

Troubleshoot Packet Drops on NCS 5500 Platforms

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Introduction

This document describes a comprehensive guide on how to effectively identify and troubleshoot packet drops in Cisco NCS55XX platforms.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document applies to all NCS 5500 platforms utilizing Jericho1 or Jericho2 ASIC architectures.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

Packet Drops

Packet drop refers to the situation where data packets traversing the network are intentionally or unintentionally discarded by the device, preventing them from reaching their intended destination.

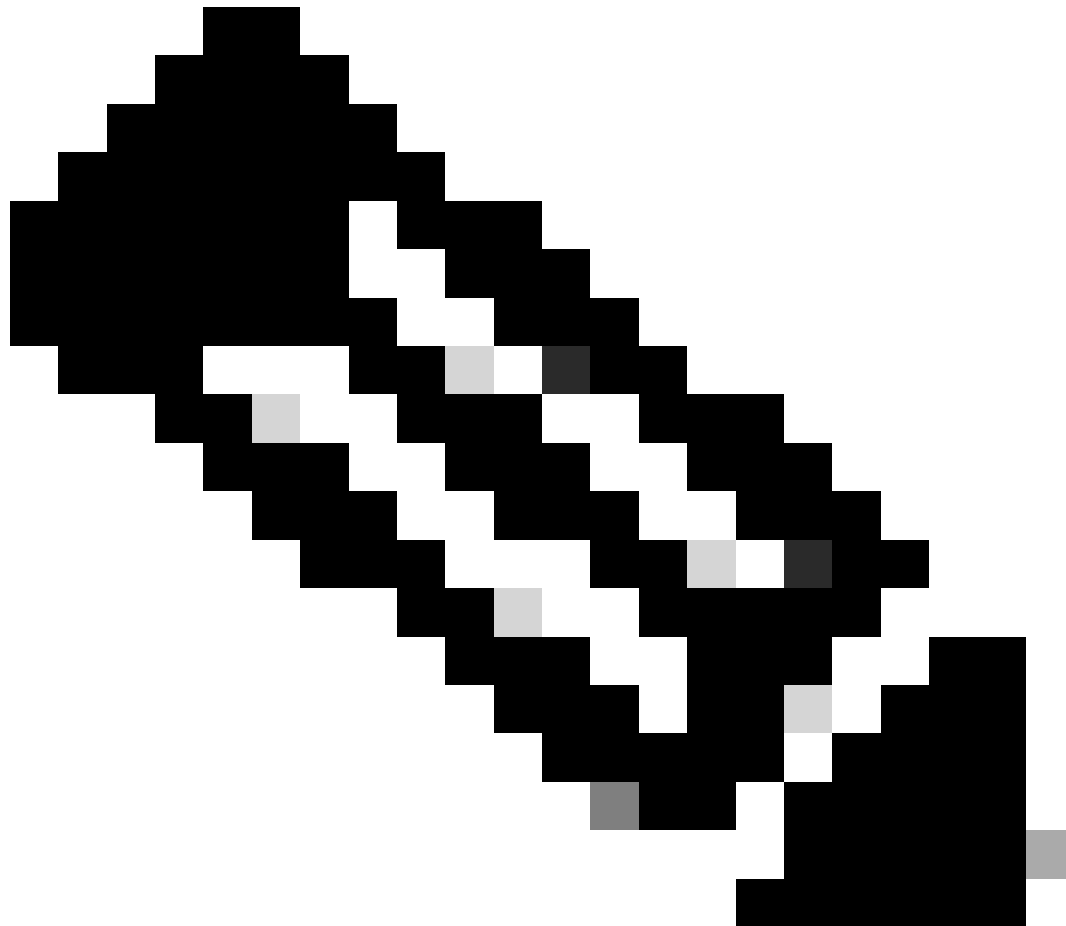
Drop Location

For Debugging any kind of packet drop, you need to perform these steps:

