

NCS5500: Vida de un paquete (Tránsito, Punt/Inject, Ping Path)

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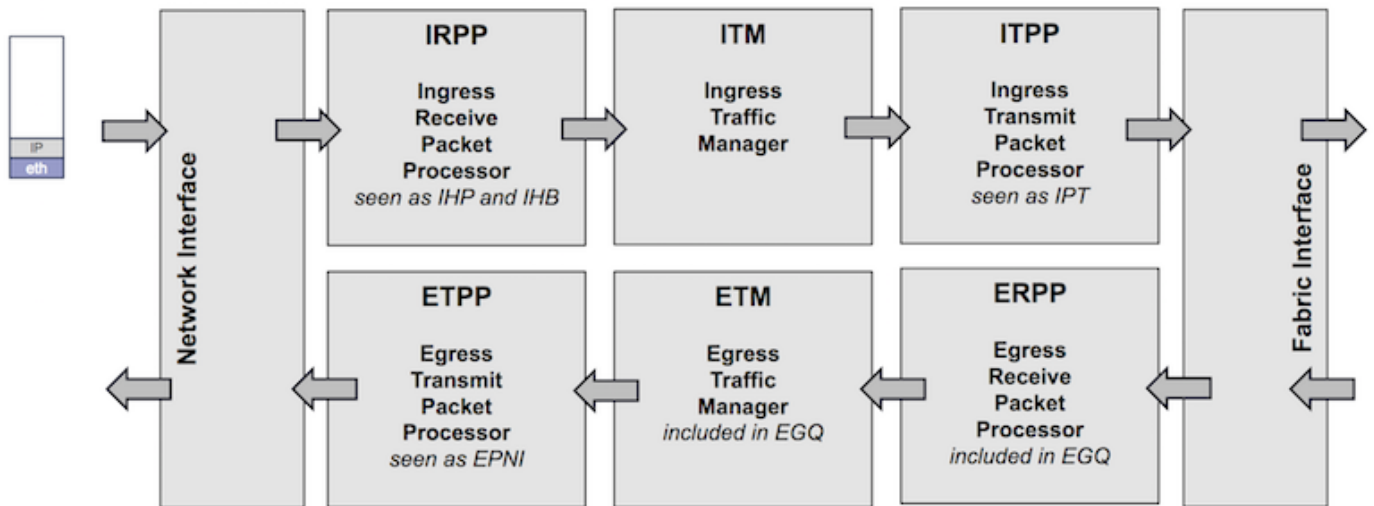
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Introducción

Este documento describe la trayectoria tomada por los paquetes de solicitud de eco/respuesta de eco ICMP dentro del cuadro NCS55xx(Fretta).

Vida de un paquete en el reenvío de ASIC



IRPP

Se recibe un paquete en una interfaz y se pasa a IRPP donde se extraerán y procesarán los primeros 128 bytes. Como resultado, se antepone el encabezado interno del sistema.

ITM

El paquete se almacena en DRAM/OCB

ITPP

Si es necesario, reescriba el encabezado del sistema (replicación de multidifusión, duplicación de puertos, etc.)

Los paquetes se dividen en celdas y se equilibran a fabric

ERPP

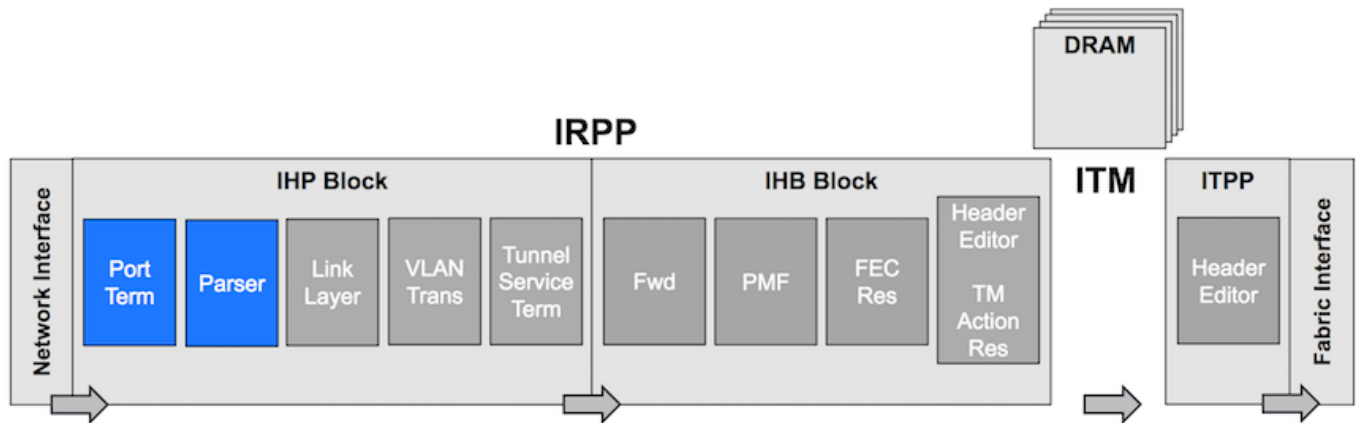
Las celdas se reciben y se reensamblan. Los primeros 128 bytes se extraen y aplican todos los filtros de capa de link, ACL de salida, Replicación de salida (multidifusión)

