NCS5500:数据包的寿命（传输、传送/注入、Ping路径）

目录

简介

数据包在转发ASIC过程中的寿命

管道转发ASIC

- IRPP（端口术语、解析器）

分支路径

两个CPU节点之间的分支路径

从NPU到RP CPU的传送路径

从RP CPU注射到NPU或LC CPU

从LC CPU向NPU注入路径

CLI用于传送/插入调试

远程Ping

- 数据包路径：回应请求
- 数据包路径：回声应答

本地Ping

- 数据包路径：回应请求
- 数据包路径：回声应答

有用的调试:

- 拓扑

用于检查远程Ping的命令

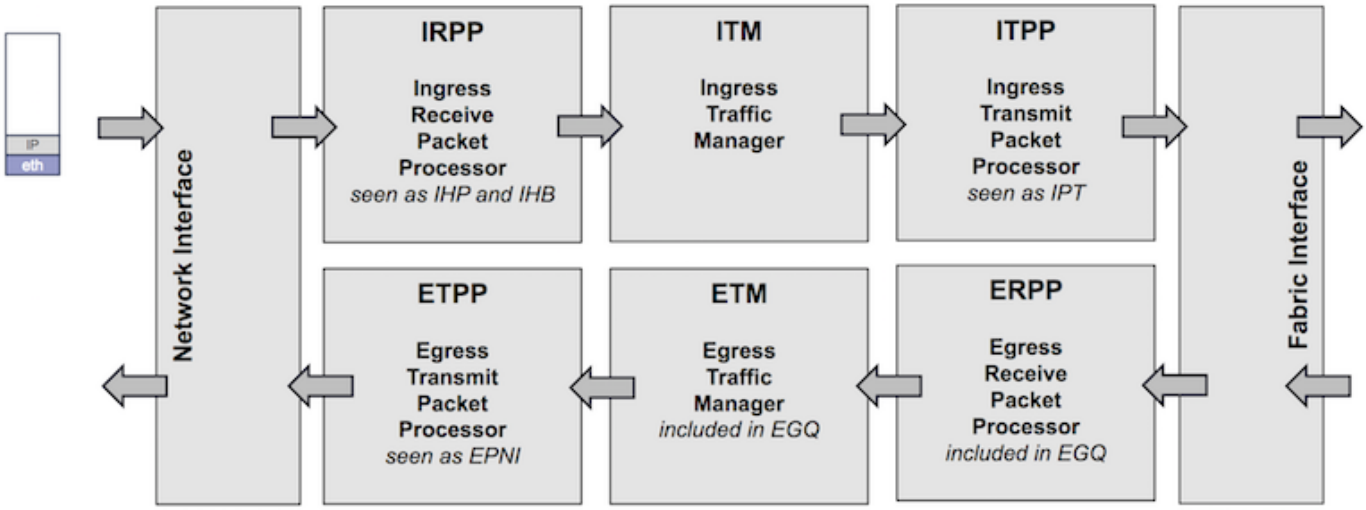
- 回应请求:本地RP:TX
- 回应请求:远程LC:RX
- 回声应答:远程节点(LC):TX
- 回声应答:本地节点(LC):RX

本地Ping

简介

本文档介绍NCS55xx(Fretta)盒内的ICMP回应请求/应答数据包所采用的路径。

数据包在转发ASIC过程中的寿命



IRPP

在接口上接收数据包，然后将其传递到IRPP，提取和处理第一个128字节。因此，内部系统报头会提前预置。

ITM

数据包存储在DRAM/OCB中

ITPP

如果需要，重写系统报头（组播复制、端口镜像等）

将数据包拆分为信元并负载均衡到交换矩阵

ERPP

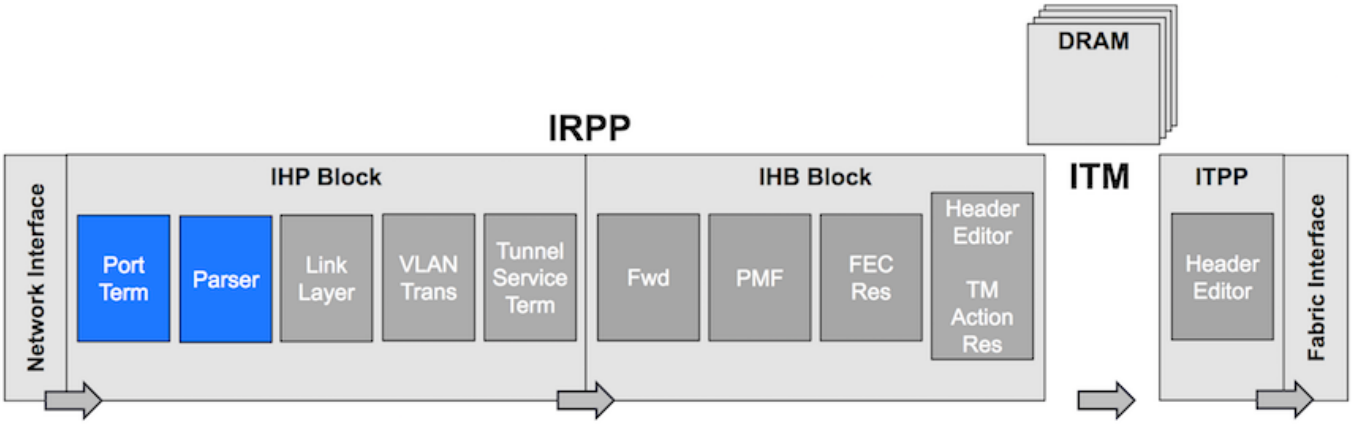
接收并重组信元。提取前128个字节并应用所有链路层过滤器、出口ACL、出口复制（组播）

