

NCS5500:패킷의 수명(전송, 펀트/주입, Ping 경로)

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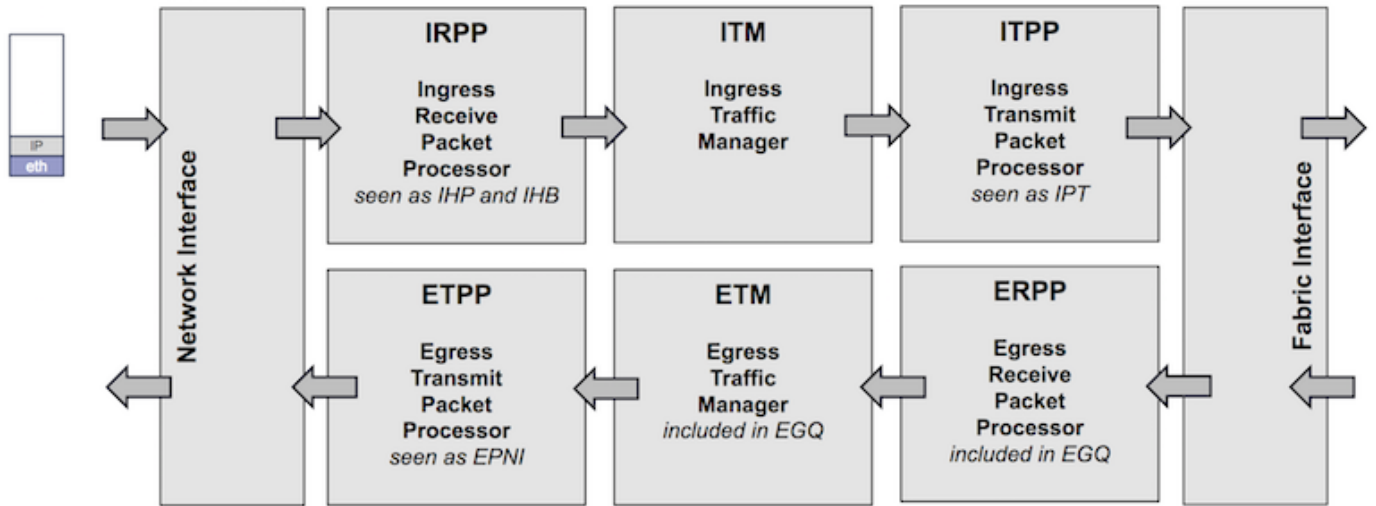
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소개

이 문서에서는 NCS55xx(Fretta) 상자 내에서 ICMP 에코 요청/에코 응답 패킷에 의해 수행되는 경로에 대해 설명합니다.

포워딩 ASIC의 패킷 수명



IRPP

패킷은 인터페이스에서 수신되고 첫 128바이트가 추출되어 처리되는 IRPP로 전달됩니다. 그 결과 내부 시스템 헤더가 추가됩니다.

ITM

패킷은 DRAM/OCB에 저장됩니다.

ITPP

필요한 경우 시스템 헤더를 다시 작성합니다(멀티캐스트 복제, 포트 미러링 등).

패킷이 셀로 분할되고 패브릭에 로드됩니다.

ERPP

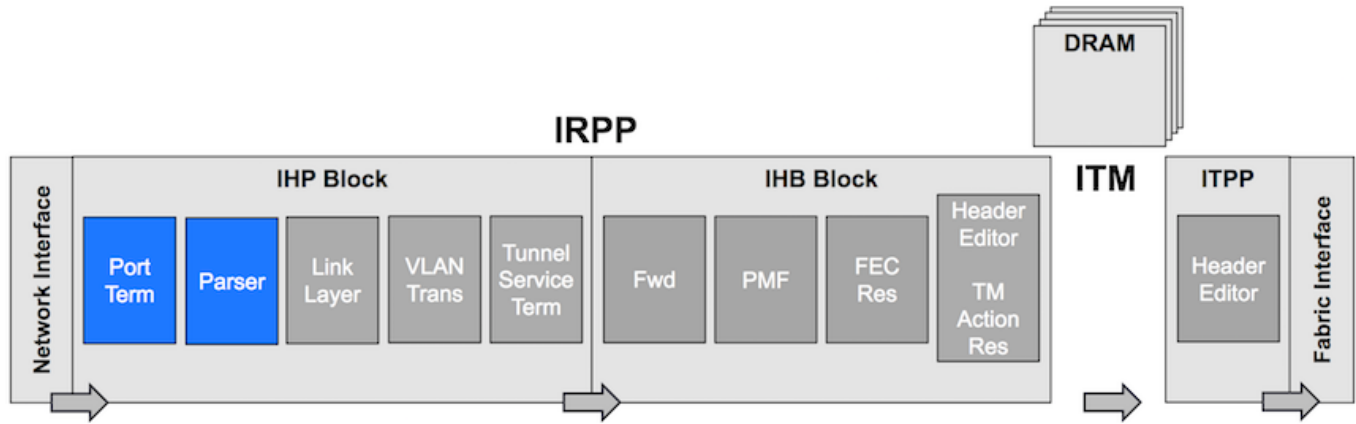
셀이 수신되고 리어셈블됩니다. 처음 128바이트가 추출되고 모든 링크 레이어 필터, 이그레스 ACL, 이그레스 복제(멀티캐스트) 적용

