Nexus 9500-R, Nexus 3000-R : Troubleshoot Input Discards

Contents

Introduction

This document describes the causes of and solutions for input discards for the Cisco Nexus 9500-R EoR and Nexus 3000-R ToR. An input discard indicates the number of packets dropped in the input queue because of congestion. This number includes drops that are caused by tail drop and Weighted Random Early Detection (WRED).

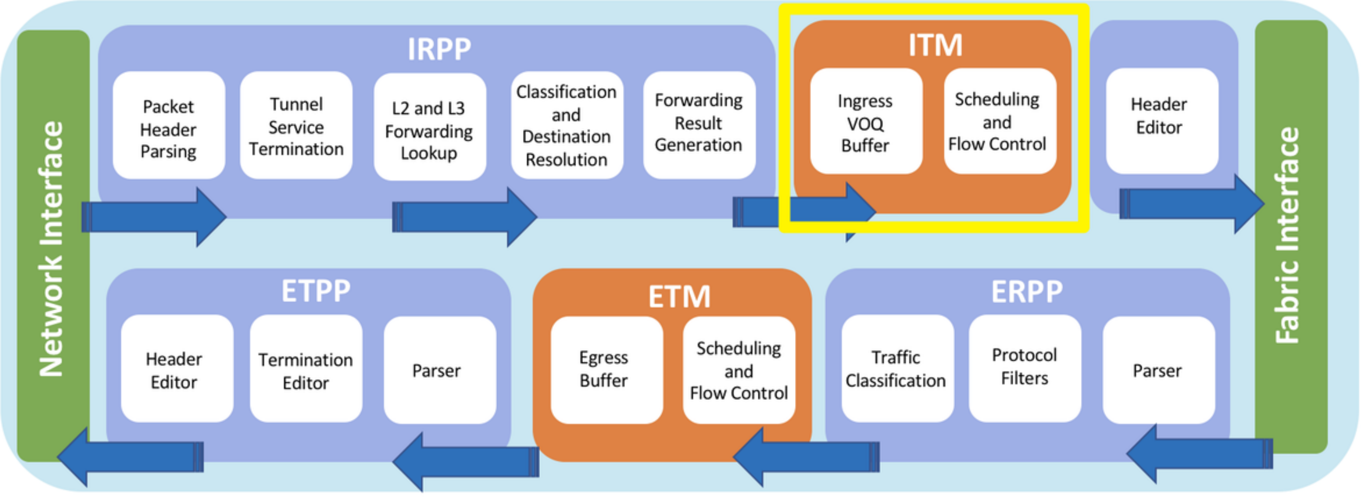
If you experience random/sporadic/historical (i.e no longer occurring) drops, please contact Cisco TAC for further investigation. This walk-through is useful when Input Discards are incremented frequently.

Background Information

The R-Series uses ingress VOQ architecture. VOQ architecture emulates egress queues in the ingress buffer with virtual queues. Each egress port has eight queues for unicast traffic and eight queues for multicast traffic. Traffic can be classified into traffic classes based on the Class-of-Service (CoS) or Differentiated Services Code Point (DSCP) value in the packets and then queued in the corresponding virtual queue for that traffic class.

The R-Series uses a distributed credit mechanism to transfer traffic over the fabric. Before a packet is scheduled to leave the VOQ, the ingress buffer scheduler requests a credit for the specific port and priority in the egress buffer. Credit is requested from an ingress credit scheduler for the destination port and priority. If buffer space is available, the egress scheduler grants access and sends the credit grant to the ingress buffer scheduler. If no buffer space is available in the egress buffer, the egress schedule does not grant a credit, and traffic is buffered in the VOQ until the next credit is available.

Below is the Packet Forwarding Pipeline for the -R platform. On this article, you focus on the **Ingress Traffic Manager** component. More details on the architecture at this link



Ingress Traffic Manager (ITM)

The ingress traffic manager (ITM) is a block in the ingress pipeline. It performs steps related to queue traffic into VOQ, schedule traffic for transmission over the fabric, and manage credits.

Ingress VOQ Buffer

The ingress VOQ buffer block manages both the on-chip buffer and the off-chip packet buffer. Both buffers use VOQ architecture, and traffic is queued based on the information from the IRPP (Ingress Receiver Packet Processor). A total of 96,000 VOQs are available for unicast and multicast traffic.

Schedule and Flow Control

Before a packet is transmitted from the ingress pipeline, the packet needs to be scheduled for transfer over the fabric. The ingress scheduler sends a credit request to the egress scheduler located in the egress traffic manager block. When the ingress traffic manager receives the credit, it starts sending traffic to the ingress transmit packet processor. If the egress buffer is full, traffic will be buffered in the dedicated queue represented by the egress port and traffic class.

Common Causes

Generally, input discards could be seen for below reasons across various Nexus hardware

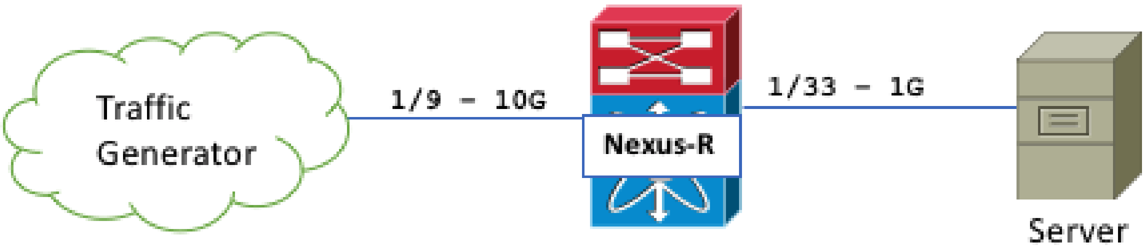
- Traffic flows congesting egress interfaces (such as 10G ingress and 1G egress)
- Oversubscribed SPAN destination port- Applies to specific hardware types.