1. Find out which Router in the topology is dropping packets.

2. Look for inputs packet counter or drop counter incrementing on interface.

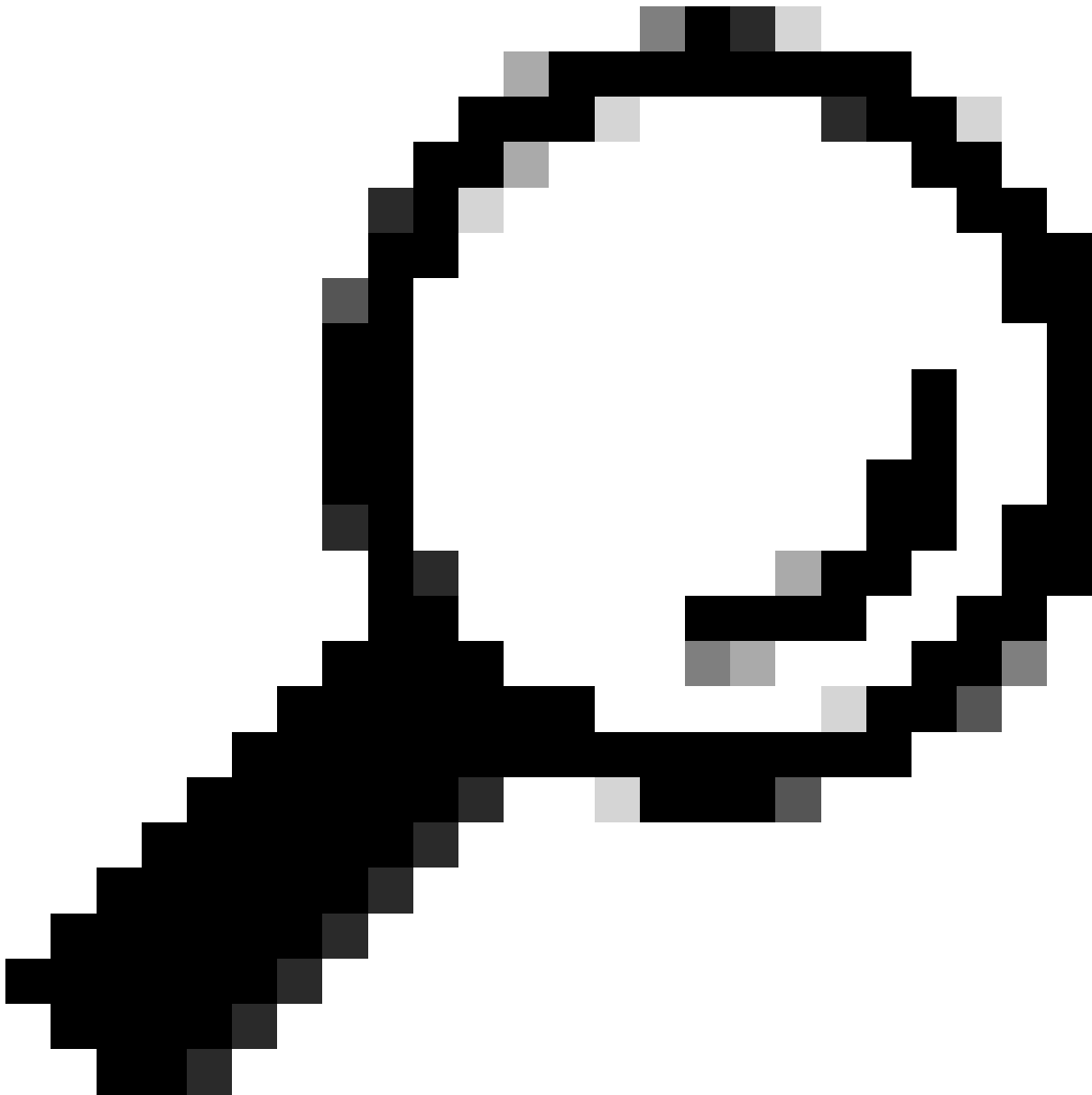
Example `show interface <>`



Note: Commands were executed on an NCS 5500 within a controlled lab environment for testing and validation purposes.

```
RP/0/RP0/CPU0:NCS-5500#show interfaces TenGigE0/0/0/14
TenGigE0/0/0/14 is up, line protocol is up
Interface state transitions: 3
Hardware is TenGigE, address is fce4.f6ad.b038 (bia fce4.f6ad.b038)
loopback not set,
Last link flapped 2w2d
ARP type ARPA, ARP timeout 04:00:00
Last input 00:00:00, output 00:00:17
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
49129 packets input, 4286647 bytes, 153 total input drops    <<  drops
0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 49129 multicast packets
```

```
0 runts, 0 giants, 0 throttles, 0 parity
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
47637 packets output, 6144913 bytes, 0 total output drops
Output 4 broadcast packets, 47633 multicast packets
845 output errors, 0 underruns, 0 applique, 0 resets      <<<<  errors
0 output buffer failures, 0 output buffers swapped out
3 carrier transitions
RP/0/RP0/CPU0:NCS-5500#
```



Tip: For bundle interfaces and sub-interfaces, ensure you run this command on the bundle interface, sub-interfaces, and the corresponding physical interfaces.

3. Once it is confirmed that a drop or error counter is increasing, the next step is to identify the Network Processing Unit (NPU) associated with the affected interface.

Example: show controllers npu voq-usage interface all instance all location <>

```
RP/0/RP0/CPU0:NCS-5500#show controllers npu voq-usage interface all instance all location 0/0/cpu0
```

```
-----  
Node ID: 0/0/CPU0
```

Intf name	Intf handle (hex)	NPU #	NPU core	PP Port	Sys Port	VOQ base	Flow base	VOQ port type	Port speed
--------------	-------------------------	----------	-------------	------------	-------------	-------------	--------------	---------------------	---------------

Hu0/0/0/5	8	0	0	1	1	1272	8360	local	100G
Hu0/1/0/2	2000088	0	1	17	857	1528	7464	remote	100G
Te0/0/0/14	1088	2	1	17	297	1728	6568	local	10G

<< NPU2, PP Port:17
<SNIP>

4. Capture packets on the NPU hosting the interface. Locate the PP port in the output, ensuring it matches the PP port identified in step 1.