ETPP/ETM

El paquete completo se almacena en un búfer hasta que se programa el paquete de salida. Los encabezados del sistema se quitan.

ASIC de reenvío de operador

IRPP (término de puerto, analizador)

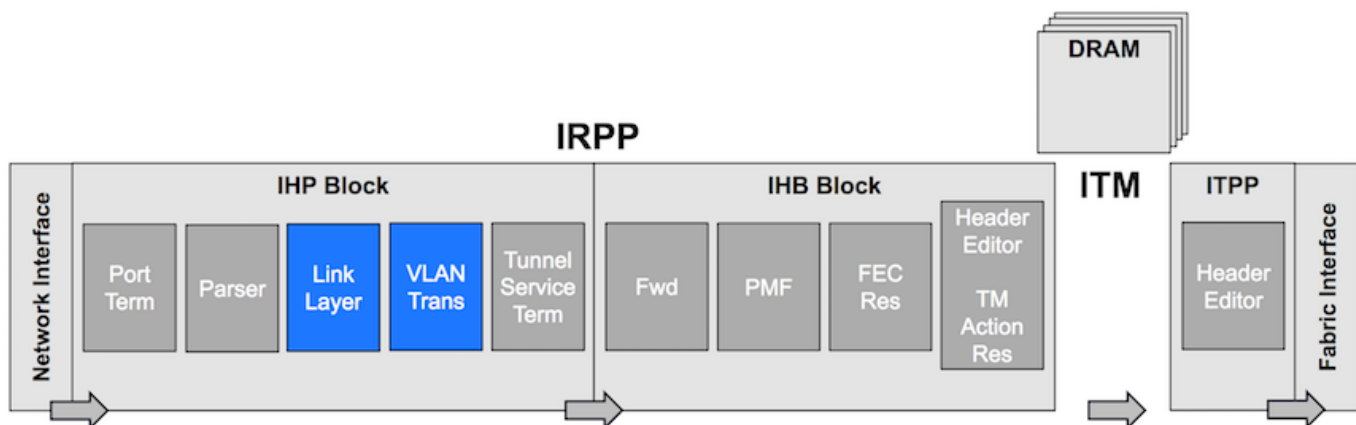


Terminación de puerto: Paquetes recibidos de la interfaz de red/CPU/recirculación

- Determine el puerto de origen y marque el paquete con él.
- Decida el programa inicial que se utilizará en el analizador.
- Identifique dónde se inicia el encabezado de red.

Analizador: Extraer Ethertype, direcciones MAC, Determinar desplazamiento para las siguientes etapas de la canalización.

IRPP(Capa de línea, VLAN Trans)



Capa de link: Filtrado en L2 y autenticación de dirección de origen.

Traducción de VLAN: Asignamos la interfaz lógica del paquete.