ETPP/ETM

整个数据包存储在缓冲区中，直到计划出站数据包为止。删除系统报头。

管道转发ASIC

IRPP（端口术语、解析器）

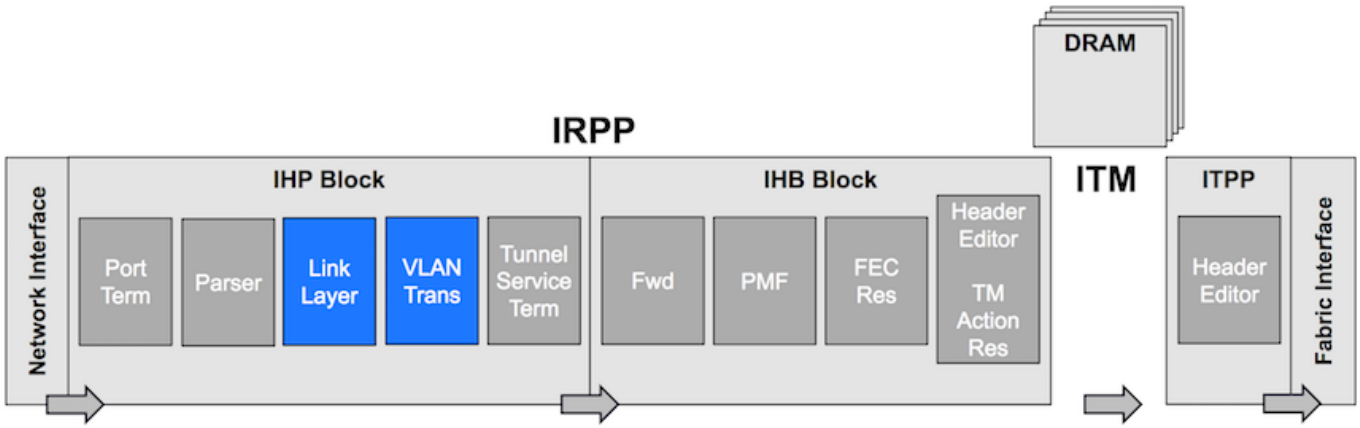


端口终止：从网络接口/CPU/循环接收的数据包

- 确定源端口并标记数据包。
- 确定要用于解析器的初始程序。
- 确定网络报头的起始位置。

解析器：提取以太网类型、MAC地址、确定管道中下一阶段的偏移量。

IRPP（线路层，VLAN传输）



链路层:过滤L2和源地址身份验证。

VLAN转换：我们映射数据包的逻辑接口。

分支路径

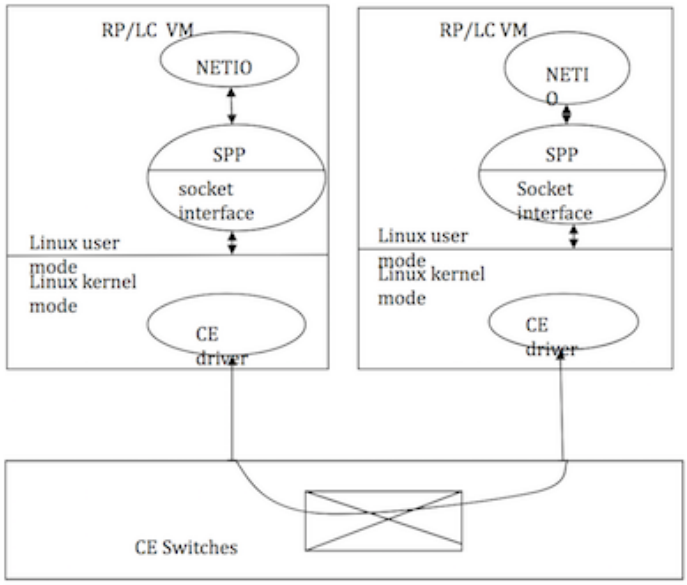
- 由于TCAM资源不足，NPU上只有少量LPTS TCAM条目可用。
- 主要LPTS查找在LC Netio上的SW LPTS Pre-IFIB中完成
- LPTS通过PMF TCAM查找直接将数据包从NPU发送到RP:
  - OSPF、OSPFv3组播和ISIS数据包直接转发到活动和备用RP
- 通过PMF TCAM查找将数据包从NPU发送到本地CPU:
  - 任何使用TCP、UDP的协议；ICMP、ND
- 通过BRCM CPU陷阱将L2协议数据包传送到LC:
  - ARP、RARP、CDP、LACP、LLDP、以太链路OAM、MACSec