Example: show controllers fia diagshell <NPU_NUMBER> "diag last" location <LC_LOCATION>

```
<#root>
```

```
RP/0/RP0/CPU0:NCS-5500#show controllers fia diagshell 2 "diag last" location 0/0/CPU0
```

```
Node ID: 0/0/CPU0
```

```
R/S/I: 0/0/2
```

```
Core 0:
```

```
Last packet information: is_valid=0 tm_port=253
```

```
pp_port=240 src_syst_port=253 port_header_type=tm packet_size=0
```

```
Packet start, offset in bytes:
```

```
00: 4e415000 00134e41 50000001 8100e602 876f00fd 0606c00e 00000000 000180c2  
20: 00000efc e4f6adb0 3888cc02 0704fce4 f6adb487 04100554 656e4769 6745302f  
40: 302f302f 31340602 00780a0a 4e43532d 35353038 2d410c10 20372e39 2e322c20  
60: 4e43532d 35353030 08000e04 00100010 100c0501 0a130101 02000000 d8001018
```

```
Core 1:
```

```
Last packet information: is_valid=1 tm_port=17
```

```
pp_port=17
```

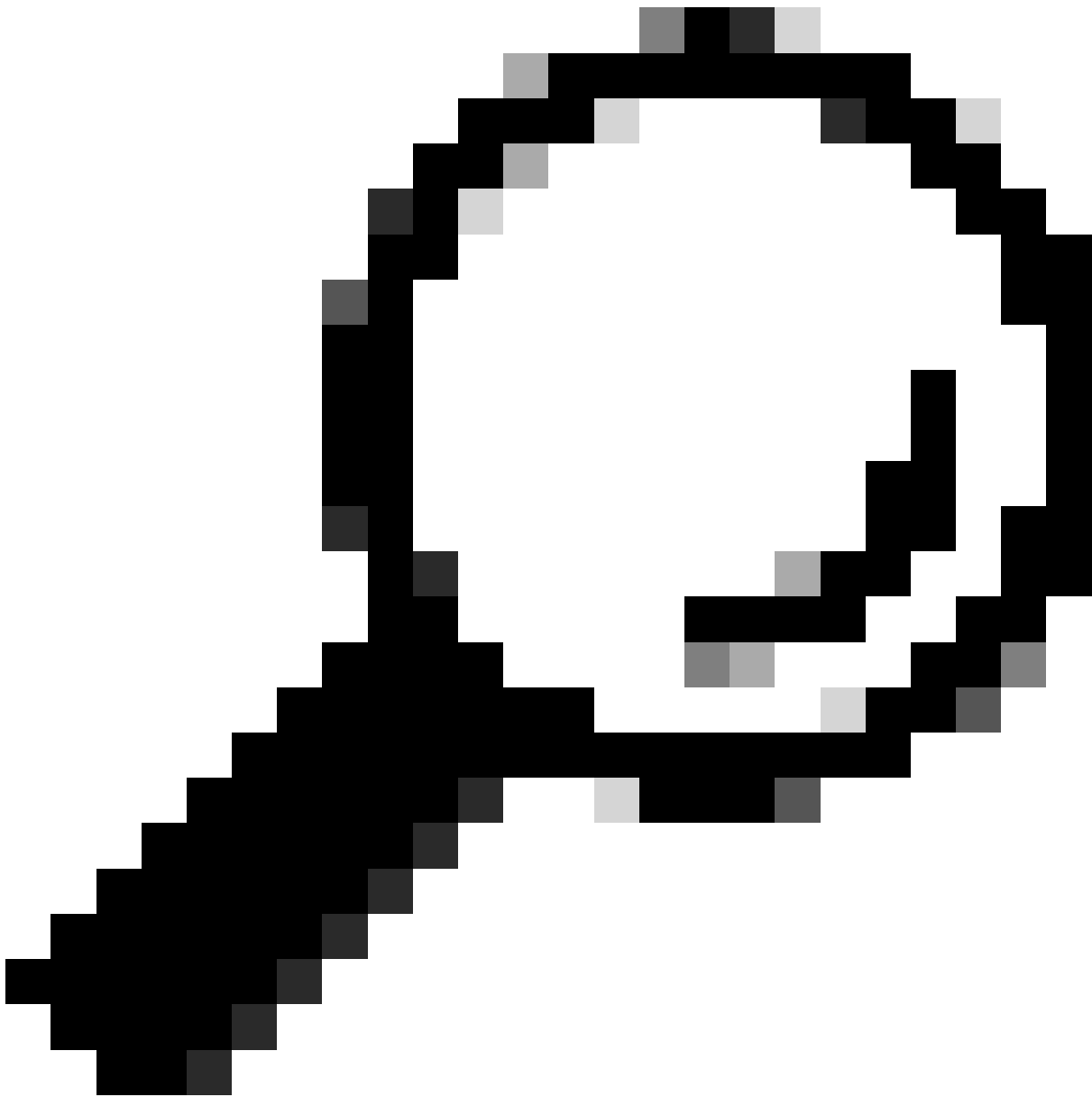
```
src_syst_port=297 port_header_type=eth packet_size=83
```

```
<< pp_port: 17
```

```
Packet start, offset in bytes:
```

```
00: 0180c200 000e40a6 b79e2552 88cc0207 0440a6b7 9e255204 070340a6 b79e2552  
20: 06020079 fe190080 c2098000 00000064 00000000 00000002 00000000 000000fe  
40: 060080c2 0b8800fe 080080c2 0c006189 06000000 00000000 00000000 00000000  
60: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