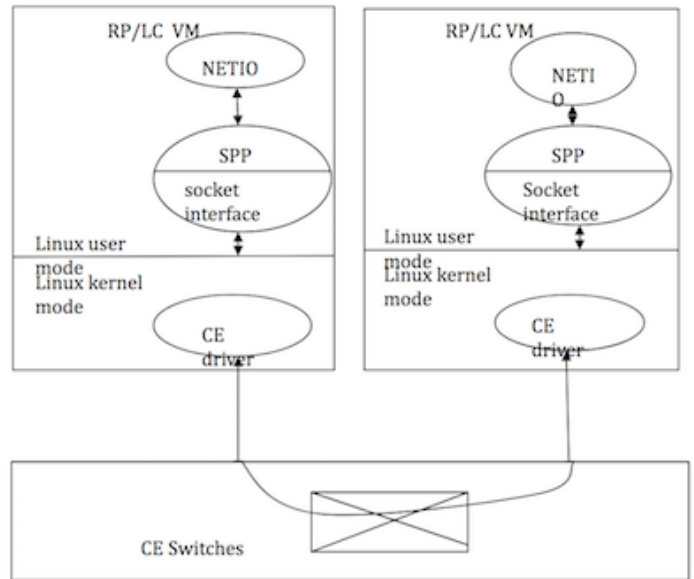
Trayectoria de Punt

- En la NPU sólo hay algunas entradas LPTS TCAM disponibles debido a la falta de recursos TCAM.
- La búsqueda de LPTS principal se realiza en SW LPTS Pre-IFIB en la Red LC
- Paquete de punteo LPTS de NPU a RP directamente a través de la búsqueda PMF TCAM: Los paquetes OSPF, OSPFv3 mcast, ISIS se envían directamente al RP activo y en espera
- Paquete de punteo LPTS de NPU a la CPU local a través de la búsqueda PMF TCAM: Cualquier protocolo que utilice TCP, UDP; ICMP, ND
- Los paquetes de protocolo L2 se envían a LC a través de la trampa de CPU BCM: ARP, RARP, CDP, LACP, LLDP, Ether-Link OAM, MACSec
- Los paquetes de excepción se envían a LC a través de la trampa de CPU BCM. TTL0,

