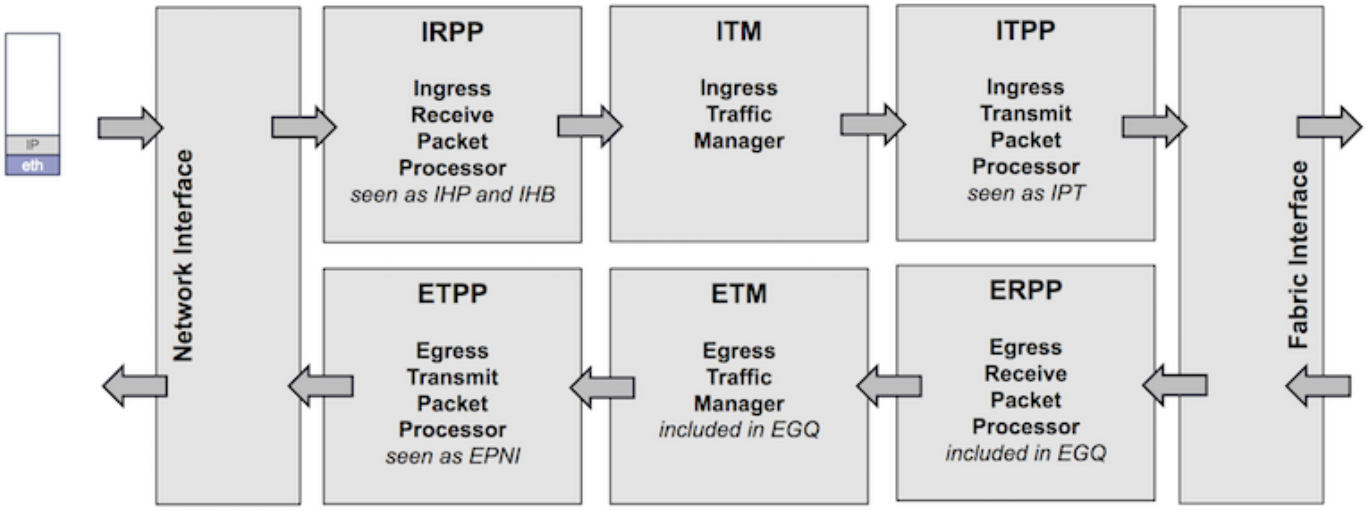
NCS5500 : Durée de vie d’un paquet(transit, Punt/Inject, chemin Ping)

Contenu

Introduction

Ce document décrit le chemin emprunté par les paquets de requête d'écho/réponse d'écho ICMP dans la zone NCS55xx(Fretta).

Durée de vie d'un paquet dans ASIC de transfert



IRPP

Un paquet est reçu sur une interface et transmis à IRPP où les 128 premiers octets seront extraits et traités. Par conséquent, l'en-tête du système interne est préfixé.

ITM

Le paquet est stocké dans la mémoire DRAM/OCB

ITPP

Si nécessaire, réécrivez l'en-tête système (réplication multidiffusion, mise en miroir des ports, etc.)

Les paquets sont divisés en cellules et leur charge est équilibrée en fabric

ERPP

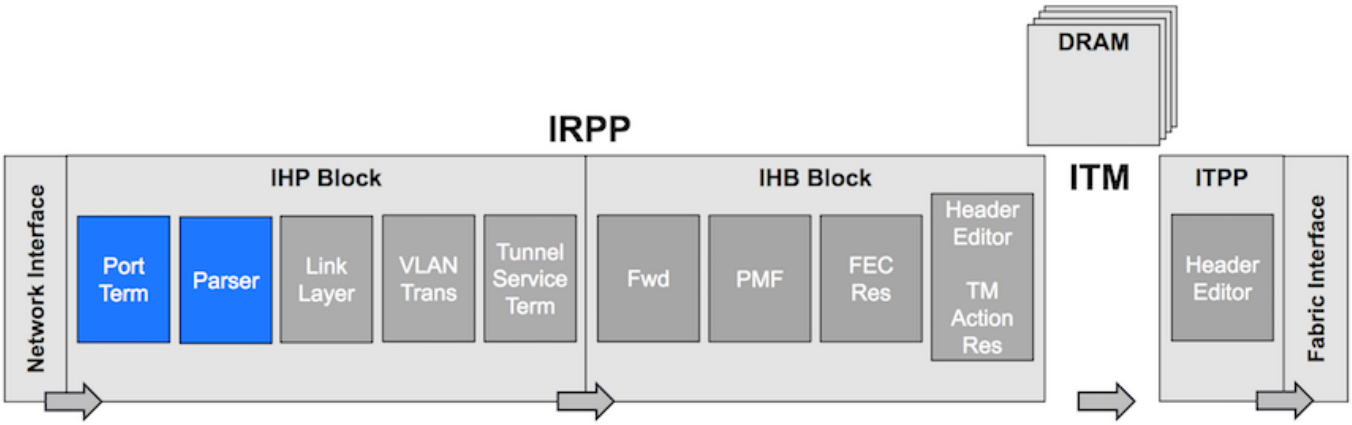
Les cellules sont reçues et réassemblées. Les 128 premiers octets sont extraits et appliquent tous les filtres de couche liaison, la liste de contrôle d'accès de sortie, la réplication de sortie (multidiffusion)