```
RP/0/RP0/CPU0:NCS-5500#
```

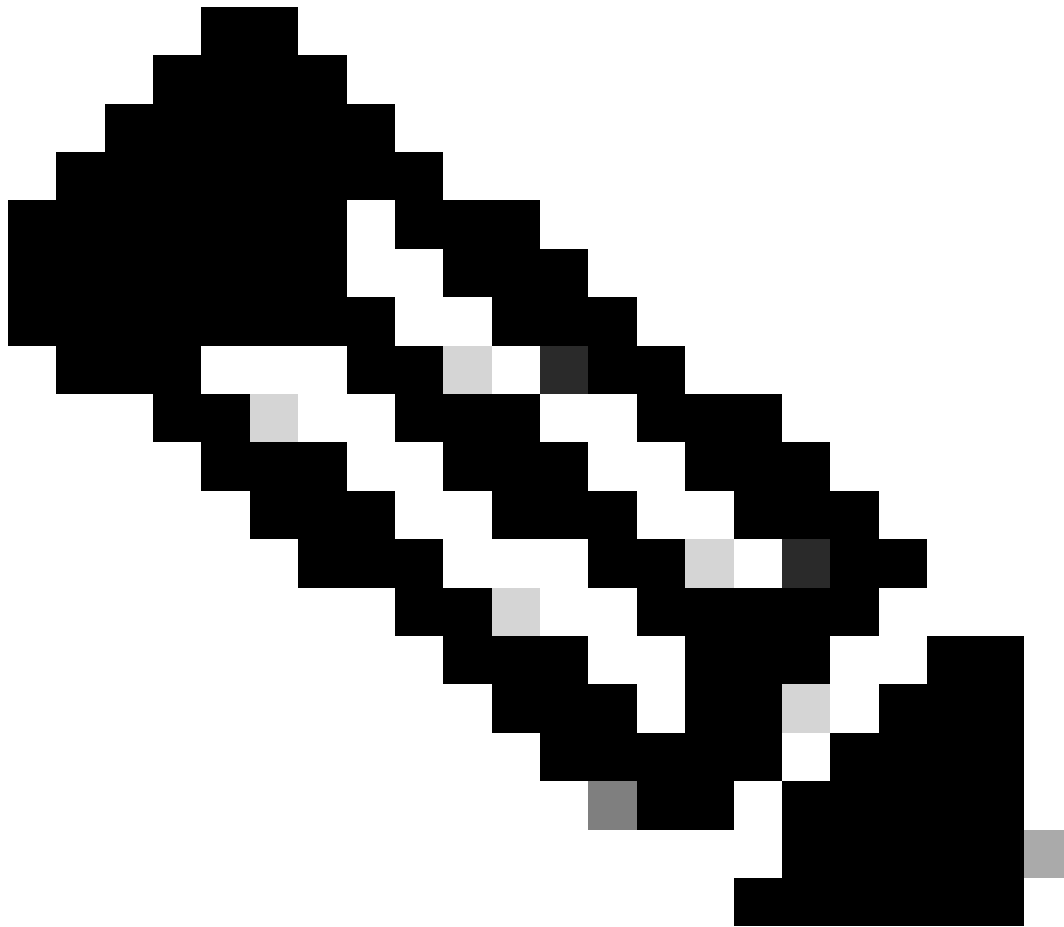


Tip: You can decode the hexadecimal data using a Packet Decoder tool to thoroughly analyze and interpret network traffic.

5. Check NPU stats: Identify the NPU number associated with your outgoing or incoming interface, then execute this command to examine the data path counters

Example: show controllers fia diagshell <NPU_NUMBER> "diag counter g c" location <LC_Location>

JERICHO NETWORK INTERFACE			
NBI			
RX_TOTAL_BYTE_COUNTER	= 0	TX_TOTAL_BYTE_COUNTER	= 0
RX_TOTAL_PKT_COUNTER	= 0	TX_TOTAL_PKT_COUNTER	= 0
RX_TOTAL_DROPPED_EOPS	= 0		
IRE		EPNI	
CPU_PACKET_COUNTER	= 0	EPE_BYTES_COUNTER	= 0
NIF_PACKET_COUNTER	= 0	EPE_PKT_COUNTER	= 0
OAMP_PACKET_COUNTER	= 0	EPE_DISCARD_PKT_CNT	= 0
OLP_PACKET_COUNTER	= 0		
RCY_PACKET_COUNTER	= 0		
IRE_FDT_INTERFACE_COUNTER	= 0		
IDR		EGQ	
MMU_IDR_PACKET_COUNTER	= 0	FQP_PACKET_COUNTER	= 0
IDR_OCB_INTERFACE_COUNTER	= 0	FQP_UNICAST_PKT_CNT	= 0
		FQP_DISCARD_UC_PKT_CNT	= 0
		FQP_UC_BYTES_CNT	= 0
		FQP_MC_PKT_CNT	= 0
		FQP_DISCARD_MC_PKT_CNT	= 0
		FQP_MC_BYTES_CNT	= 0
		EHP_UNICAST_PKT_CNT	= 0
		EHP_MC_HIGH_PKT_CNT	= 0
		EHP_MC_LOW_PKT_CNT	= 0
		DELETED_PKT_CNT	= 0
		RQP_PKT_CNT	= 0
		RQP_DSCRD_PKT_CNT	= 0
IQM		FDR	
ENQUEUE_PKT_CNT	= 0	CELLS_IN_CNT_P1	= 0
DEQUEUE_PKT_CNT	= 0	CELLS_IN_CNT_P2	= 0
DELETED_PKT_CNT	= 0	CELLS_IN_CNT_P3	= 0
ENQ_DISCARDED_PACKET_COUNTER	= 0	CELLS_IN_TDM_CNT	= 0
		CELLS_IN_MESHMC_CNT	= 0
		CELLS_IN_IPT_CNT	= 0
		EGQ_DROP_CNT	= 0
		EGQ_MESHMC_DROP_CNT	= 0
		EGQ_TDM_OVF_DROP_CNT	= 0
IPT		FDR	
EGQ_PKT_CNT	= 0	CELLS_OUT_CNT_P1	= 0
ENQ_PKT_CNT	= 0	CELLS_OUT_CNT_P2	= 0
FDT_PKT_CNT	= 0	CELLS_OUT_CNT_P3	= 0
CRC_ERROR_CNT	= 0	CELLS_OUT_TDM_CNT	= 0
		CELLS_OUT_MESHMC_CNT	= 0
		CELLS_OUT_IPT_CNT	= 0
FDT		FDR	
IPT_DESC_CELL_COUNTER	= 0	P1_CELL_IN_CNT	= 0
IRE_DESC_CELL_COUNTER	= 0	P2_CELL_IN_CNT	= 0
		P3_CELL_IN_CNT	= 0
TRANSMITTED_DATA_CELLS_COUNTER	= 0	CELL_IN_CNT_TOTAL	= 0
JERICHO FABRIC INTERFACE			



Note: Carefully monitor if any highlighted counters are incrementing.

6. Review the **statistics** from each processing stage of the NPU:

Example: show controller npu stats counters-all instance <NPU_NUMBER> loc <LC_Location>

