up, line protocol is up
  Hardware is SPA-5X1GE-V2, address is 0021.55dc.3f50 (bia 0021.55dc.3f50)
  Internet address is 192.168.2.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 35/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto, media type is SX
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 02:24:23, output 00:00:55, output hang never
  Last clearing of "show interface" counters 00:01:04
  Input queue: 0/375/0/0 (size/max/drops/flushes);
```

Total output drops: 48783

```
...
```

在QFP上，可以将这些丢弃检查为Taildrop。

<#root>

```
Router#
```

show platform hardware qfp active statistics drop | exclude _0_

```
-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------
```

TailDrop

```
                           72374984
```

483790

按数据包分段过载

如果数据包由于MTU大小而分段，即使入口接口小于线速，出口接口也可超过线速。在这种情况下

，数据包在出口接口被丢弃。

<#root>

```
Router#
```

show interfaces gigabitEthernet 1/1/0

```
GigabitEthernet1/1/0 is up, line protocol is up
  Hardware is SPA-5X1GE-V2, address is 0022.5516.2050 (bia 0022.5516.2050)
  Internet address is 192.168.2.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 25/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto, media type is SX
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:36:52, output 00:00:12, output hang never
  Last clearing of "show interface" counters 00:00:55
  Input queue: 0/375/0/0 (size/max/drops/flushes);
```

Total output drops: 272828

```
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 99998000 bits/sec, 14290 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
     0 runs, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     4531543 packets output, 4009748196 bytes, 0 underruns
```

在QFP上，可以将这些丢弃检查为Taildrop。

<#root>

```
Router#
```

show platform hardware qfp active statistics drop | exclude _0_

```
-------------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-------------------------------------------------------------------
```

TailDrop

```
                           109431162
```

272769

分段数据包的性能限制

在QFP中，全局数据包内存(GPM)用于重组分段数据包。如果GPM在重组大量分段数据包时耗尽，这些计数器会显示数据包丢弃的数量。在许多情况下，这是性能限制。

<#root>

Router#

show platform hardware qfp active statistics drop | ex _0_

```
-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------

ReassNoFragInfo

                  39280654854

57344096


ReassTimeout

                           124672

128
```

转发到Null0接口

发往Null0接口的数据包在ESP上丢弃，而不会传送到RP。在这种情况下，可能无法通过传统命令(show interfaces null0)检查计数器。检查ESP计数器，以了解数据包丢弃的数量。如果同时使用“clear”和“exclude _0_”选项，则只能检查新的丢弃数据包。

<#root>

Router#

show platform hardware qfp active statistics drop clear | ex _0_

```
-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------

Ipv4Null0

                                11286

99
```

RP切换（具有高可用性非支持功能）

如果RP切换，这些数据包将被丢弃，直到新的活动RP重新编程QFP：

- 如果在切换之前新的活动RP未与旧的活动RP同步，则所有数据包都会被丢弃。
- 数据包由高可用性(HA)不支持功能处理。

```
<#root>

Router#

show platform hardware qfp active statistics drop | ex _0_

-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------


Ipv4NoAdj

                             6993660

116561


Ipv4NoRoute

                         338660188

5644337
```

传送数据包

在Cisco ASR 1000系列路由器上，无法由ESP处理的数据包将被传送到RP。如果传送数据包过多，QFP丢弃统计信息的TailDrop将增加。

```
<#root>

Router#

show platform hardware qfp active statistics drop | ex _0_

-----------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-----------------------------------------------------------------


TailDrop

                             26257792

17552
```

选中Buffering， Queuing and Scheduling (BQS)队列输出计数器以指定丢弃的接口。
“internal0/0/rp：0”显示从ESP传送到RP的接口。

<#root>

Router#

show platform hardware qfp active infrastructure bqs queue output default all

Interface:

internal0/0/rp:0

, QFP if_h: 1, Num Queues/Schedules: 2
  Queue specifics:
    Index 0 (Queue ID:0x2f, Name:)
      Software Control Info:
        (cache) queue id: 0x0000002f, wred: 0x88b002d2, qlimit (bytes): 6250048
        parent_sid: 0x232, debug_name:
        sw_flags: 0x00000011, sw_state: 0x00000001
        orig_min : 0   ,   min: 0
        orig_max : 0   ,   max: 0
        share   : 1
      Statistics:

tail drops (bytes): 26257792   ,   (packets): 17552

        total enqs (bytes): 4433777480   ,   (packets): 2963755
        queue_depth (bytes): 0
  Queue specifics:
...

在这种情况下，输入队列丢弃在入口接口上计数。

<#root>

Router#

show interfaces TenGigabitEthernet 1/0/0

TenGigabitEthernet1/0/0 is up, line protocol is up
  Hardware is SPA-1X10GE-L-V2, address is 0022.5516.2040 (bia 0022.5516.2040)
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 10000Mbps, link type is force-up, media type is 10GBase-LR
  output flow-control is on, input flow-control is on
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:15:10, output 00:00:30, output hang never
  Last clearing of "show interface" counters 00:14:28

Input queue

: 0/375/

2438309

/0 (size/max/

drops

/flushes); Total output drops: 0