Applicable Hardware

PID
N9K-X9636C-R
N9K-X9636Q-R
N9K-X9636C-RX
N9K-X96136YC-R
N3K-C36180YC-R
N3K-C3636C-R

Troubleshoot Input Discards

Common Scenario - 10G to 1G Traffic Flow - Constant Drops:

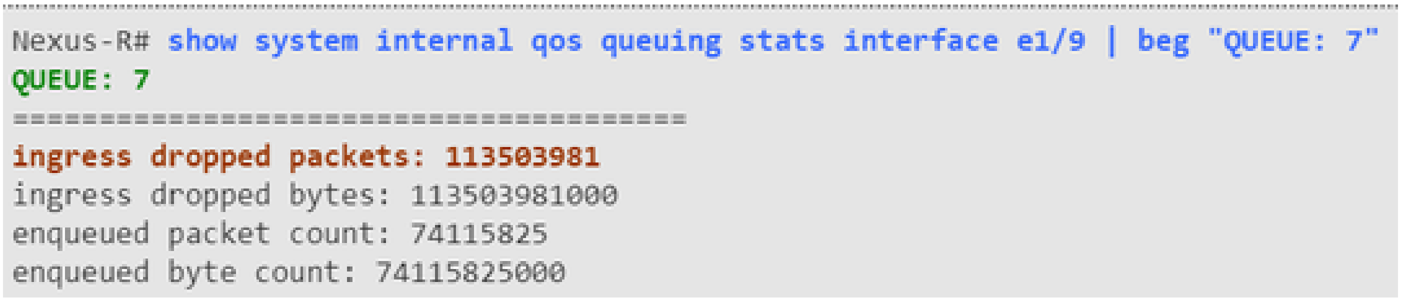


Throughout this article, the value for the counter of "input discards" and any HW internal counter that references the same will change as the errors were incrementing while testing and relevant commands must be grabbed live.

Step 1. Check which Queue is Impacted on your Input Discards Interface.

This step comes in handy later.

In our case, it is Queue 7, the default queue - There are 8 queues total on ingress:



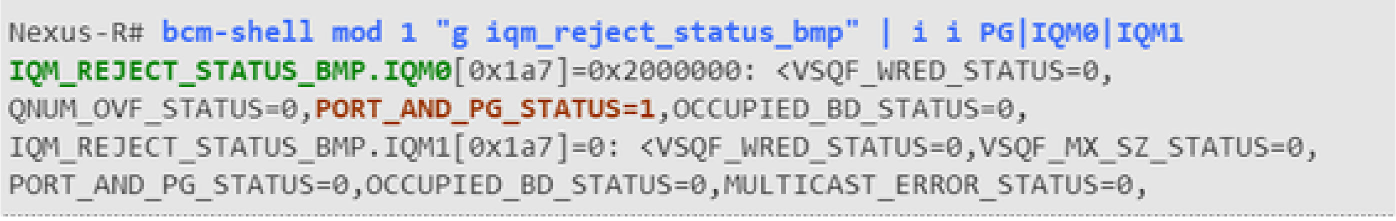
```
Nexus-R# show system internal qos queuing stats interface e1/9 | beg "QUEUE: 7"
QUEUE: 7
========================================
ingress dropped packets: 113503981
ingress dropped bytes: 113503981000
enqueued packet count: 74115825
enqueued byte count: 74115825000
```

Step 2. Check Broadcom's Graphical Representation of Counters used for Diagnostics:

```
Nexus-R# bcm-shell mod 1 "diag counters g"

                                            |
/|\
                                            |           J E R I C H O   N E T W O R K   I N T E
R F A C E           |
                                           \|/
|
+-------------------------------------------+-------------------------------------------+--------
------------------------------------+-------------------------------------------+
|                                                                                      NBI
|
|  RX_TOTAL_BYTE_COUNTER                         = 10,616,663,796                       |
TX_TOTAL_BYTE_COUNTER                         = 41,136                               |
|  RX_TOTAL_PKT_COUNTER                          = 10,659,301                           |
TX_TOTAL_PKT_COUNTER                          = 606                                  |
|  RX_TOTAL_DROPPED_EOPS                         = 0                                    |
|
+-------------------------------------------+-------------------------------------------+--------
------------------------------------+-------------------------------------------+
|                                          IRE                                          |
EPNI                                          |
|  CPU_PACKET_COUNTER                            = 606                                  |
|
|  NIF_PACKET_COUNTER                            = 10,659,302                           |
EPE_BYTES_COUNTER                             = 41,136                               |
|  OAMP_PACKET_COUNTER                           = 0                                    |
EPE_PKT_COUNTER                               = 606                                  |
|  OLP_PACKET_COUNTER                            = 0                                    |
EPE_DSCRD_PKT_CNT                             = 0                                    |
|  RCY_PACKET_COUNTER                            = 0                                    |
|
|  IRE_FDT_INTRFACE_CNT                          = 0                                    |
|
+-------------------------------------------+-------------------------------------------+--------
------------------------------------+-------------------------------------------+
|                                          IDR                                          |
EGQ                                          |
|                                                                                       |
|
|  MMU_IDR_PACKET_COUNTER                        = 10,659,302                           |
FQP_PACKET_COUNTER                            = 606                                  |
|  IDR_OCB_INTERFACE_COUNTER                     = 0                                    |
PQP_UNICAST_PKT_CNT                           = 606                                  |
|                                                                                       |
PQP_DSCRD_UC_PKT_CNT                          = 0                                    |
|                                                                                       |
PQP_UC_BYTES_CNT                              = 48,408                               |
+-------------------------------------------+-------------------------------------------|
PQP_MC_PKT_CNT                                = 0                                    |
|                                          IQM                                          |
PQP_DSCRD_MC_PKT_CNT                          = 0                                    |
|                                                                                       |
PQP_MC_BYTES_CNT                              = 0                                    |
|  ENQUEUE_PKT_CNT                               = 1,403,078                            |
EHP_UNICAST_PKT_CNT                           = 606                                  |
|  DEQUEUE_PKT_CNT                               = 1,403,078                            |
EHP_MC_HIGH_PKT_CNT                           = 0                                    |
|  DELETED_PKT_CNT                               = 0                                    |
EHP_MC_LOW_PKT_CNT                            = 0                                     |
|  ENQ_DISCARDED_PACKET_COUNTER                  = 9,256,829                             |
DELETED_PKT_CNT                               = 0                                     |
|   Rejects: PORT_AND_PG_STATUS                                                          |
|
|                                                                                        |
RQP_PKT_CNT                                   = 606                                   |
|                                                                                        |
RQP_DSCRD_PKT_CNT                             = 0                                     |
|                                                                                        |
PRP_PKT_DSCRD_TDM_CNT                         = 0                                     |
|                                                                                        |
PRP_SOP_DSCRD_UC_CNT                          = 0                                     |
|                                                                                        |
PRP_SOP_DSCRD_MC_CNT                          = 0                                     |
|                                                                                        |
PRP_SOP_DSCRD_TDM_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                                     |
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
|                                                                                        |
FDA                                           |
|                                                                                        |
CELLS_IN_CNT_P1         = 0                |  CELLS_OUT_CNT_P1        = 0                 |
|                                                                                        |
CELLS_IN_CNT_P2         = 0                |  CELLS_OUT_CNT_P2        = 0                 |
+-------------------------------------------+-------------------------------------------|
CELLS_IN_CNT_P3         = 0                |  CELLS_OUT_CNT_P3        = 0                 |
|                                          IPT                                           |
CELLS_IN_TDM_CNT        = 0                |  CELLS_OUT_TDM_CNT       = 0                 |
|                                                                                        |
CELLS_IN_MESHMC_CNT     = 0                |  CELLS_OUT_MESHMC_CNT    = 0                 |
|  EGQ_PKT_CNT                                   = 606                                -->
CELLS_IN_IPT_CNT        = 606              |  CELLS_OUT_IPT_CNT       = 606               |
|  ENQ_PKT_CNT                                   = 1,403,084                             |
EGQ_DROP_CNT                                  = 0                                     |
|  FDT_PKT_CNT                                   = 1,402,472                             |
EGQ_MESHMC_DROP_CNT                           = 0                                     |
|  CRC_ERROR_CNT                                 = 0                                     |
EGQ_TDM_OVF_DROP_CNT                          = 0                                     |
|  CFG_EVENT_CNT                                 = 606 *                                 |
|
|  CFG_BYTE_CNT                                  = 48,408                                |
|
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
|                                          FDT                                           |
FDR                                           |
|  IPT_DESC_CELL_COUNTER                         = 5,609,892                             |
P1_CELL_IN_CNT                                = 0                                     |
|  IRE_DESC_CELL_COUNTER                         = 0                                     |
P2_CELL_IN_CNT                                = 0                                     |
|                                                                                        |
P3_CELL_IN_CNT                                = 0                                     |
|  TRANSMITTED_DATA_CELLS_COUNTER                = 5,609,892                             |
CELL_IN_CNT_TOTAL                                = 0                                    |
+--------------------------------------------+--------------------------------------------+-------
------------------------------------+--------------------------------------------+
                                            |
/|\
                                            |            J E R I C H O   F A B R I C   I N T E R
F A C E              |
                                           \|/
|
```