```
RP/0/RP0/CPU0:NCS-5500#show controllers npu stats counters-all instance 2 location 0/0/CPU0
FIA Statistics Rack: 0, Slot: 1, Asic instance: 0
Per Block Statistics:
```

Ingress:

NBI RX:

RX_TOTAL_BYTE_COUNTER	= 987134
RX_TOTAL_PKT_COUNTER	= 7117

IRE:

CPU_PACKET_COUNTER	= 0
NIF_PACKET_COUNTER	= 7117
OAMP_PACKET_COUNTER	= 16976
OLP_PACKET_COUNTER	= 0

RCY_PACKET_COUNTER	= 23081
IRE_FDT_INTRFACE_CNT	= 0
IDR:	
MMU_IDR_PACKET_COUNTER	= 3037
IDR_OCB_PACKET_COUNTER	= 0
IQM:	
ENQUEUE_PKT_CNT	= 52073
DEQUEUE_PKT_CNT	= 52073
DELETED_PKT_CNT	= 0
ENQ_DISCARDED_PACKET_COUNTER	= 0
IPT:	
EGQ_PKT_CNT	= 35207
ENQ_PKT_CNT	= 52073
FDT_PKT_CNT	= 16976
CFG_EVENT_CNT	= 49036
CFG_BYTE_CNT	= 5313772
FDT:	
IPT_DESC_CELL_COUNTER	= 16976
IRE_DESC_CELL_COUNTER	= 0
TRANSMITTED_DATA_CELLS_COUNTER	= 16976
Egress:	
FDR:	
P1_CELL_IN_CNT	= 17538
P2_CELL_IN_CNT	= 0
P3_CELL_IN_CNT	= 0
CELL_IN_CNT_TOTAL	= 17538
FDA:	
CELLS_IN_CNT_P1	= 17538
CELLS_IN_CNT_P2	= 0
CELLS_IN_CNT_P3	= 0
CELLS_IN_TDM_CNT	= 0
CELLS_IN_MESHMC_CNT	= 0
CELLS_IN_IPT_CNT	= 35317
CELLS_OUT_CNT_P1	= 17538
CELLS_OUT_CNT_P2	= 0
CELLS_OUT_CNT_P3	= 0
CELLS_OUT_TDM_CNT	= 0
CELLS_OUT_MESHMC_CNT	= 0
CELLS_OUT_IPT_CNT	= 35317
EGQ_DROP_CNT	= 0
EGQ_MESHMC_DROP_CNT	= 0
EGQ:	
FQP_PACKET_COUNTER	= 52635
PQP_UNICAST_PKT_CNT	= 52635
PQP_DSCRD_UC_PKT_CNT	= 0
PQP_UC_BYTES_CNT	= 5750183
PQP_MC_PKT_CNT	= 0
PQP_DSCRD_MC_PKT_CNT	= 0
PQP_MC_BYTES_CNT	= 0
EHP_UNICAST_PKT_CNT	= 52635
EHP_MC_HIGH_PKT_CNT	= 0
EHP_MC_LOW_PKT_CNT	= 0
DELETED_PKT_CNT	= 0
EHP_MC_HIGH_DSCRD_CNT	= 0