```
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 70886000 bits/sec, 5915 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     2981307 packets input, 4460035272 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 watchdog, 0 multicast, 0 pause input
     15 packets output, 5705 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

此命令可以显示传送的原因：

<#root>

```
Router#

show platform hardware qfp active infrastructure punt statistics type per-cause

Global Per Cause Statistics

  Number of punt causes =   46

  Per Punt Cause Statistics
                                                  Packets       Packets
  Counter ID  Punt Cause Name                     Received      Transmitted
  ------------------------------------------------------------------------
  00          RESERVED                            0             0
  01          MPLS_FRAG_REQUIRE                   0             0

02          IPV4_OPTIONS                        2981307       2963755

...
```

您还可以检查**show ip traffic** 命令。

<#root>

```
Router#
```

show ip traffic

```
IP statistics:
  Rcvd:  2981307 total, 15 local destination
         0 format errors, 0 checksum errors, 0 bad hop count
         0 unknown protocol, 0 not a gateway
         0 security failures, 0 bad options,
```

2981307 with options

```
  Opts:  2981307 end, 0 nop, 0 basic security, 0 loose source route
         0 timestamp, 0 extended security, 0 record route
         0 stream ID, 2981307 strict source route, 0 alert, 0 cipso, 0 ump
         0 other, 0 ignored
  Frags: 0 reassembled, 0 timeouts, 0 couldn't reassemble
         0 fragmented, 0 fragments, 0 couldn't fragment
  Bcast: 0 received, 0 sent
  Mcast: 0 received, 0 sent
  Sent:  23 generated, 525450 forwarded
  Drop:  0 encapsulation failed, 0 unresolved, 0 no adjacency
         0 no route, 0 unicast RPF, 0 forced drop, 0 unsupported-addr
         0 options denied, 0 source IP address zero
...
```

按弃用全局策略器划分的弃用限制

如果太多传送数据包发往路由器本身，Taildrop将通过QFP丢弃计数器对PuntGlobalPolicerDrops进行计数。Punt全局监察器可保护RP免受过载影响。这些丢包并不在传输数据包中显示，而在FOR_US数据包中显示。

```
   <#root>

Router#
```

show platform hardware qfp active statistics drop | ex _0_

```
-------------------------------------------------------------
Global Drop Stats                          Octets         Packets
-------------------------------------------------------------
```

PuntGlobalPolicerDrops 155856 102

TailDrop 4141792688 2768579
...

通过此命令可以了解传送的原因：

<#root>

Router#

show platform hardware qfp active infrastructure punt statistics type per-cause

Global Per Cause Statistics

Number of punt causes = 46

Per Punt Cause Statistics

Counter ID	Punt Cause Name	Packets Received	Packets Transmitted
00	RESERVED	0	0
01	MPLS_FRAG_REQUIRE	0	0
02	IPV4_OPTIONS	0	0
03	L2 control/legacy	0	0
04	PPP_CONTROL	0	0
05	CLNS_CONTROL	0	0
06	HDLC_KEEPALIVE	0	0
07	ARP	3	3
08	REVERSE_ARP	0	0
09	LMI_CONTROL	0	0
10	incomplete adjacency punt	0	0

11 FOR_US 5197865 2428755

RP上的数据包丢弃

LSMPI上的数据包错误

在Cisco ASR 1000系列路由器上，数据包通过Linux共享内存传送接口(LSMPI)从ESP传送到RP。LSMPI是通过Linux共享内存在RP上的IOSd和Linux内核之间传输数据包的虚拟接口。从ESP传送到RP的数据包由RP的Linux内核接收。Linux内核通过LSMPI将这些数据包发送到IOSD进程。如果在LSMPI上看到错误计数器启动，则这是软件缺陷。开立 TAC 案例.

<#root>

Router#

show platform software infrastructure lsmpi

<snip>

```
  Lsmpi0 is up, line protocol is up
  Hardware is LSMPI
  MTU 1500 bytes, BW 1000000 Kbit, 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
     15643 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
```

1 input errors

```
, 0 CRC,
```

3 frame

```
, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     295 packets output, 120491 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

相关信息

- **排除Cisco ASR 1000 Series Aggregation Services Routers失败故障**
- **Cisco ASR 1000系列聚合服务路由器-产品支持**
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