- 异常数据包通过BRCM CPU陷阱传送到LC。
  - TTL0、TTL1、MTU Exceed、选项数据包

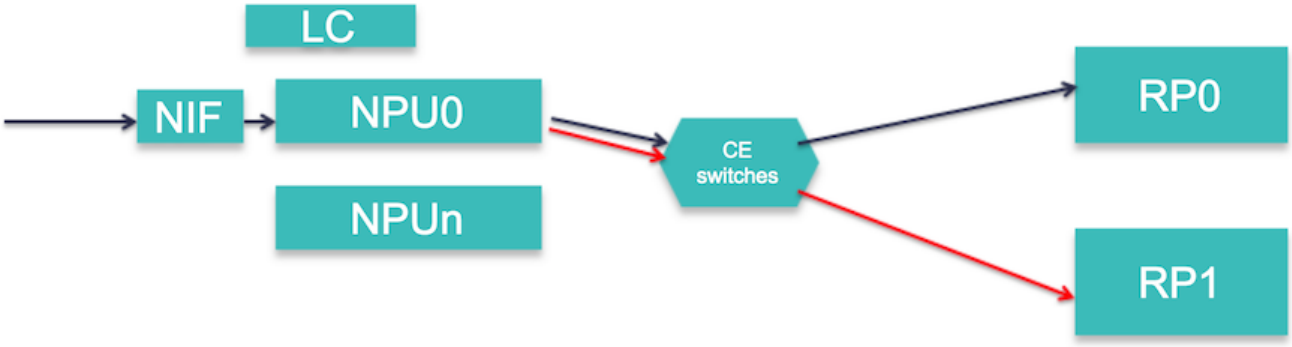
两个CPU节点之间的分支路径

NetIO→SPP→CE switches→SPP→NETIO

CE switches: SC, FC, LC switches

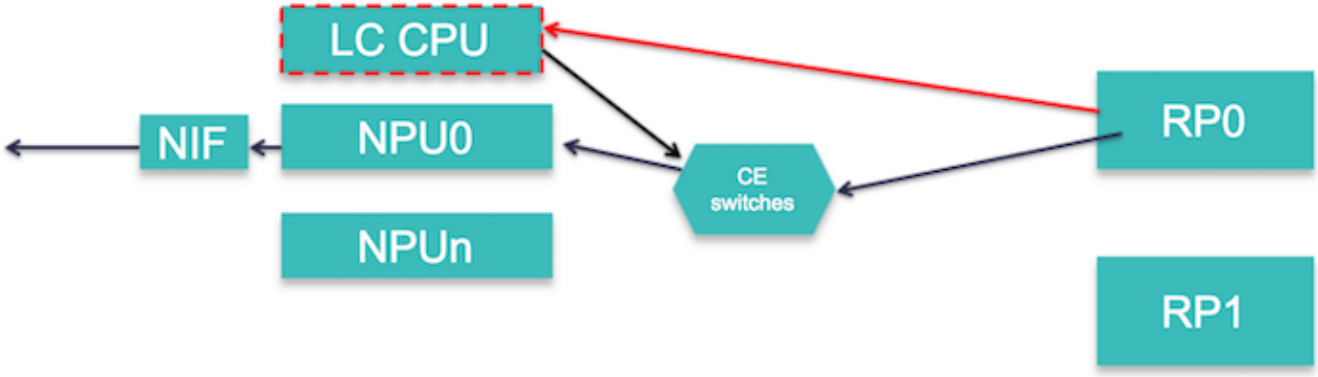


从NPU到RP CPU的传送路径



RX Forus数据包在NPU上复制。一个发送到主用RP，另一个发送到主用RP

从RP CPU注射到NPU或LC CPU

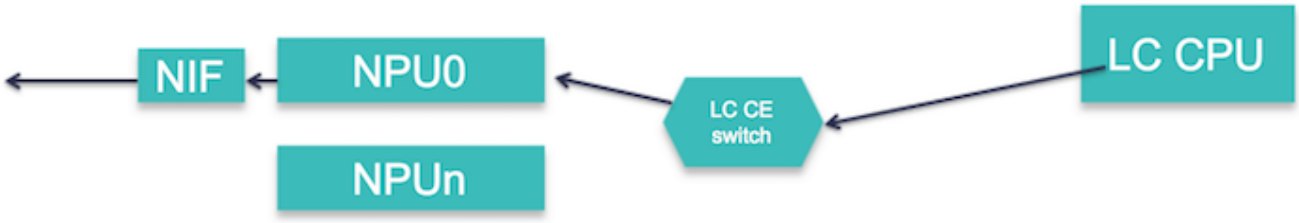


如果前缀邻接关系完成或它是预路由数据包，则将L3数据包直接注入NPU

如果出现以下情况，则向LC CPU注入L3数据包：

- 前缀邻接为GLEAN。
- MPLS路由前数据包
- 数据包大小超过MTU。

从LC CPU向NPU注入路径



从LC CPU向NPU注入以下数据包：

- ARP、ND、ICMP回应应答、分段数据包
- CDP、LACP、LLDP、以太链路OAM数据包

CLI用于传送/插入调试

<#root>

```
Show SPP node counters location <>
```

```
show netio chain
```

```
        location <>
```

show netio drop location <>

show ipv4/ipv6 traffic location <>

show fwd statistics location <>

show lpts pifib entry brief statistics location <>

show controllers fia diagshell

"diag counters g cdsp" location <>

show interface <> location <>

远程Ping

数据包路径：回应请求

Local Node[ICMP(RP) -> IP I/O(RP) -> NetIO/Forwarder(RP) -> SPP(RP) -> NPU] -> wire -> Remote[NPU -> LP