ETPP/ETM

전체 패킷은 패킷 출력이 예약될 때까지 버퍼에 저장됩니다. 시스템 헤더가 제거됩니다.

파이프라인 전달 ASIC

IRPP(포트 용어, 파서)

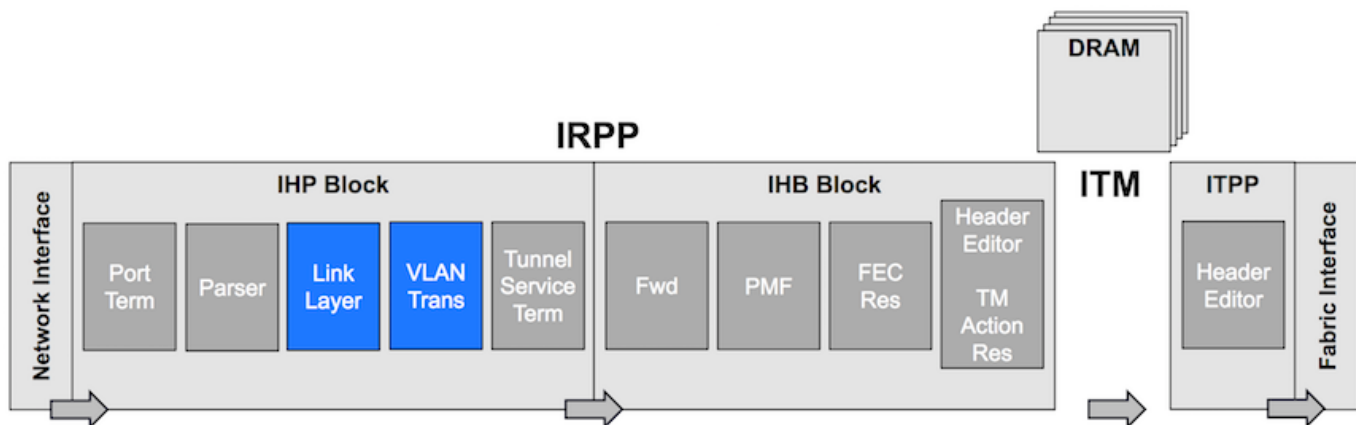


포트 종료: 네트워크 인터페이스/CPU/재순환에서 수신된 패킷

- 소스 포트를 확인하고 패킷을 표시합니다.
- 파서에서 사용할 초기 프로그램을 결정합니다.
- 네트워크 헤더가 시작되는 위치를 식별합니다.

파서: Extract Ethertype, MAC Addresses, 파이프라인의 다음 단계에 대한 오프셋을 결정합니다.

IRPP(라인 레이어, VLAN 트랜잭션)



링크 계층: L2 및 소스 주소 인증에 대한 필터링.

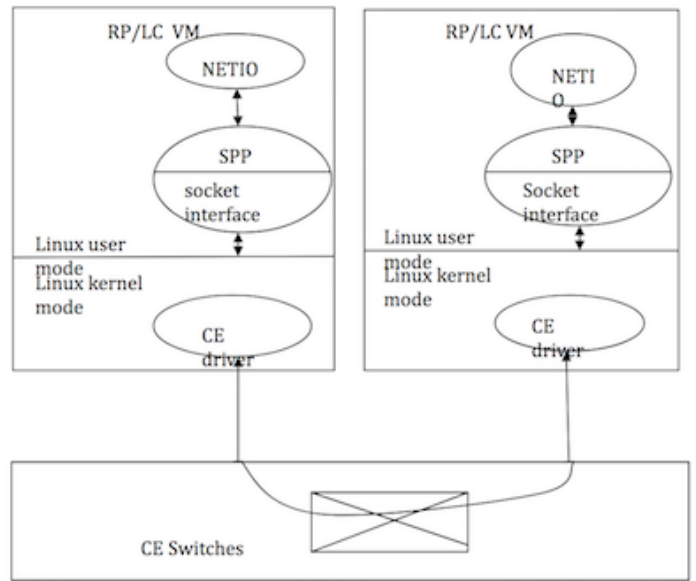
VLAN 변환: 패킷의 논리적 인터페이스를 매핑합니다.