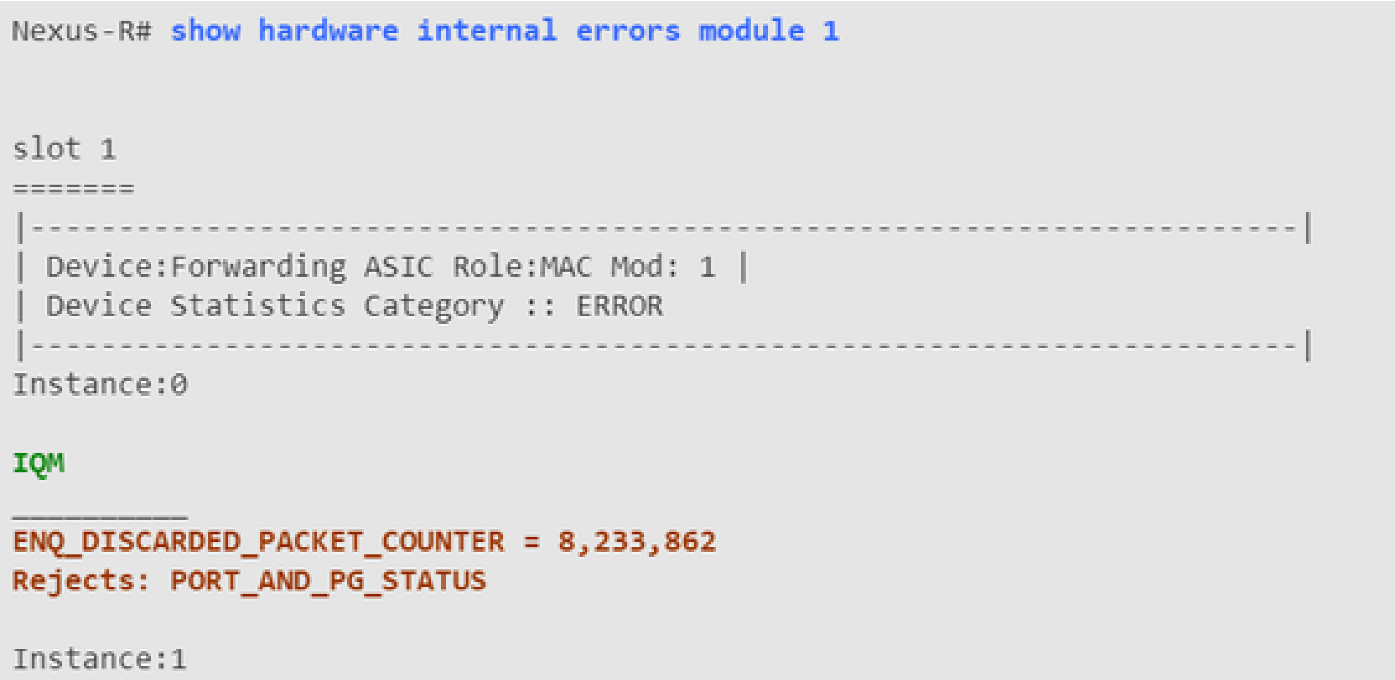
A QUEUE_DELETED_PACKET_COUNTER being greater than zero would indicate that packets were DELETED by the IQM (Ingress Queueing Manager) afterenqueue. This would be due to an active queue not receiving any credits which would suggest a misconfiguration of the scheduling scheme. You would check this via **bcm-shell mod X "getReg IQM_QUEUE_DELETED_PACKET_COUNTER"**

ENQ_DISCARDED_PACKET_COUNTER means packets were discarded BEFORE enqueue. You can see this counter set in BCM as well (command is cleared on read)*:*