```

EHP_MC_LOW_DSCRD_CNT      = 0
ERPP_LAG_PRUNING_DSCRD_CNT = 0
ERPP_PMF_DISCARDS_CNT     = 0
ERPP_VLAN_MBR_DSCRD_CNT   = 0

EPNI:
EPE_BYTES_COUNTER         = 5459532
EPE_PKT_COUNTER           = 52635
EPE_DSCRD_PKT_CNT        = 0

NBI TX:
TX_TOTAL_BYTE_COUNTER     = 2315363
TX_TOTAL_PKT_COUNTER      = 15053
RP/0/RP0/CPU0:NCS-5500#

```

7. Refer to the trap statistics to determine if a packet has been dropped or redirected to the CPU.

Example: show controllers npu stats traps-all instance <NPU_NUMBER> loc <LC_Location>

```
RP/0/RP0/CPU0:NCS-5500#show controllers npu stats traps-all instance 2 location 0/0/CPU0
```

Trap Type	NPU ID	Trap ID	TrapStats ID	Policer	Packet Accepted	Packet Dropped
RxTrapMimDiscardMacsaDrop (IRB)	2	1	0x1	32045	0	0
RxTrapMimDiscardMacsaSnoop(dot1x)	2	3	0x3	32020	0	53
RxTrapMimSaMove(CFM_DOWNM_MEP_DMM)	2	6	0x6	32039	0	0

<SNIP>
RP/0/RP0/CPU0:NCS-5500#

8. For packets that are not marked as dropped in the trap counters, review the **SPP counters** to check for any potential drops.

Example:show spp node-counters loc <LC/RP location>

```

RP/0/RP0/CPU0:NCS-5500#show spp node-counters location 0/0/CPU0
socket/rx
      ether raw pkts:      4098990
-----
socket/tx
      ce pkts:            923918
-----
fretta/classify
forwarded NPU packet to NetIO: 3536836
forwarded CPU packet to NetIO: 102051
forwarded NPU packet to SPI0:  360025
  dropped in classify node:    1638 <<<
  1nx 12 drop in classify node: 1637
    port-mapper drop:        1
  <SNIP>
-----

```

```

client/inject
    pkts injected into spp:          923728
    NetIO->NPU injected into spp:    461604
    NetIO->CPU injected into spp:    102132
    <SNIP>
    LACP:                            128529
    LLDP:                            231463
-----
cfm_off_tx_node
    Hostname updated:                1
-----
pkt_classrx
    Other punt traffic to XR:        3998476
    LPTS: ICMPv4 to XR:              119
    LPTS: ARP request:               127
    Total Pkts to XR:                3998912
    Total Pkts punted to RP Lnx:      190
    LPTS: ARP reply:                 190
    Total Pkts to both dests:        190
-----
client/punt
    punted to client:                3998861
no client found - send to defa:      51
-----
RP/0/RP0/CPU0:NCS-5500#

```

9. If no traps are observed incrementing, proceed to examine the **Virtual Output Queue (VOQ)** statistics.

Example:

```

show controllers npu voq-usage interface <interface> instance <NPU_NUMBER> loc <LC_Location> show controllers npu stats voq base
<voq-base> instance <NPU_NUMBER> location <LC_Location>

```