ETPP/ETM

Le paquet entier est stocké dans une mémoire tampon jusqu'à ce que le paquet sortant soit planifié. Les en-têtes système sont supprimés.

ASIC de transfert de pipeline

IRPP (Port Term, Analyseur)

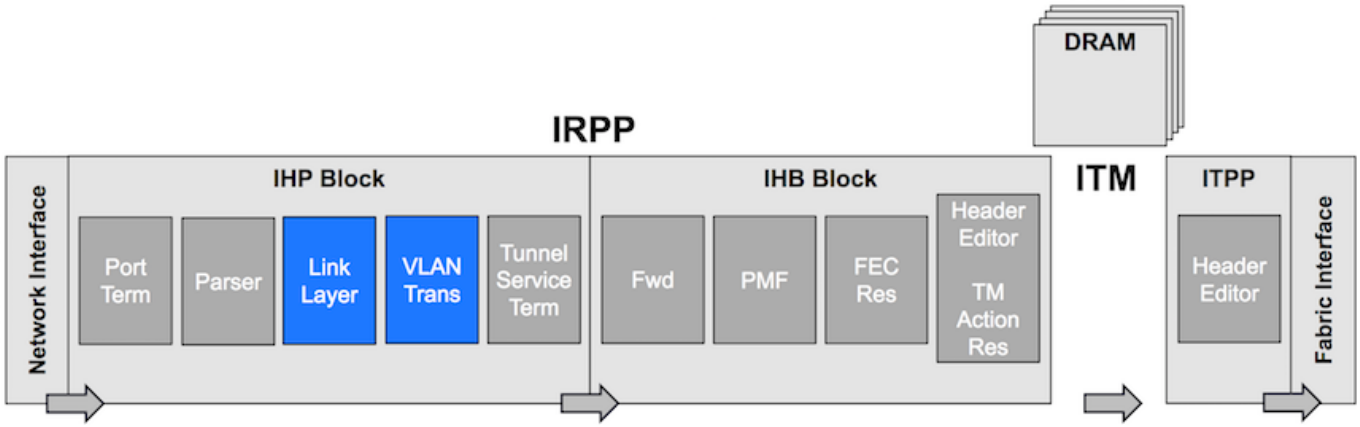


Terminaison du port : Paquets reçus de l'interface réseau/CPU/Recirculation

- Déterminez le port source et marquez le paquet avec lui.
- Décidez du programme initial à utiliser dans l'analyseur.
- Identifiez le début de l'en-tête du réseau.

Analyseur : Extraire Ethertype, Adresses MAC, Déterminer le décalage pour les étapes suivantes du pipeline.

IRPP (couche de ligne, transbordement VLAN)



Couche liaison : Filtrage sur L2 et authentification d'adresse source.

Traduction VLAN : Nous mappons l'interface logique du paquet.

Chemin Punt

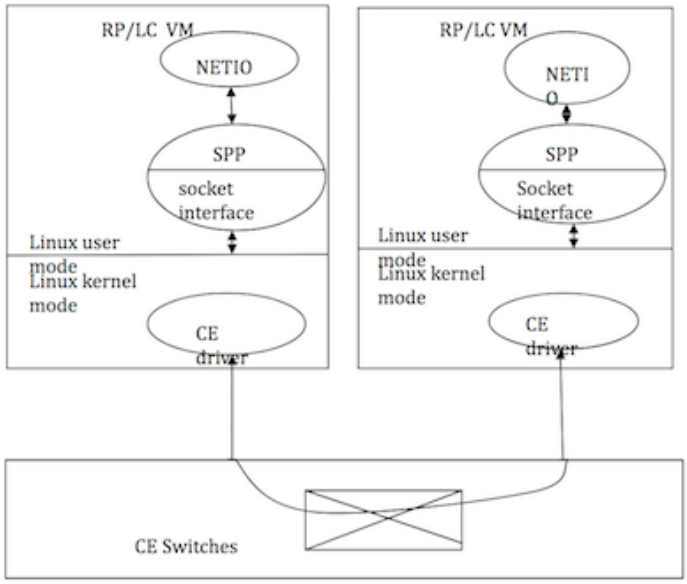
- Seules quelques entrées TCAM LPTS sont disponibles sur le NPU en raison d'un manque de ressources TCAM.
- La recherche LPTS majeure est effectuée dans SW LPTS Pre-IFIB sur LC Netio
- Paquet de pontage LPTS de NPU vers RP directement via la recherche TCAM PMF : Les paquets OSPF, OSPFv3 mcast et ISIS sont acheminés directement vers le RP actif et de secours
- Paquet de pontage LPTS de NPU au CPU local via la recherche TCAM PMF : Tout protocole qui utilise TCP, UDP ; ICMP, ND
- Les paquets de protocole de couche 2 sont punis à LC via le piège CPU BRCM : ARP, RARP, CDP, LACP, LLDP, OAM de liaison Ethernet, MACSec