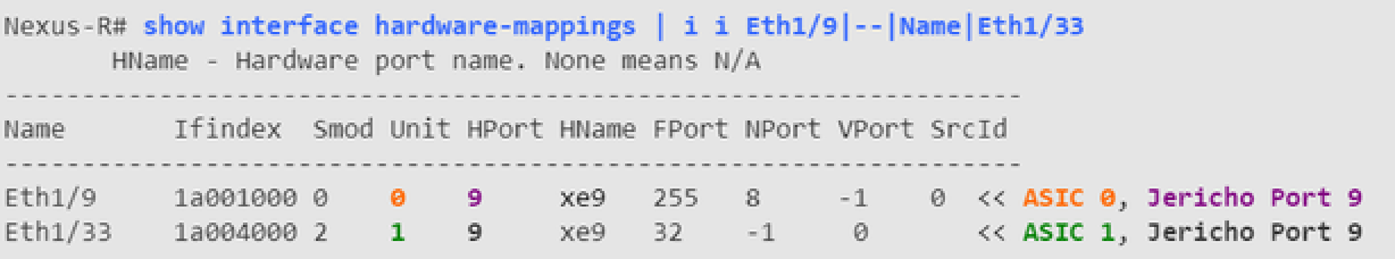
```
Nexus-R# bcm-shell mod 1 "g iqm_reject_status_bmp" | i i PG|IQM0|IQM1
IQM_REJECT_STATUS_BMP.IQM0[0x1a7]=0x2000000: <VSQF_WRED_STATUS=0,
QNUM_OVF_STATUS=0,PORT_AND_PG_STATUS=1,OCCUPIED_BD_STATUS=0,
IQM_REJECT_STATUS_BMP.IQM1[0x1a7]=0: <VSQF_WRED_STATUS=0,VSQF_MX_SZ_STATUS=0,
PORT_AND_PG_STATUS=0,OCCUPIED_BD_STATUS=0,MULTICAST_ERROR_STATUS=0,
```

You can always notice these quickly with **show hardware internal errors module X** (command clears on read):



```
Nexus-R# show hardware internal errors module 1


slot 1
=======
|------------------------------------------------------------------------|
| Device:Forwarding ASIC Role:MAC Mod: 1 |
| Device Statistics Category :: ERROR
|------------------------------------------------------------------------|
Instance:0

IQM
__________
ENQ_DISCARDED_PACKET_COUNTER = 8,233,862
Rejects: PORT_AND_PG_STATUS

Instance:1
```

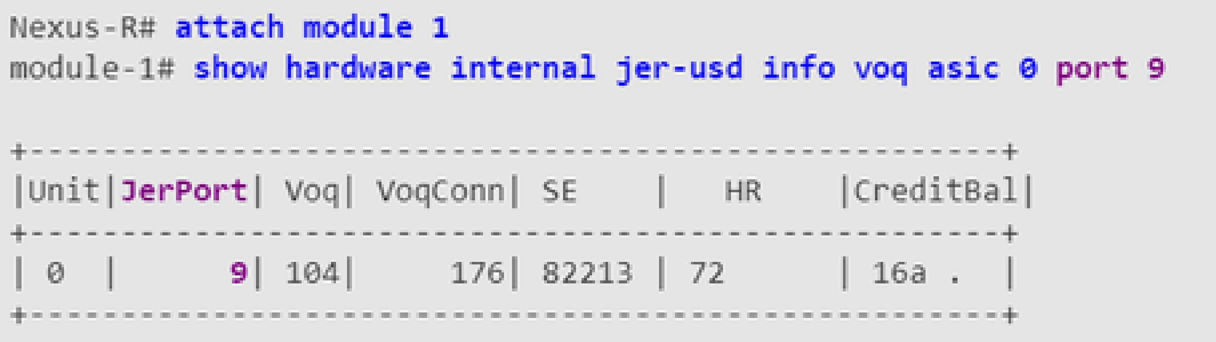
Step 3. Find what ASIC and what Jericho Port your Front Panel Port experiencing Input Discards belongs to:



```
Nexus-R# show interface hardware-mappings | i i Eth1/9|--|Name|Eth1/33
       HName - Hardware port name. None means N/A
-------------------------------------------------------------------
Name       Ifindex  Smod Unit HPort HName FPort NPort VPort SrcId
-------------------------------------------------------------------
Eth1/9     1a001000 0    0    9     xe9   255   8     -1    0  << ASIC 0, Jericho Port 9
Eth1/33    1a004000 2    1    9     xe9   32    -1     0       << ASIC 1, Jericho Port 9
```

Displaying Eth1/33 for this example. In an actual network, you won't know the congested egress port yet.

Step 4. Understand what VOQ and VOQ Connector your Ingress Port has.



```
Nexus-R# attach module 1
module-1# show hardware internal jer-usd info voq asic 0 port 9

+-------------------------------------------------------+
|Unit|JerPort| Voq| VoqConn| SE      |    HR      |CreditBal|
+-------------------------------------------------------+
| 0  |      9| 104|     176| 82213 | 72         | 16a .  |
+-------------------------------------------------------+
```

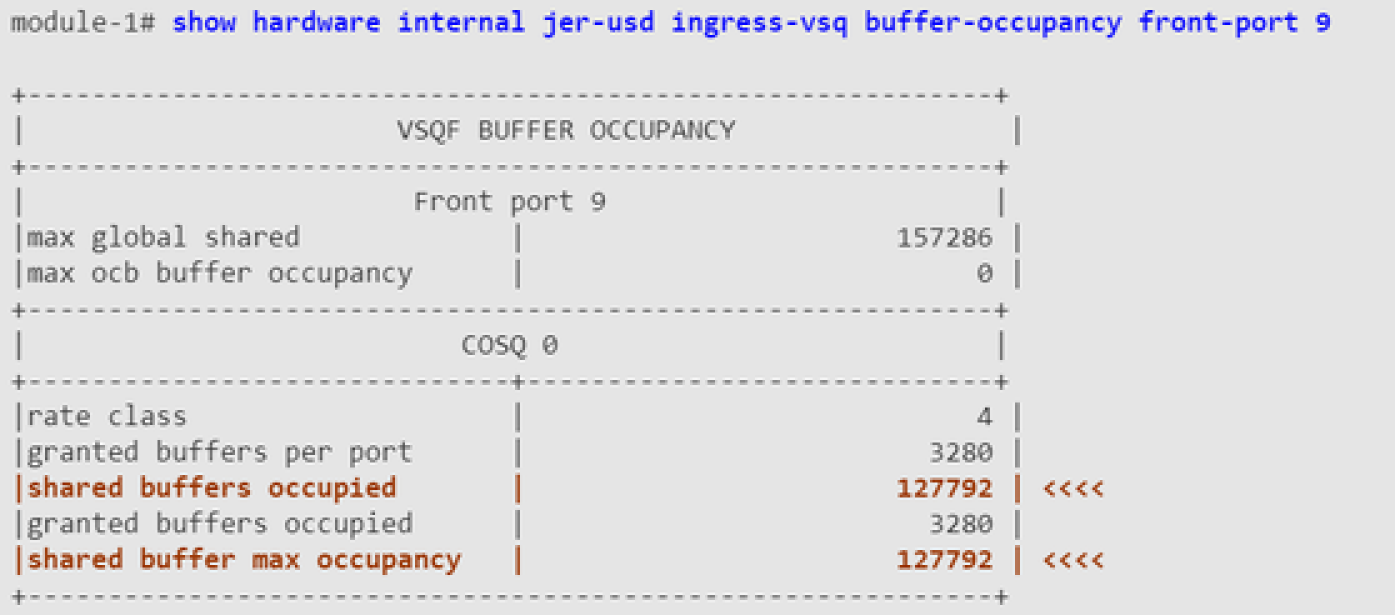
This command shows us details for the flow for ingress VoQ for a specific port. Additionally, it shows us the current credit balance of the VoQ.