```

RP/0/RP0/CPU0:NCS-5500#show controllers npu voq-usage interface tenGigE 0/0/0/14 instance 2 location 0/0/0/14

```

```

-----
Node ID: 0/0/CPU0
Intf      Intf      NPU NPU  PP  Sys  VOQ  Flow  VOQ  Port
name      handle     #  core Port Port base base port speed
              (hex)
-----
Te0/0/0/14 1088      2   1   17  297  1728 6568 local 10G
RP/0/RP0/CPU0:NCS-5500#

```

```

RP/0/RP0/CPU0:NCS-5500#show controllers npu stats voq base 1728 instance 2 loc 0/0/cpu0
Fri Jun 13 01:45:30.348 UTC

```

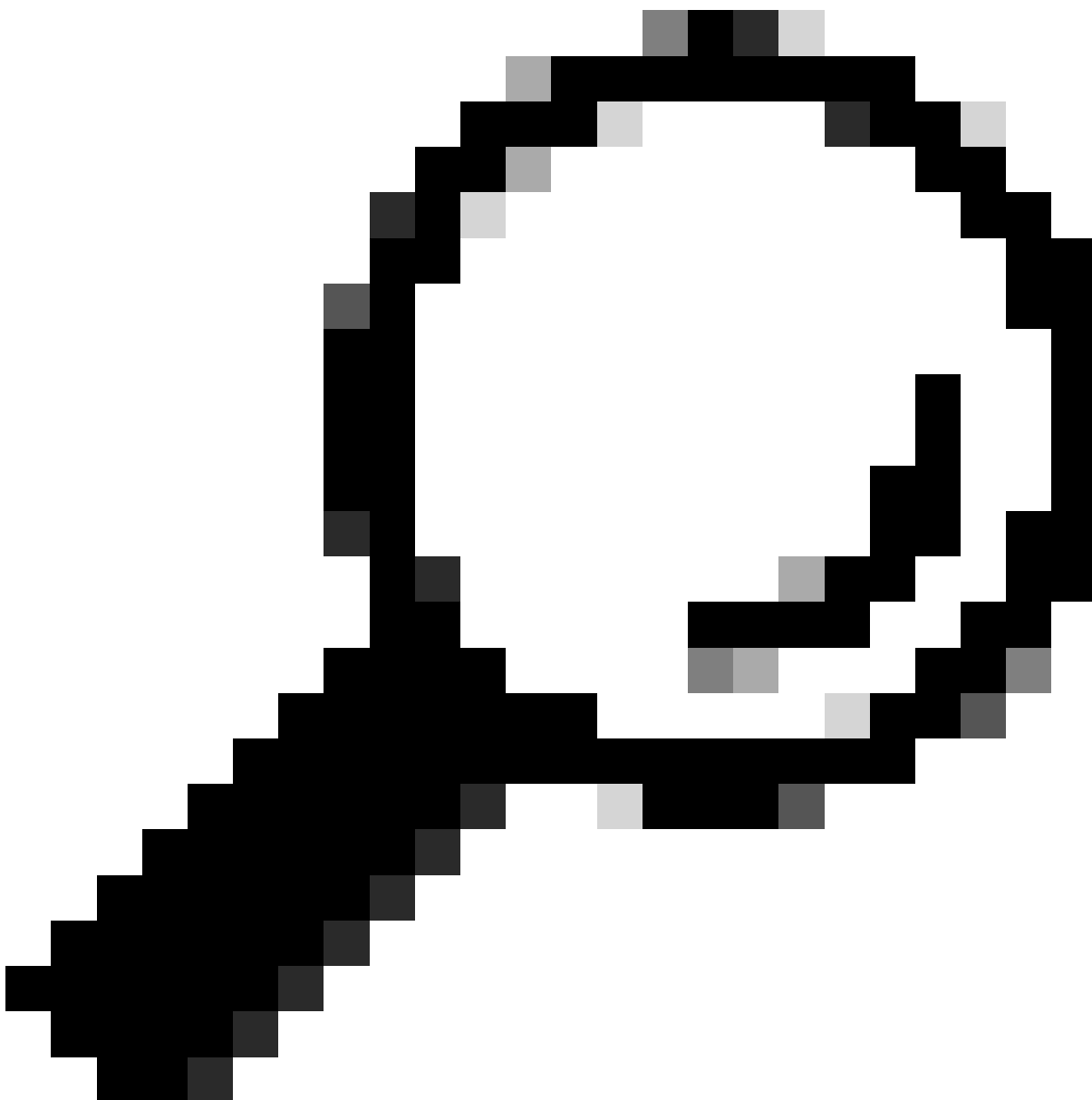
```

Location      =      0/0/CPU0
Asic Instance  =          2
VOQ Base      =      1728
ReceivedPkts   ReceivedBytes  DroppedPkts   DroppedBytes
-----
Core-0:
TC_0 = 0          0          0          0
TC_1 = 0          0          0          0
TC_2 = 0          0          0          0
TC_3 = 0          0          0          0
TC_4 = 0          0          0          0

```