数据包路径：回声应答

Remote Node[IPv4/ICMP (LC) -> FWD/NetIO (LC) -> SPP (LC) -> NPU] -> wire -> Local Node[LPTS(HW) -> SPP(

本地Ping

数据包路径：回应请求

```
RP(ICMP/IPv4 IO -> netio -> SPP -> CE) -> LC(SPP -> netio -> ICMP/ipv4 IO)
```

数据包路径：回声应答

```
LC(IPv4 IO/ICMP -> Netio -> SPP -> CE) -> RP(SPP -> net -> ipv4 io/ICMP)
```

有用的调试:

```
debug icmp ipv4 location 0/0/CPU0

debug ipv4 packet location 0/0/CPU0

debug ipv4 ping events location 0/0/CPU0
```

拓扑

```
Fretta_1(GigabitEthernet0/0/0/16 ) <---->(GigabitEthernet0/0/0/16 ) Fretta_2
```

```
RP/0/RP0/CPU0:fretta_1#  ping 1.1.16.2 count 10000
```

用于检查远程Ping的命令

回应请求:本地RP:TX

```
Path: ICMP(RP) -> IP I/O(RP) -> NetIO/Forwarder(RP) -> SPP(RP) -> NPU
```

1. IP I/O:检查是否生成回应请求：

<#root>

```
show ipv4 traffic brief

ICMP statistics:

  Sent:

 0 admin unreachable, 0 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded


10000 echo request

, 0 echo reply
        0 mask request, 0 mask reply
        0 parameter error, 0 redirects
        10000 total
```

2. NetIO

<#root>

```
RP/0/RP0/CPU0:fretta_1#show netio clients location 0/rP0/CPU0

Counters                  Errors/Total
----------------------------------------

Output                          0/10019


Input                           0/11804
Puntback                        0/0
Jump                            0/0
Driver Output                   0/10002

Mutex Bypass Counters        Total
----------------------------------------
Egress handled               0
Egress chainwalked           10006
Egress dropped               0
Ingress handled              10000
Ingress chainwalked          0
Ingress dropped              0



ClientID         Drop/Total        Drop/Total      Cur/High/Max    Cur/High/Max
-------------------------------------------------------------------------------
ipv6_icmp           0/0               0/0             0/0/1000        0/0/1000

icmp                0/10000

          0/0             0/1/1000        0/0/1000
```

If ping is failing then check if it is getting dropped in Netio:

```
RP/0/RP0/CPU0:fretta_1#show netio drops location 0/rP0/CPU0
Thu Apr 20 20:28:09.577 UTC

Drops for interfaces on node 0/RP0/CPU0
```

No drops

3. SPP

<#root>

```
RP/0/RP0/CPU0:fretta_1#show spp node-counters
Thu Apr 20 20:29:05.785 UTC
0/0/CPU0:
fretta/classify
      forwarded to spp clients:           10006
 forwarded NPU packet to NetIO:           10006
      dropped in classify node:              24
         Fwded to CoPP sampler:               1
                      PUNT ARP:               1
                     PUNT IFIB:           10006
                IFIB RAWIP4_FM:           10000
                IFIB RAWIP6_FM:               6
-------------------------------
client/inject
        pkts injected into spp:           10002
  NetIO->NPU injected into spp:               2
  NetIO->CPU injected into spp:           10000
          NetIO->NPU PROTO ARP:               2
           NetIO->CPU PKT LPTS:           10000
-------------------------------
socket/rx
                ether raw pkts:           10031
-------------------------------
```

socket/tx

ce pkts: 10002

```
-------------------------------
client/punt
              punted to client:           10007
-------------------------------

0/RP0/CPU0:
socket/rx
                ether raw pkts:           10002
           mgmt interface pkts:            3204
-------------------------------
```

```
socket/tx
                       ce pkts:           10000
           mgmt interface pkts:               5
------------------------------
fretta/classify
      forwarded to spp clients:           13204
 forwarded CPU packet to NetIO:           10000
forwarded Mgmt packet to NetIO:            3204
      dropped in classify node:               2
------------------------------
client/inject
        pkts injected into spp:           10005
  NetIO->NPU injected into spp:           10000
     MGMT_IF injected into spp:               5
NetIO->NPU PROTO IPV4_PREROUTE:           10000
------------------------------
client/punt
              punted to client:           13204
------------------------------
```