The port's VOQ is derived in this way:

LCs are 0 based - Module 1 is 0, Module 2 is 1, etc
There are 256 System Port IDs per LC

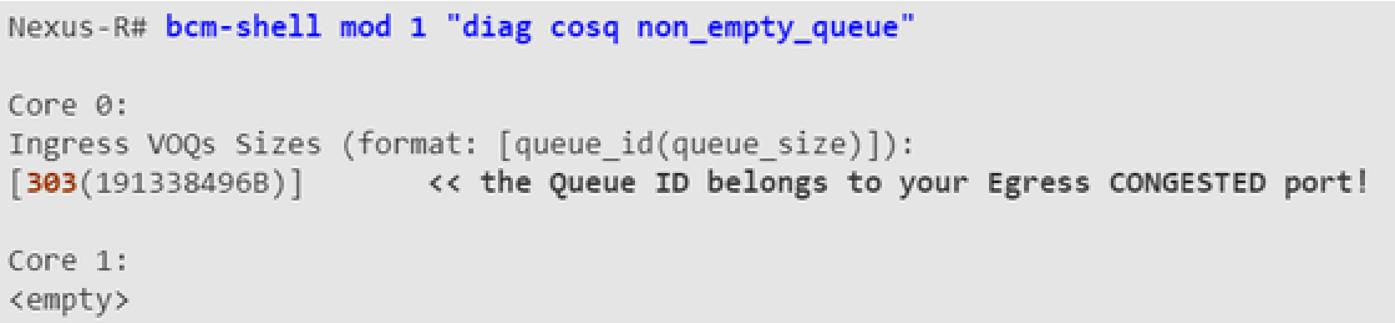
ID = (LC * System port ID) + FP number
Eth1/9 = (0 * 256) + 9 = 9
VOQ ID = 32 + (System Port ID * 8)
Eth1/9 = 32 + (9 * 8) = 104

Our VOQ for Eth1/9 will therefore be 104 which matches the output previously gathered



```
module-1# show hardware internal jer-usd ingress-vsq buffer-occupancy front-port 9

+--------------------------------------------------------------+
|                    VSQF BUFFER OCCUPANCY                      |
+--------------------------------------------------------------+
|                        Front port 9                          |
|max global shared             |                        157286 |
|max ocb buffer occupancy      |                             0 |
+--------------------------------------------------------------+
|                           COSQ 0                             |
+------------------------------+-------------------------------+
|rate class                    |                             4 |
|granted buffers per port      |                          3280 |
|shared buffers occupied       |                        127792 | <<<<
|granted buffers occupied      |                          3280 |
|shared buffer max occupancy   |                        127792 | <<<<
+--------------------------------------------------------------+
```

Step 5. Check from BCM's perspective, which Queue specifically is Non-Empty; i.e Congested.

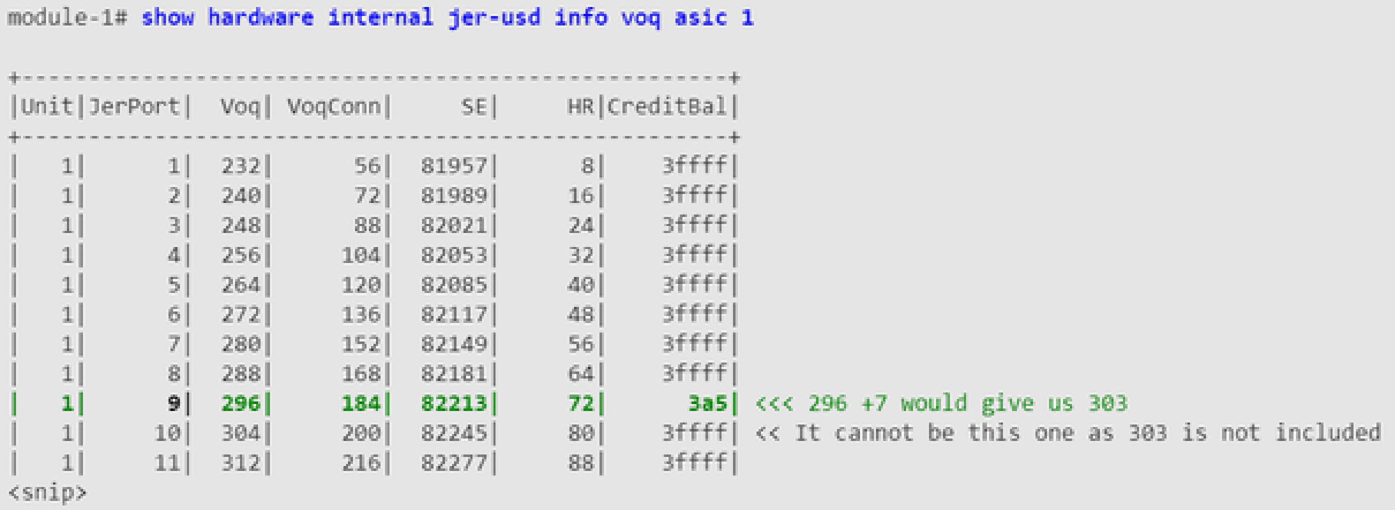


```
Nexus-R# bcm-shell mod 1 "diag cosq non_empty_queue"

Core 0:
Ingress VOQs Sizes (format: [queue_id(queue_size)]):
[303(191338496B)]       << the Queue ID belongs to your Egress CONGESTED port!

Core 1:
<empty>
```

Step 6. Find your Egress Congested Port from the non-empty Queue value:

If the Queue is 303, recall that these queues are actually a range so it can be 303 + 7 or 303-7 - The question is, which port has a VOQ that matches on a range of 296-303 or alternatively, 303-310?

It is known that Queue 7 on Eth1/9 is congested, so 303 actually is the highest in its range so the range of 296-303 is a well-educated guess.