```
TC_5 = 0          0          0          0
TC_6 = 0          0          0          0
TC_7 = 47929      7570783    0          0
<SNIP>
RP/0/RP0/CPU0:NCS-5500#
```

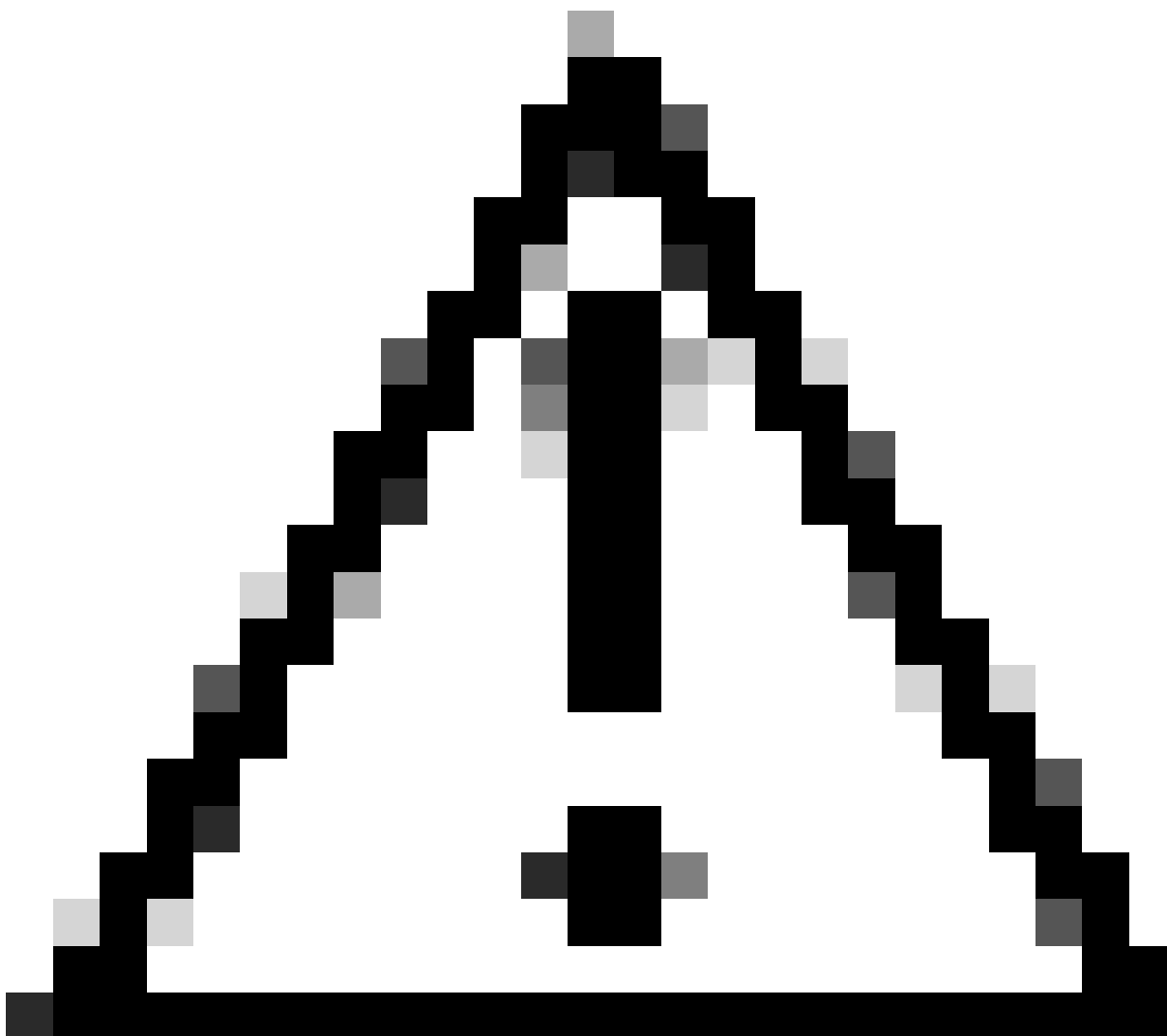
Information Required to Open a Case with TAC



Tip: Run the commands mentioned multiple times at regular intervals to actively monitor and identify if any counters, such as errors, drops, or overruns, are incrementing.

Please gather all the commands mentioned in this document, along with the these additional commands for comprehensive troubleshooting:

show drops all ongoing location <LC_Location>



Caution: For certain versions of Jericho1, the command used is **show drops-all ongoing location <LC_Location>**

show tech -support

show captured packets ingress location <LC_Location>

Related Information

[NCS 5500: Life of a Packet\(Transit, Punt/Inject, Ping Path\)](#)

[Cisco Technical Support & Downloads](#)