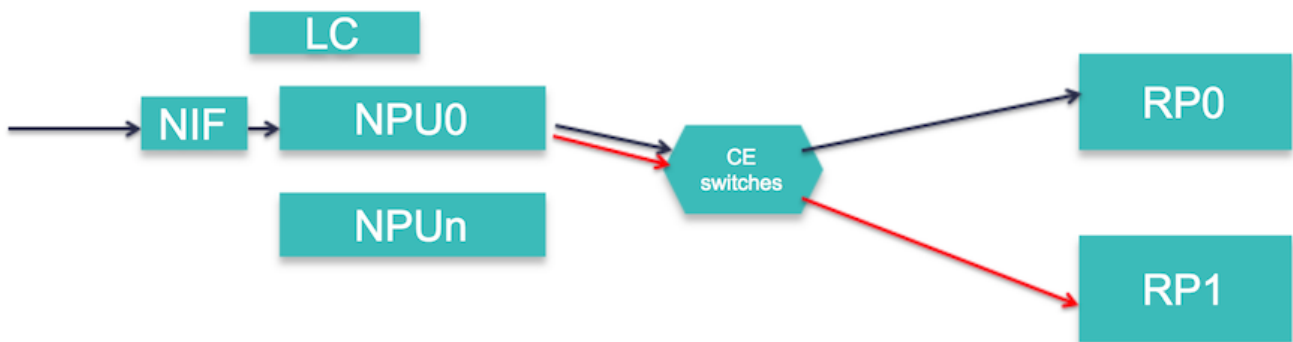
Ruta de punteo entre dos nodos de CPU

NetIO → SPP → CE switches → SPP → NETIO

CE switches: SC, FC, LC switches

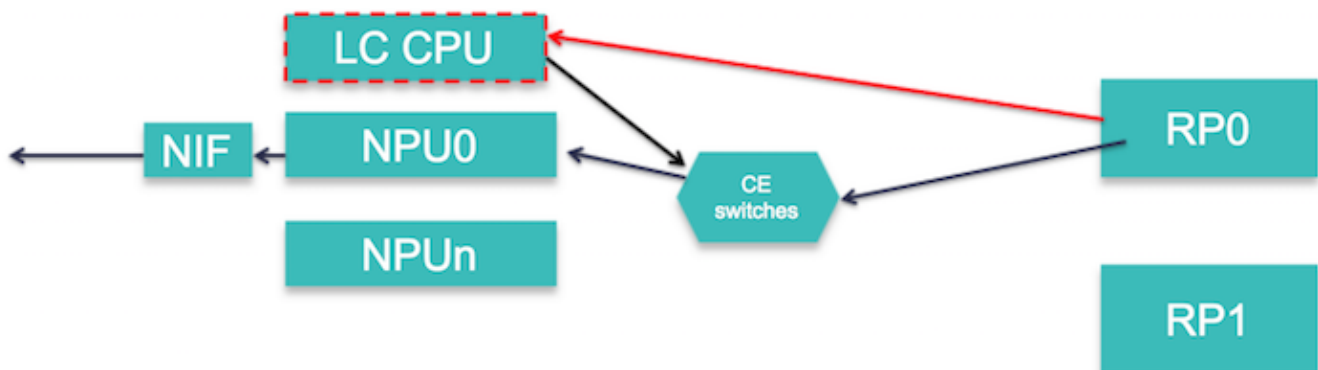


Trayectoria de Punt de NPU a CPU RP



Los paquetes RX Forus se replican en NPU. Uno se envía al RP Activo y otro al RP Estático

Inyección de CPU RP a CPU NPU o LC



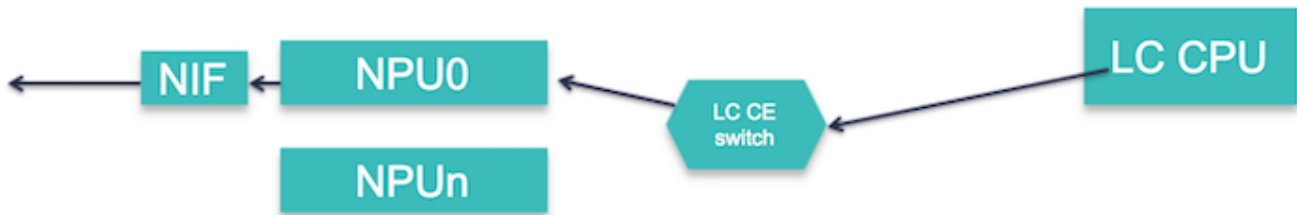
Los paquetes L3 se inyectan directamente a NPU si la adyacencia del prefijo está completa o es

un paquete de ruta previa

Los paquetes L3 se inyectan a la CPU LC por si acaso:

- La adyacencia Prefix es GLEAN.
- paquete de ruta previa MPLS
- El tamaño del paquete supera la MTU.

Inyectar Trayectoria de la CPU LC a NPU



Estos paquetes se inyectan de la CPU LC a la NPU:

- ARP, ND, respuesta de eco ICMP, paquetes fragmentados
- Paquetes CDP, LACP, LLDP, EtherLink OAM

CLI para Punt/Inject Debugging

```
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 remoto

Ruta del paquete: Solicitud de eco

```
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)]
```

Ruta del paquete: Respuesta de eco

```
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

Ruta del paquete: Solicitud de eco

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

Ruta del paquete: Respuesta de eco

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

Depuraciones Útiles:

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

```
debug ipv4 packet location 0/0/CPU0
```

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

Topología

```
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
```

Comandos para verificar Ping Remoto

Solicitud de eco: RP local: TX

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

1. E/S IP: Compruebe si se genera la solicitud de eco:

```
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. Compruebe si la solicitud de eco se envía al cable:

```

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

```

Solicitud de eco: LC remota: RX

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

1. Verifique si el paquete se recibe del cable:

```

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. Verifique el contador 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

ClientID	Input Drop/Total	Punt Drop/Total	XIPC InputQ Cur/High/Max	XIPC PuntQ 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	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. estadísticas 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

Respuesta de eco: Nodo remoto (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. Estadísticas 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. Verifique si el paquete se envía al cable.

```

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. Estadísticas de interfaz

```

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
```

Respuesta de eco: Nodo 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. Verifique si los paquetes vienen del cable.

```
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. Contadores 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 en 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 en 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. Estadísticas FWD en 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 en LC para enviar a SPP en 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 en 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 en 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

ClientID	Input Drop/Total	Punt Drop/Total	XIPC InputQ Cur/High/Max	XIPC PuntQ 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 H 0/0	0/0	L 0/0/1000 H 0/0/1000	0/0/0
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	0/0	0/0
raw	L 0/0 H 0/0	0/0	L 0/0/1600 H 0/0/1600	0/0/0
tcp	L 0/0 H 0/0	0/0	L 0/0/1600 H 0/0/1600	0/0/0
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. Estadísticas de interfaz:

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

<TBD>