- Les paquets d'exception sont punis à LC via le déroutement du processeur BRCM. TTL0, TTL1, MTU dépassé, paquets d'option

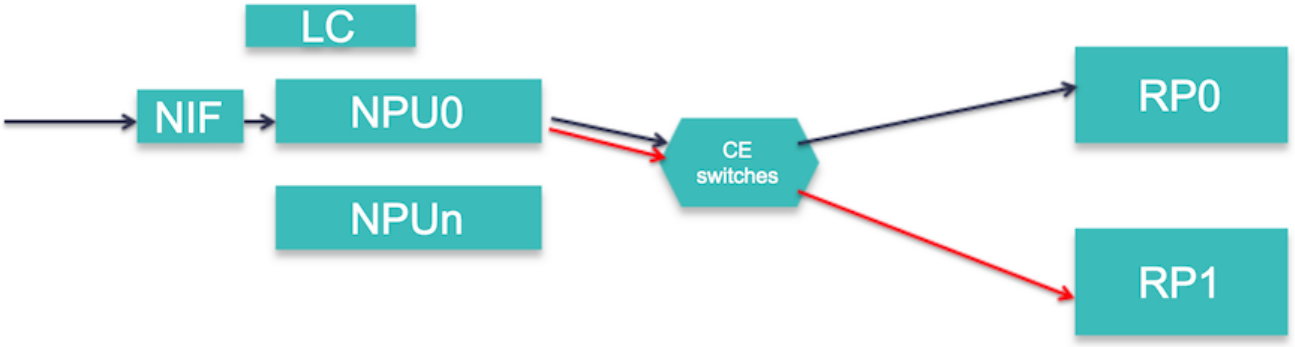
Chemin d'accès unique entre deux noeuds CPU

NetIO→SPP→CE switches→SPP→NETIO

CE switches: SC, FC, LC switches

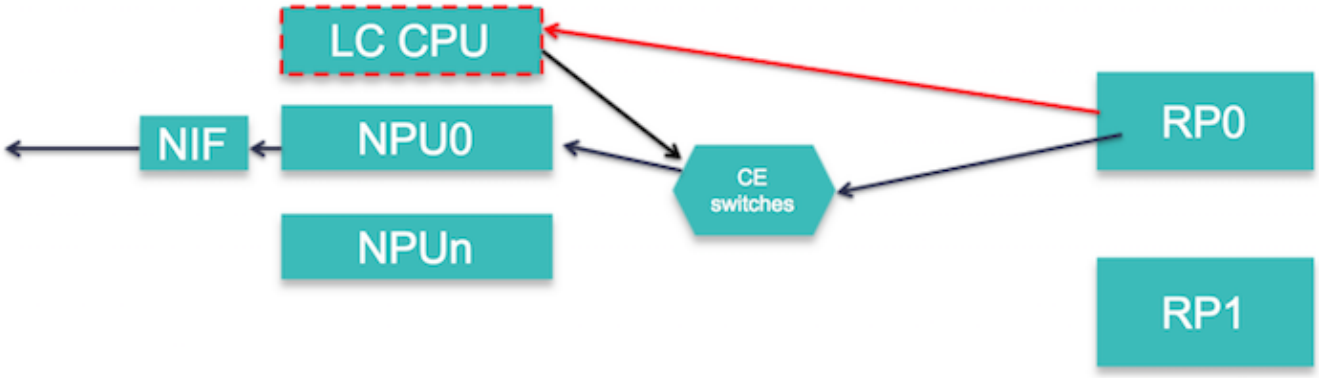


Chemin d'accès du processeur NPU au processeur RP



Les paquets RX Forus sont répliqués sur NPU. L'une est envoyée au RP actif et l'autre au RP de démarrage