4.检查回应请求是否发送到线路：

```
 RP/0/RP0/CPU0:fretta_1#show controllers gigabitEthernet 0/0/0/16 stats | be Egress
Thu Apr 20 21:17:28.176 UTC

Egress:
    Output total bytes          = 1140270
        Output good bytes           = 1140270

    Output total packets        = 10004
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 1
    Output pkts 65-127 bytes    = 10003
    Output pkts 128-255 bytes   = 0
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 10004
    Output unicast pkts         = 10000
    Output multicast pkts       = 3
    Output broadcast pkts       = 1

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0
```

回应请求:远程LC:RX

```
Path: NPU -> LPTS(HW) -> SPP(LC) -> NetIO/Forwarder(LC) -> LPTS(SW)(LC) -> IP I/O (LC) -> ICMP (LC)
```

1.检查数据包是否从有线接收：

<#root>

```
RP/0/RP0/CPU0:fretta_2#show controllers gigabitEthernet 0/0/0/16 stats
Thu Apr 20 20:44:22.115 UTC
Statistics for interface GigabitEthernet0/0/0/16 (cached values):

Ingress:
    Input total bytes           = 1140270
    Input good bytes            = 1140270

    Input total packets         = 10004
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 1

Input pkts 65-127 bytes     = 10003
```

2.检查LPTS计数器。

```
RP/0/RP0/CPU0:fretta_2#show lpts pifib hardware entry brief location 0/0/CPU0 | i ICMP
Thu Apr 20 20:45:54.687 UTC
```

<#root>

```
DestIP               SrcIP               vrf   L4   LPort/Type   RPort  npu  Flowtype           DestNo
0.0.0.0              0.0.0.0             0     1    ECHO         0      0

ICMP-local

        Local LC     MEDIUM

10000

  0
```

3. SPP

```
RP/0/RP0/CPU0:fretta_2#show spp node-counters location 0/0/CPU0
```

<#root>

```
fretta/classify
      forwarded to spp clients:           10006
 forwarded NPU packet to NetIO:           10006
      dropped in classify node:              22
         Fwded to CoPP sampler:               2
                      PUNT ARP:               2
                     PUNT IFIB:           10006
                IFIB IPv4_STACK:           10000
                 IFIB RAWIP6_FM:               6
-------------------------------
client/inject
        pkts injected into spp:           10002
  NetIO->NPU injected into spp:           10002
          NetIO->NPU PROTO ARP:               2
         NetIO->NPU PROTO IPV4:           10000
-------------------------------
```

socket/rx

```
                ether raw pkts:           10030

-------------------------------
socket/tx
                       ce pkts:           10002
-------------------------------
client/punt
              punted to client:           10008
-------------------------------
```

4. Netio

```
show netio chains gigabitEthernet 0/0/0/16 location 0/0/cpu0
```

<#root>

<12> (ipv4)   Stats IN: 10000 pkts, 1140000 bytes; OUT: 10000 pkts, 1140000 bytes

<#root>

```
       Protocol        SAFI       Pkts In    Bytes In    Pkts Out   Bytes Out
---------------  ----------    ----------  ----------  ----------  ----------
```

ipv4 Unicast 10000

```
1140000       10000     1000000
      ipv4   Multicast            0           0           0           0
      ipv4   Broadcast            0           0           0           0
      ipv6     Unicast            0           0           0           0
      ipv6   Multicast            0           0           0           0
```

<#root>

```
RP/0/RP0/CPU0:fretta_2#show netio clients location 0/0/CPU0
Thu Apr 20 20:52:26.802 UTC

Counters                   Errors/Total
---------------------------------------
Output                          0/10002
Input                           0/10008
Puntback                        0/0
Jump                            0/0
Driver Output                   0/10002

XIPC queues               Dropped/Queued    Cur/High/Max
-----------------------------------------------------------
OutputL                         0/10000         0/1/6000
OutputH                         0/2             0/1/3000
Puntback                        0/0             0/0/6000

                    Input              Punt          XIPC InputQ      XIPC PuntQ
ClientID          Drop/Total         Drop/Total      Cur/High/Max    Cur/High/Max
-------------------------------------------------------------------------------
ipv6_icmp           0/0                0/0             0/0/1000        0/0/1000

icmp                0/10000            0/0             0/1/1000        0/0/1000


clns              L 0/0                0/0           L 0/0/1000        0/0/0
                  H 0/0                              H 0/0/1000
ipv6_io             0/0                0/0             0/0/1000        0/0/1000
ipv6_nd             0/0                0/0             0/0/1500        0/0/1000
l2snoop             0/0                0/0             0/0/1000        0/0/0
ether_sock          0/0                0/0
tp_oam              0/0                0/0             0/0/1000        0/0/1000
icmpv6_unreach_jump         0/0                 0/0
arp                 0/2                0/0             0/1/1000        0/0/1000
mpls_io             0/0                0/0             0/0/1000        0/0/1000
ipv4                0/0                0/0             0/0/1000        0/0/1000
ipv6                0/0                0/0             0/0/1000        0/0/1000

Key:
  L = queue for lower priority packets
  H = queue for higher priority packets
```