펀트 경로

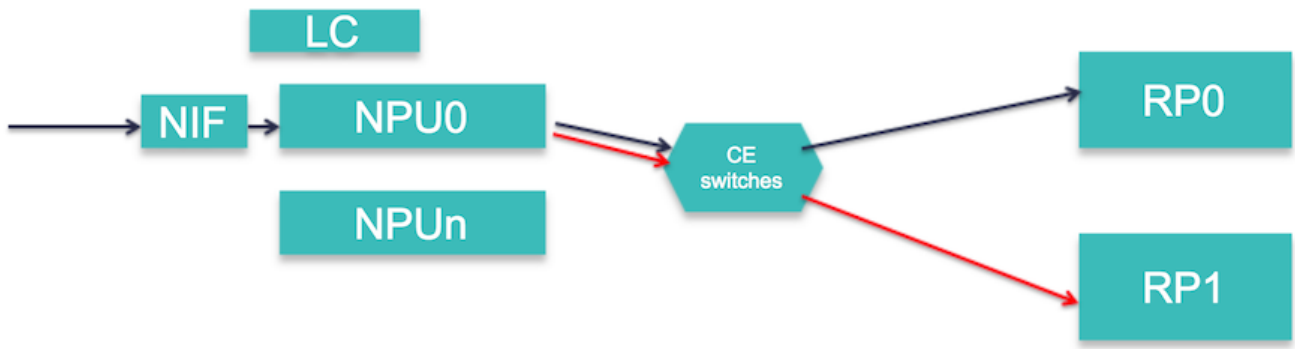
- TCAM 리소스가 부족하여 NPU에서 몇 개의 LPTS TCAM 항목만 사용할 수 있습니다.
- 주요 LPTS 조회는 LC Netio의 SW LPTS Pre-IFIB에서 수행됩니다.
- PMF TCAM 조회를 통해 직접 NPU에서 RP로 LPTS 펀트 패킷: OSPF, OSPFv3 멀티캐스트, ISIS 패킷은 액티브 및 스탠바이 RP에 직접 펀딩됩니다.
- PMF TCAM 조회를 통해 NPU에서 로컬 CPU로 LPTS 펀트 패킷: TCP, UDP를 사용하는 모든 프로토콜 ICMP, ND
- L2 프로토콜 패킷은 BRCM CPU 트랩을 통해 LC에 펀딩됩니다. ARP, RARP, CDP, LACP, LLDP, Ether-link OAM, MACSec
- 예외 패킷은 BRCM CPU 트랩을 통해 LC에 펀딩됩니다. TTL0, TTL1, MTU Exceed, 옵션 패킷