Injection du processeur RP vers le processeur NPU ou LC

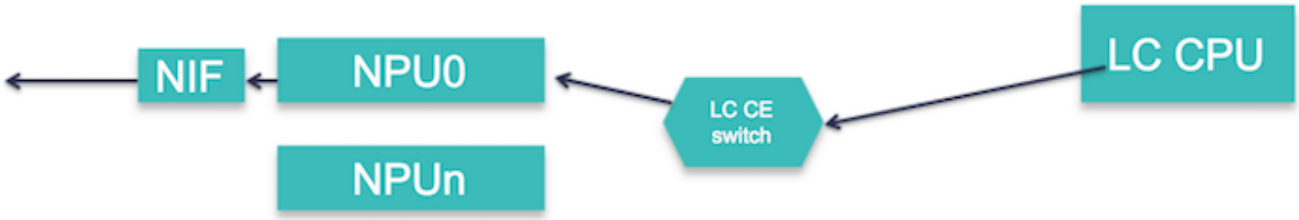


Les paquets de couche 3 sont injectés directement à NPU si la contiguïté de préfixe est terminée ou s'il s'agit d'un paquet de pré-route

Les paquets de couche 3 sont injectés au processeur LC dans le cas où :

- La contiguïté de préfixe est GLEAN.
- Paquet de pré-routage MPLS
- La taille du paquet dépasse la MTU.

Chemin d'injection du processeur LC vers NPU



Ces paquets sont injectés du CPU LC au NPU :

- ARP, ND, réponse écho ICMP, paquets fragmentés
- Paquets CDP, LACP, LLDP, OAM EtherLink

CLI pour le débogage de Punt/Inject

```
Show SPP node counters location <>

show netio chain
```

```
show netio drop location <>

show ipv4/ipv6 traffic location <>

show fwd statistics location <>

show lpts pifib entry brief statistics location <>

show controllers fia diagshell
```

```
show interface <> location <>
```

Ping distant

Chemin du paquet : Demande d'écho

```
Local Node[ICMP(RP) -> IP I/O(RP) -> NetIO/Forwarder(RP) -> SPP(RP) -> NPU] -> wire ->
Remote[NPU -> LPTS(HW) -> SPP(LC) -> NetIO/Forwarder(LC) -> LPTS(SW)(LC) -> IP I/O (LC) -> ICMP
(LC)]
```

Chemin du paquet : Réponse d'écho

```
Remote Node[IPv4/ICMP (LC) -> FWD/NetIO (LC) -> SPP (LC) -> NPU] -> wire -> Local Node[LPTS(HW)
-> SPP(LC) -> NetIO/Forwarder(LC) -> NetIO(RP) -> IP I/O (RP) -> ICMP (RP)]
```

Ping local

Chemin du paquet : Demande d'écho

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

Chemin du paquet : Réponse d'écho

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

Débogages utiles:

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

debug ipv4 packet location 0/0/CPU0

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

Topologie

```
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
```

Commandes permettant de vérifier la commande Remote Ping

Demande d'écho : RP local : TX

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

1. E/S IP : Vérifiez si la demande d'écho est générée :

```
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

```
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

```
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. Vérifiez si la demande d'écho est envoyée au câble :

```
 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
```

Demande d'écho : LC distant : RX

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

1. Vérifiez si le paquet est reçu du câble :

```
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. Cochez le compteur LPTS.

```
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

DestIP               SrcIP                vrf   L4   LPort/Type   RPort  npu  Flowtype
DestNode     PuntPrio Accept Drop
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

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

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

       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

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. Statistiques FWD

```
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. IOS IP

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

 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
```

Réponse d'écho : Noeud distant(LC) : TX

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

1. E/S IP

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

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
```

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

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

```
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. Statistiques FWD

```
 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

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. Vérifiez si le paquet est envoyé au câble.

```
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. Statistiques d'interface

```
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
```

Réponse d'écho : Noeud local (LC) : RX

```
LPTS(HW) -> SPP(LC) -> NetIO/Forwarder(LC) -> LPTS PreIFIB Lookup -> SPP(LC) -> CE(LC) ->
SPP(RP) -> NetIO(RP) -> IP I/O (RP) -> ICMP (RP)
```

1. Vérifiez si des paquets arrivent du câble.

```
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. Compteurs LPTS

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

0.0.0.0              0.0.0.0              0     1    ECHOREPLY    0      0    ICMP-app-default
Local LC     LOW      10000  0
```

3. SPP sur LC

```
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. Netio sur LC

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

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

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. Statistiques FWD sur LC.

```
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. SPP sur LC à envoyer au SPP sur RP.

```
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. SPP sur RP

```
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. Netio sur RP.

```
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. E/S IP

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

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

  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. Statistiques d'interface :

```
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#
```

Ping local

<À déterminer>