5. FWD统计信息

<#root>

```
RP/0/RP0/CPU0:fretta_2#show fwd statistics all location 0/0/cpu0
Thu Apr 20 20:51:50.347 UTC
RECEIVE STATISTICS SUMMARY:

rx_pkts: 10008


punt_pkts: 10008
```

```
ingress_total_drops: 0
TRANSMIT STATISTICS SUMMARY:
inject_pkts: 10002
tx_pkts: 10002
egress_total_drops: 0
RP/0/RP0/CPU0:fretta_2#
```

6. IP IOS

```
show ipv4 traffic brief location 0/0/CPU0
```

<#root>

Rcvd:

```
0 admin unreachable, 0 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded
```

10000 echo request

```
, 0 echo reply
        0 mask request, 0 mask reply
        0 redirect, 0 parameter error
        0 source quench, 0 timestamp, 0 timestamp reply
        0 router advertisement, 0 router solicitation
        10000 total, 0 checksum errors, 0 unknown
```

回声应答:远程节点(LC):TX

```
Path: IPv4/ICMP (LC) -> FWD/NetIO (LC) -> SPP (LC) -> NPU
```

1. IP IO

```
RP/0/RP0/CPU0:fretta_2#show ipv4 traffic brief location 0/0/CPU0
```

<#root>

```
ICMP statistics:
```

Sent:

```
 0 admin unreachable, 0 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded
        0 echo request,
```

10000 echo reply

```
        0 mask request, 0 mask reply
        0 parameter error, 0 redirects
        10000 total
```

2. Netio

```
show netio chains gigabitEthernet 0/0/0/16 location 0/0/cpu0
```

<#root>

<12> (ipv4)   Stats IN: 10000 pkts, 1140000 bytes; OUT: 10000 pkts, 1140000 bytes

<#root>

```
       Protocol        SAFI       Pkts In    Bytes In    Pkts Out   Bytes Out
---------------  ----------    ----------  ----------  ----------  ----------
           ipv4     Unicast         10000     1140000
```

10000

```
     1000000
           ipv4   Multicast             0           0           0           0
           ipv4   Broadcast             0           0           0           0
           ipv6     Unicast             0           0           0           0
           ipv6   Multicast             0           0           0           0
```

<#root>

```
RP/0/RP0/CPU0:fretta_2#show netio clients location 0/0/CPU0
Thu Apr 20 20:52:26.802 UTC

Counters                  Errors/Total
----------------------------------------
```

Output   0/10002

```
Input                           0/10008
Puntback                        0/0
Jump                            0/0
Driver Output                   0/10002
```

```
XIPC queues               Dropped/Queued    Cur/High/Max
------------------------------------------------------------
OutputL                        0/10000         0/1/6000
OutputH                        0/2             0/1/3000
Puntback                       0/0             0/0/6000
```

3. FWD统计信息

<#root>

```
 RP/0/RP0/CPU0:fretta_2#show fwd statistics all location 0/0/cpu0
Thu Apr 20 20:51:50.347 UTC
RECEIVE STATISTICS SUMMARY:
rx_pkts: 10008
punt_pkts: 10008
ingress_total_drops: 0
TRANSMIT STATISTICS SUMMARY:
inject_pkts: 10002


tx_pkts: 10002


egress_total_drops: 0
```

4. SPP

```
 show spp node-counters location 0/0/CPU0
```

<#root>

```
fretta/classify
      forwarded to spp clients:           10006
 forwarded NPU packet to NetIO:           10006
      dropped in classify node:              22
         Fwded to CoPP sampler:               2
                     PUNT ARP:               2
                   PUNT IFIB:            10006
               IFIB IPv4_STACK:            10000
                IFIB RAWIP6_FM:                6
------------------------------
client/inject
        pkts injected into spp:           10002
  NetIO->NPU injected into spp:           10002
          NetIO->NPU PROTO ARP:               2
         NetIO->NPU PROTO IPV4:           10000
------------------------------
socket/rx
                ether raw pkts:           10030
```

```
------------------------------
socket/tx

                      ce pkts:           10002

------------------------------
client/punt
              punted to client:           10008
------------------------------
```

5.检查数据包是否送出到电线。

<#root>

```
RP/0/RP0/CPU0:fretta_2#show controllers gigabitEthernet 0/0/0/16 stats
Thu Apr 20 21:20:22.593 UTC
Statistics for interface GigabitEthernet0/0/0/16 (cached values):
Egress:
    Output total bytes          = 1140270
    Output good bytes           = 1140270

    Output total packets        = 10004
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 1

 Output pkts 65-127 bytes    = 10003

    Output pkts 128-255 bytes   = 0
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 10004
    Output unicast pkts         = 10000
    Output multicast pkts       = 3
    Output broadcast pkts       = 1

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0
```

6.接口统计信息

<#root>

```
RP/0/RP0/CPU0:fretta_2#show int gigabitEthernet 0/0/0/16
Thu Apr 20 21:21:37.942 UTC
GigabitEthernet0/0/0/16 is up, line protocol is up
  Interface state transitions: 1
  Hardware is GigabitEthernet, address is 008a.964a.7040 (bia 008a.964a.7040)
  Internet address is 1.1.16.2/24
  MTU 1514 bytes, BW 1000000 Kbit (Max: 1000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 1000Mb/s, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 01:00:13
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:56:58, output 00:56:58
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     10004 packets input, 1140270 bytes, 0 total input drops
     3 drops for unrecognized upper-level protocol
     Received 1 broadcast packets, 3 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort


 10004 packets output

, 1140270 bytes, 0 total output drops
     Output 1 broadcast packets, 3 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

回声应答:本地节点(LC):RX