두 CPU 노드 간의 Punt 경로

NetIO→SPP→CE switches→SPP→NETIO
 CE switches: SC, FC, LC switches

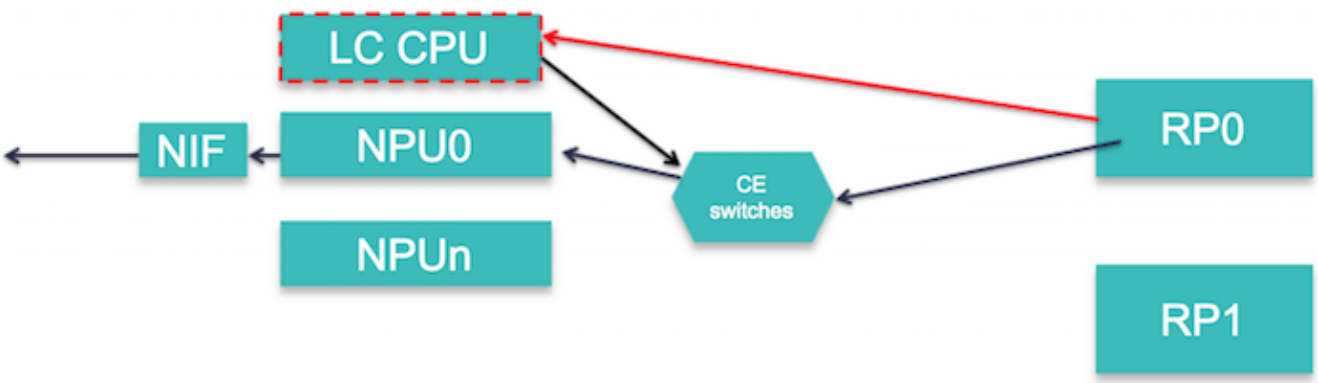


NPU에서 RP CPU로의 펀트 경로



RX Forus 패킷은 NPU에서 복제됩니다. 하나는 Active RP로, 다른 하나는 Stby RP로 전송됩니다.

RP CPU에서 NPU 또는 LC CPU로 삽입

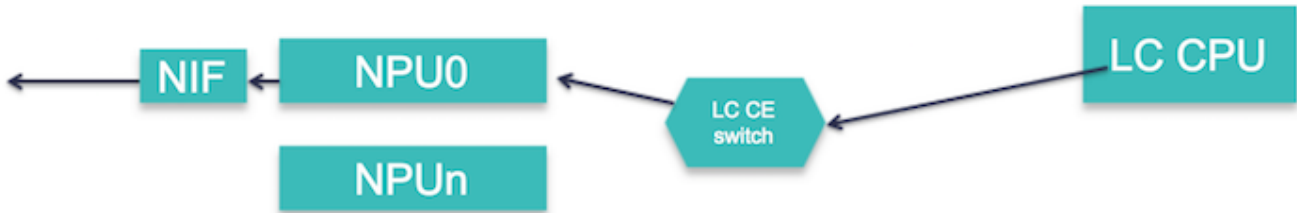


접두사 인접성이 완료되었거나 사전 경로 패킷인 경우 L3 패킷이 NPU에 직접 삽입됩니다.

다음과 같은 경우 L3 패킷이 LC CPU에 삽입됩니다.

- 접두사 인접성은 GLEAN입니다.
- MPLS 사전 라우팅 패킷
- 패킷 크기가 MTU를 초과합니다.

LC CPU에서 NPU로 경로 삽입



이러한 패킷은 LC CPU에서 NPU로 주입됩니다.

- ARP, ND, ICMP 에코 응답, 단편화된 패킷
- CDP, LACP, LLDP, 이더 링크 OAM 패킷

펀트/삽입 디버깅용 CLI

```
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 <>
```

원격 Ping

패킷 경로:에코 요청

```
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)]

패킷 경로:에코 응답

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)]

로컬 Ping

패킷 경로:에코 요청

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

패킷 경로:에코 응답

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

유용한 디버깅:

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

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

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

토폴로지

```
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
```

원격 Ping을 확인하는 명령

에코 요청:로컬 RP:TX

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

1. IP I/O:에코 요청이 생성되었는지 확인:

```
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. 에코 요청이 전선으로 전송되었는지 확인합니다.

```

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

```

에코 요청:원격 LC:RX

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

1. 패킷이 와이어에서 수신되었는지 확인합니다.

```

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. LPTS 카운터를 확인합니다.

```

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. 네티오

```
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	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 통계

```
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
```

```
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
```

에코 응답:원격 노드(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
```

```
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. 네티오

```
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. FWD 통계

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. 패킷이 와이어로 전송되었는지 확인합니다.

```
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. 인터페이스 통계

```
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
```

에코 응답:로컬 노드(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. 패킷이 와이어에서 수신되는지 확인합니다.

```
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 카운터

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. LC의 SPP

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. LC의 Netio

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. LC의 FWD 통계

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. RP의 SPP로 전송할 LC의 SPP

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. RP의 SPP

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. RP의 네이티오

```

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              Punt              XIPC InputQ       XIPC PuntQ
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             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               0/0
raw                       L 0/0             0/0               L 0/0/1600        0/0/0
                        H 0/0             0/0               H 0/0/1600
tcp                       L 0/0             0/0               L 0/0/1600        0/0/0
                        H 0/0             0/0               H 0/0/1600
udp                       L 0/307           0/0               L 0/1/1600        0/0/0
                        H 0/0             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

```
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. 인터페이스 통계:

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#

로컬 Ping

<TBD>