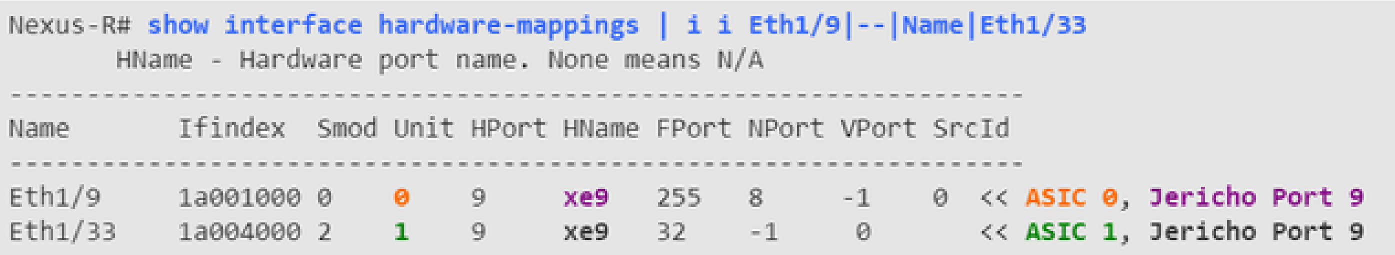
```
module-1# show hardware internal jer-usd info voq asic 1

+----------------------------------------------------+
|Unit|JerPort|  Voq| VoqConn|     SE|    HR|CreditBal|
+----------------------------------------------------+
|   1|      1|  232|      56|  81957|     8|    3ffff|
|   1|      2|  240|      72|  81989|    16|    3ffff|
|   1|      3|  248|      88|  82021|    24|    3ffff|
|   1|      4|  256|     104|  82053|    32|    3ffff|
|   1|      5|  264|     120|  82085|    40|    3ffff|
|   1|      6|  272|     136|  82117|    48|    3ffff|
|   1|      7|  280|     152|  82149|    56|    3ffff|
|   1|      8|  288|     168|  82181|    64|    3ffff|
|   1|      9|  296|     184|  82213|    72|      3a5| <<< 296 +7 would give us 303
|   1|     10|  304|     200|  82245|    80|    3ffff| << It cannot be this one as 303 is not included
|   1|     11|  312|     216|  82277|    88|    3ffff|
<snip>
```

Display the same for asic 0 - Not shown here for brevity; you would notice under the Voq column that your range of interest is not in that ASIC

Notice a few things on the above output:

- Our egress congested port is on ASIC 1.
- Our egress congested port has a VOQ of 296 and 303 would equate to Queue 7 on that port.
- Notice the Credit Balance column - There are very few credits left on this interface to grant which is why our ingress Eth1/9 starts buffering.

Step 7. Check which Front Panel Port is in ASIC 1 and Maps to Jericho Port 9 based on your Previous Finding.



```
Nexus-R# show interface hardware-mappings | i i Eth1/9|--|Name|Eth1/33
       HName - Hardware port name. None means N/A
------------------------------------------------------------------
Name       Ifindex   Smod Unit HPort HName FPort NPort VPort SrcId
------------------------------------------------------------------
Eth1/9     1a001000 0    0    9     xe9   255   8     -1    0   << ASIC 0, Jericho Port 9
Eth1/33    1a004000 2    1    9     xe9   32    -1    0         << ASIC 1, Jericho Port 9
```

At this point, you have found the egress congested port - Determine whether there's something wrongfully bursting into the network, you have configured SPAN and your destination port is 1G while sourcing one or more 10G interface or if this is a bottleneck/design issue.