```
LPTS(HW) -> SPP(LC) -> NetIO/Forwarder(LC) -> LPTS PreIFIB Lookup -> SPP(LC) -> CE(LC) -> SPP(RP) -> Ne
```

1.检查数据包是否从线路进入。

<#root>

```
RP/0/RP0/CPU0:fretta_1#show controllers gigabitEthernet 0/0/0/16 stats
Thu Apr 20 21:17:28.176 UTC
Statistics for interface GigabitEthernet0/0/0/16 (cached values):

Ingress:
    Input total bytes           = 1140270
    Input good bytes            = 1140270

    Input total packets         = 10004
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 1
```

```
   Input pkts 65-127 bytes     = 10003

    Input pkts 128-255 bytes    = 0
    Input pkts 256-511 bytes    = 0
    Input pkts 512-1023 bytes   = 0
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 0

    Input good pkts             = 10004
    Input unicast pkts          = 10000
    Input multicast pkts        = 3
    Input broadcast pkts        = 1

    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             = 0
    Input MIB jabber            = 0
    Input MIB CRC               = 0
```

2. LPTS计数器

```
RP/0/RP0/CPU0:fretta_1#show lpts pifib hardware entry brief locatio 0/0/CPU0
```

<#root>

```
0.0.0.0              0.0.0.0              0     1

ECHOREPLY

    0      0    ICMP-app-default   Local LC     LOW

10000

  0
```

3. LC上的SPP

<#root>

```
RP/0/RP0/CPU0:fretta_1#show spp node-counters location 0/0/CPU0
Thu Apr 20 21:01:31.974 UTC
fretta/classify
      forwarded to spp clients:           10006
 forwarded NPU packet to NetIO:           10006
      dropped in classify node:              24
         Fwded to CoPP sampler:               1
                      PUNT ARP:               1
                    PUNT IFIB:           10006
               IFIB RAWIP4_FM:           10000
               IFIB RAWIP6_FM:               6
-------------------------------
client/inject
        pkts injected into spp:           10002
  NetIO->NPU injected into spp:               2
  NetIO->CPU injected into spp:           10000
          NetIO->NPU PROTO ARP:               2
           NetIO->CPU PKT LPTS:           10000
-------------------------------

socket/rx


               ether raw pkts:           10031


-------------------------------
socket/tx
                       ce pkts:           10002
-------------------------------
client/punt
              punted to client:           10007
-------------------------------
```

4. LC上的Netio

```
RP/0/RP0/CPU0:fretta_1# show netio chains gigabitEthernet 0/0/0/16 location 0/0/cpu0
```

<#root>

```
<12> (ipv4)   Stats IN: 10000 pkts, 1140000 bytes; OUT: 0 pkts, 0 bytes
```

<#root>

```
Protocol SAFI counts:
--------------------

       Protocol        SAFI       Pkts In    Bytes In    Pkts Out   Bytes Out
---------------  ----------    ----------  ----------  ----------  ----------


 ipv4     Unicast         10000     1140000
```

```
        0           0
           ipv4   Multicast            0           0           0           0
           ipv4   Broadcast            0           0           0           0
           ipv6     Unicast            0           0           0           0
           ipv6   Multicast            0           0           0           0
```

5. LC上的FWD统计信息。

<#root>

```
RP/0/RP0/CPU0:fretta_1#show fwd statistics all location 0/0/CPU0
Thu Apr 20 21:04:27.767 UTC
RECEIVE STATISTICS SUMMARY:
```

rx_pkts: 10007

punt_pkts: 10007

```
ingress_total_drops: 0
TRANSMIT STATISTICS SUMMARY:
inject_pkts: 10002
tx_pkts: 10002
egress_total_drops: 0
RP/0/RP0/CPU0:fretta_1#
```

5. LC上的SPP发送到RP上的SPP。

<#root>

```
RP/0/RP0/CPU0:fretta_1#show spp node-counters location 0/0/CPU0
Thu Apr 20 21:01:31.974 UTC
fretta/classify
      forwarded to spp clients:           10006
 forwarded NPU packet to NetIO:           10006
      dropped in classify node:              24
         Fwded to CoPP sampler:               1
                     PUNT ARP:                1
                    PUNT IFIB:           10006
                IFIB RAWIP4_FM:           10000
                IFIB RAWIP6_FM:               6
-------------------------------
client/inject
        pkts injected into spp:           10002
  NetIO->NPU injected into spp:               2
  NetIO->CPU injected into spp:           10000
          NetIO->NPU PROTO ARP:               2
           NetIO->CPU PKT LPTS:           10000
-------------------------------
socket/rx
                ether raw pkts:           10031
-------------------------------
```

socket/tx

```
                      ce pkts:           10002

-------------------------------
client/punt
              punted to client:           10007
-------------------------------
```

6. RP上的SPP

<#root>