Additional Commands

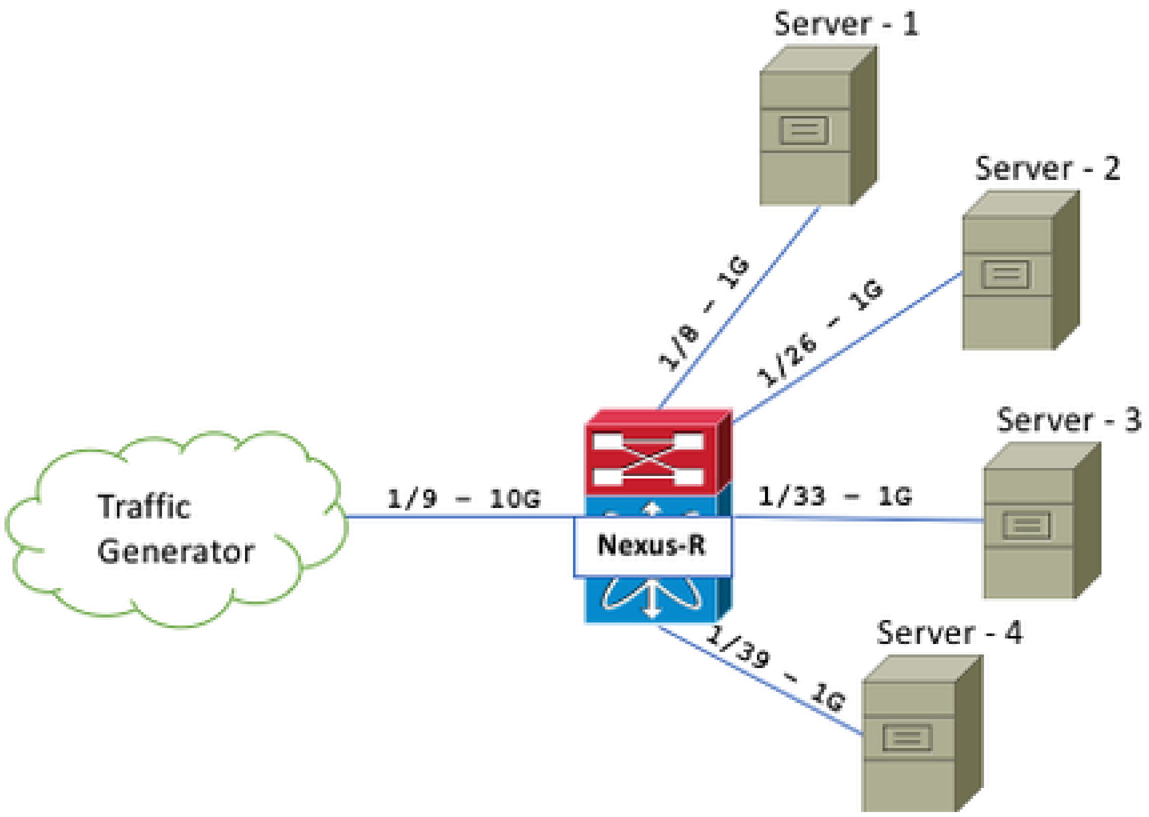
These are more advanced - Not needed to find Egress Congested port under normal scenarios.

```
Nexus-R# bcm-shell mod 1 "diag counters g"

                                            |
/|\
                                            |           J E R I C H O   N E T W O R K   I N T E
R F A C E            |
                                           \|/
|
+--------------------------------------------+------------------------------------------+-------
----------------------------------+------------------------------------------+
|                                                                                      NBI
|
|  RX_TOTAL_BYTE_COUNTER                          = 10,616,663,796                        |
TX_TOTAL_BYTE_COUNTER                          = 41,136                                |
|  RX_TOTAL_PKT_COUNTER                           = 10,659,301                            |
TX_TOTAL_PKT_COUNTER                           = 606                                   |
|  RX_TOTAL_DROPPED_EOPS                          = 0                                     |
|
+--------------------------------------------+------------------------------------------+-------
----------------------------------+------------------------------------------+
|                                          IRE                                         |
EPNI                                              |
|  CPU_PACKET_COUNTER                             = 606                                   |
|
|  NIF_PACKET_COUNTER                             = 10,659,302                            |
EPE_BYTES_COUNTER                              = 41,136                                |
|  OAMP_PACKET_COUNTER                           = 0                                    |
EPE_PKT_COUNTER                               = 606                                  |
|  OLP_PACKET_COUNTER                            = 0                                    |
EPE_DSCRD_PKT_CNT                             = 0                                    |
|  RCY_PACKET_COUNTER                            = 0                                    |
|
|  IRE_FDT_INTRFACE_CNT                          = 0                                    |
|
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
|                                          IDR                                          |
EGQ                                          |
|                                                                                       |
|
|  MMU_IDR_PACKET_COUNTER                        = 10,659,302                           |
FQP_PACKET_COUNTER                            = 606                                  |
|  IDR_OCB_INTERFACE_COUNTER                     = 0                                    |
PQP_UNICAST_PKT_CNT                           = 606                                  |
|                                                                                       |
PQP_DSCRD_UC_PKT_CNT                          = 0                                    |
|                                                                                       |
PQP_UC_BYTES_CNT                              = 48,408                               |
+-------------------------------------------+-------------------------------------------|
PQP_MC_PKT_CNT                                = 0                                    |
|                                          IQM                                          |
PQP_DSCRD_MC_PKT_CNT                          = 0                                    |
|                                                                                       |
PQP_MC_BYTES_CNT                              = 0                                    |
|  ENQUEUE_PKT_CNT                               = 1,403,078                            |
EHP_UNICAST_PKT_CNT                           = 606                                  |
|  DEQUEUE_PKT_CNT                               = 1,403,078                            |
EHP_MC_HIGH_PKT_CNT                           = 0                                    |
|  DELETED_PKT_CNT                               = 0                                    |
EHP_MC_LOW_PKT_CNT                            = 0                                    |
|  ENQ_DISCARDED_PACKET_COUNTER                  = 9,256,829                            |
DELETED_PKT_CNT                               = 0                                    |
|   Rejects: PORT_AND_PG_STATUS                                                         |
|
|                                                                                       |
RQP_PKT_CNT                                   = 606                                  |
|                                                                                       |
RQP_DSCRD_PKT_CNT                             = 0                                    |
|                                                                                       |
PRP_PKT_DSCRD_TDM_CNT                         = 0                                    |
|                                                                                       |
PRP_SOP_DSCRD_UC_CNT                          = 0                                    |
|                                                                                       |
PRP_SOP_DSCRD_MC_CNT                          = 0                                    |
|                                                                                       |
PRP_SOP_DSCRD_TDM_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                                    |
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
|                                                                                       |
FDA                                          |
|                                                                                       |
CELLS_IN_CNT_P1         = 0               |  CELLS_OUT_CNT_P1        = 0               |
|                                                                                       |
CELLS_IN_CNT_P2         = 0               |  CELLS_OUT_CNT_P2        = 0               |
+-------------------------------------------+-------------------------------------------|
CELLS_IN_CNT_P3         = 0               |  CELLS_OUT_CNT_P3        = 0               |
|                                          IPT                                          |
CELLS_IN_TDM_CNT        = 0               |  CELLS_OUT_TDM_CNT       = 0               |
|                                                                                       |
CELLS_IN_MESHMC_CNT     = 0               |  CELLS_OUT_MESHMC_CNT    = 0               |
|  EGQ_PKT_CNT                                     = 606                                  -->
CELLS_IN_IPT_CNT        = 606             |  CELLS_OUT_IPT_CNT       = 606             |
|  ENQ_PKT_CNT                                     = 1,403,084                            |
EGQ_DROP_CNT                                  = 0                                      |
|  FDT_PKT_CNT                                     = 1,402,472                            |
EGQ_MESHMC_DROP_CNT                           = 0                                      |
|  CRC_ERROR_CNT                                   = 0                                    |
EGQ_TDM_OVF_DROP_CNT                          = 0                                      |
|  CFG_EVENT_CNT                                   = 606 *                                |
|
|  CFG_BYTE_CNT                                    = 48,408                               |
|
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
|                                          FDT                                          |
FDR                                           |
|  IPT_DESC_CELL_COUNTER                           = 5,609,892                            |
P1_CELL_IN_CNT                                = 0                                      |
|  IRE_DESC_CELL_COUNTER                           = 0                                    |
P2_CELL_IN_CNT                                = 0                                      |
|                                                                                       |
P3_CELL_IN_CNT                                = 0                                      |
|  TRANSMITTED_DATA_CELLS_COUNTER                  = 5,609,892                            |
CELL_IN_CNT_TOTAL                             = 0                                      |
+-------------------------------------------+-------------------------------------------+-------
------------------------------------+-------------------------------------------+
                                            |
/|\
                                            |            J E R I C H O   F A B R I C   I N T E R
F A C E            |
                                           \|/
|
```

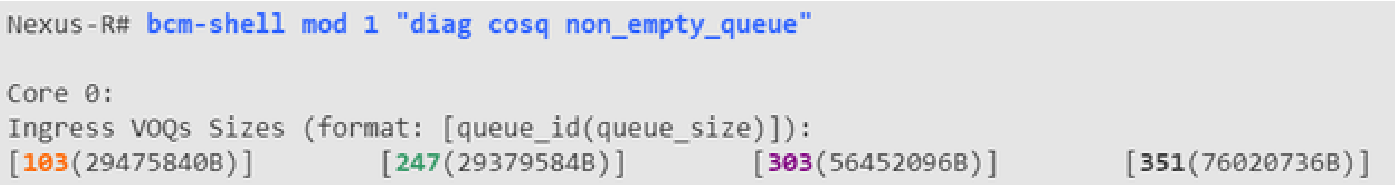
Additional Lab Tests:

Step 1. Input Discards with Multiple Egress Congested Interfaces.