```
RP/0/RP0/CPU0:fretta_1#show spp node-counters location 0/rP0/CPU0
Thu Apr 20 21:06:33.045 UTC
```

socket/rx

```
                ether raw pkts:           10002


           mgmt interface pkts:           16651
-------------------------------
socket/tx
                      ce pkts:           10000
           mgmt interface pkts:              14
-------------------------------
fretta/classify
      forwarded to spp clients:           26651
 forwarded CPU packet to NetIO:           10000
forwarded Mgmt packet to NetIO:           16651
      dropped in classify node:               2
-------------------------------
client/inject
        pkts injected into spp:           10014
  NetIO->NPU injected into spp:           10000
     MGMT_IF injected into spp:              14
NetIO->NPU PROTO IPV4_PREROUTE:           10000
-------------------------------
client/punt
              punted to client:           26651
-------------------------------
```

7. RP上的Netio。

<#root>

```
RP/0/RP0/CPU0:fretta_1#show netio clients location 0/RP0/CPU0
Thu Apr 20 21:05:05.977 UTC
```

```
Counters                  Errors/Total
---------------------------------------
Output                     0/10031
Input                      0/25872
Puntback                   0/0
Jump                       0/0
Driver Output              0/10014

Mutex Bypass Counters        Total
---------------------------------------
Egress handled               0
Egress chainwalked           10018
Egress dropped               0
Ingress handled              10000
Ingress chainwalked          0
Ingress dropped              0

XIPC queues              Dropped/Queued    Cur/High/Max
-------------------------------------------------------------
OutputL                    0/10004         0/1/6000
OutputH                    0/14            0/1/3000
Puntback                   0/0             0/0/6000
PMutex_egressL             0/10004         0/1/6000
PMutex_egressH             0/14            0/1/1500
PMutex_ingressL            0/0             0/0/6000
PMutex_ingressH            0/0             0/0/1500

                    Input              Punt          XIPC InputQ      XIPC PuntQ
ClientID          Drop/Total         Drop/Total      Cur/High/Max    Cur/High/Max
-------------------------------------------------------------------------------
ipv6_icmp           0/0                0/0             0/0/1000        0/0/1000

icmp                0/10000            0/0             0/1/1000        0/0/1000


clns              L 0/0                0/0           L 0/0/1000        0/0/0
                  H 0/0                              H 0/0/1000
eth_mgmt            0/0                0/0
ipv6_io             0/0                0/4             0/0/1000        0/1/1000
ipv6_nd             0/4                0/0             0/1/1500        0/0/1000
l2snoop             0/0                0/0             0/0/1000        0/0/0
ether_sock          0/0                0/0
icmpv6_unreach_jump         0/0                 0/0
raw               L 0/0                0/0           L 0/0/1600        0/0/0
                  H 0/0                              H 0/0/1600
tcp               L 0/0                0/0           L 0/0/1600        0/0/0
                  H 0/0                              H 0/0/1600
udp               L 0/307              0/0           L 0/1/1600        0/0/0
                  H 0/0                              H 0/0/1600
arp                 0/15565            0/0             0/4/1000        0/0/1000
mpls_io             0/0                0/0             0/0/1000        0/0/1000
lspv_server         0/0                0/0
ipv4                0/0                0/0             0/0/1000        0/0/1000
ipv6                0/0                0/0             0/0/1000        0/0/1000

Key:
  L = queue for lower priority packets
  H = queue for higher priority packets
```

8. IP IO

```
RP/0/RP0/CPU0:fretta_1#



RP/0/RP0/CPU0:fretta_1#show ipv4 traffic brief
```

<#root>

Rcvd

```
: 0 admin unreachable, 0 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded
        0 echo request,
```

10000 echo reply

```
        0 mask request, 0 mask reply
        0 redirect, 0 parameter error
        0 source quench, 0 timestamp, 0 timestamp reply
        0 router advertisement, 0 router solicitation
        10000 total, 0 checksum errors, 0 unknown
```

9.接口统计信息：

<#root>

```
RP/0/RP0/CPU0:fretta_1# show int gigabitEthernet 0/0/0/16
Thu Apr 20 21:22:12.822 UTC
GigabitEthernet0/0/0/16 is up, line protocol is up
  Interface state transitions: 1
  Hardware is GigabitEthernet, address is 008a.964b.7040 (bia 008a.964b.7040)
  Internet address is 1.1.16.1/24
  MTU 1514 bytes, BW 1000000 Kbit (Max: 1000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 1000Mb/s, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 01:01:11
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:58:03, output 00:58:03
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
```

10004 packets input

```
, 1140270 bytes, 0 total input drops
```

```
     3 drops for unrecognized upper-level protocol
     Received 1 broadcast packets, 3 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     10004 packets output, 1140270 bytes, 0 total output drops
     Output 1 broadcast packets, 3 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions


RP/0/RP0/CPU0:fretta_1#
```

本地Ping

<待定>

关于此翻译
思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

请注意：即使是最好的机器翻译，其准确度也不及专业翻译人员的水平。

Cisco Systems, Inc. 对于翻译的准确性不承担任何责任，并建议您总是参考英文原始文档（已提供链接）。