Consider this topology wherein the Traffic Generator is sending 2G of traffic towards each Server:

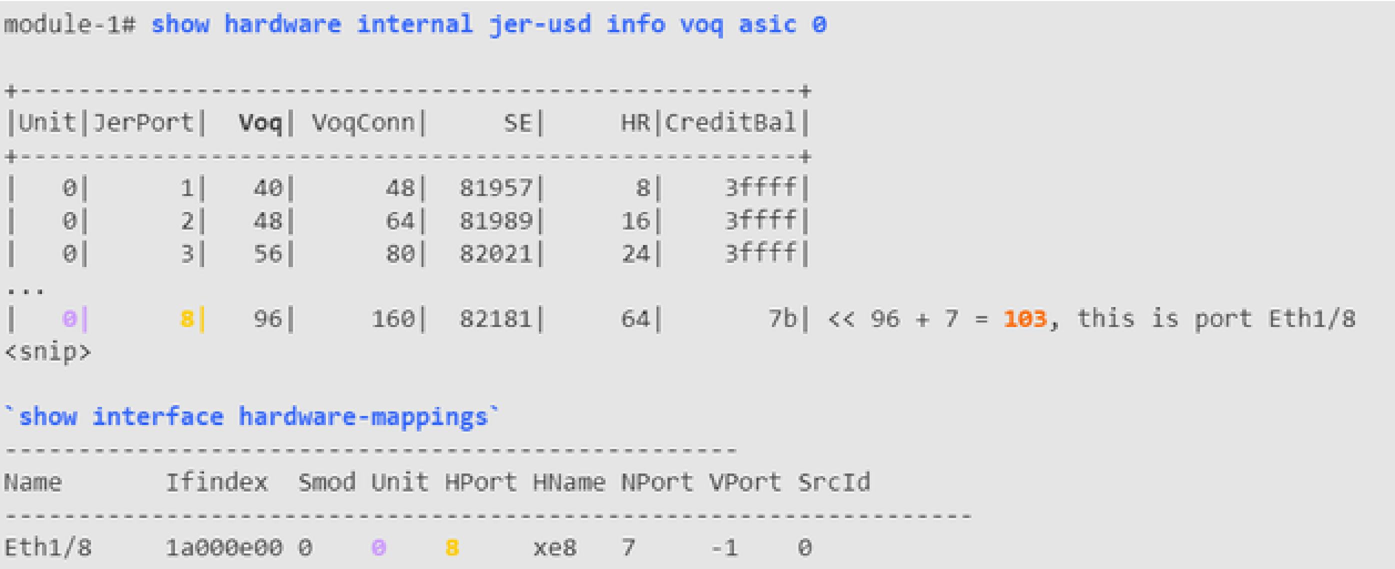


Quickly check which Queues are not empty - Notice there are 4:



```
Nexus-R# bcm-shell mod 1 "diag cosq non_empty_queue"

Core 0:
Ingress VOQs Sizes (format: [queue_id(queue_size)]):
[103(29475840B)]        [247(29379584B)]        [303(56452096B)]        [351(76020736B)]
```

Determine what interfaces these Queues belong to - Check ASIC 0 first (it only demonstrates with one interface):

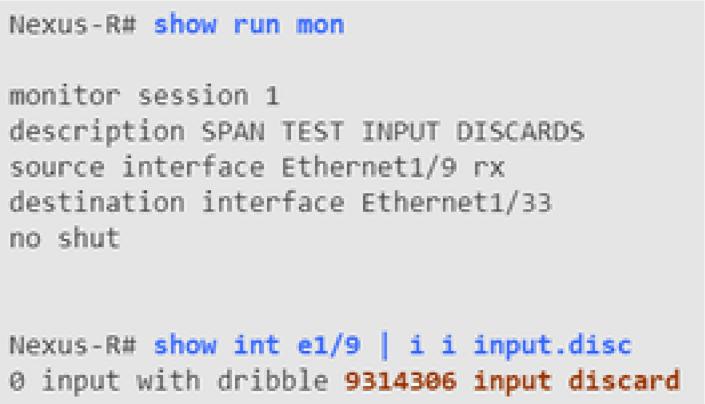


```
module-1# show hardware internal jer-usd info voq asic 0

+-------------------------------------------------------+
|Unit|JerPort|  Voq| VoqConn|      SE|     HR|CreditBal|
+-------------------------------------------------------+
|   0|      1|   40|      48|  81957|      8|    3ffff|
|   0|      2|   48|      64|  81989|     16|    3ffff|
|   0|      3|   56|      80|  82021|     24|    3ffff|
...
|   0|      8|   96|     160|  82181|     64|       7b| << 96 + 7 = 103, this is port Eth1/8
<snip>

`show interface hardware-mappings`
-------------------------------------------------------
Name       Ifindex  Smod Unit HPort HName NPort VPort SrcId
--------------------------------------------------------------------
Eth1/8     1a000e00 0    0    8     xe8   7     -1    0
```

Repeat the same process for the other three Queue values: 247, 303 and 351.

Step 2. Input Discards due to SPAN.

Setting Eth1/33 as a SPAN destination port while setting Eth1/9 as a SPAN source port in the RX direction



```
Nexus-R# show run mon

monitor session 1
description SPAN TEST INPUT DISCARDS
source interface Ethernet1/9 rx
destination interface Ethernet1/33
no shut


Nexus-R# show int e1/9 | i i input.disc
0 input with dribble 9314306 input discard
```

Step 3. Input Discards due to Traffic Hair Pin.

Sending packets with SRC 10.10.10.10 and DEST 192.168.10.10 where Eth1/9 is in 10.10.10.1/24 - This does not result in an Input Discard; however, you do see this counter:

```
Nexus-R# bcm-shell mod 1 "diag counters g"

| /|\
| J E R I C H O N E T W O R K I N T E R F A C E |
\|/ |
+--------------------------------------------+-------------------------------------------+-------
-------------------------------------+-------------------------------------------+
_PACKET_COUNTER = 0 | DELETED_PKT_CNT = 12,027,201 |
| | Discards: INVALID_OTM SRC_EQUAL_DEST
+--------------------------------------------+-------------------------------------------+-------
-------------------------------------+-------------------------------------------+
```

Step 4. Send Packets with a Destination IP that is Unknown.

Send packets with SRC 10.10.10.10 and DEST 192.168.10.10 where Eth1/9 is in 10.10.10.1/24 and Eth1/33 is an L3 port in the 172.16.0.1/30 subnet - No drop counter, no input discards even when the destination is **unknown**.

Step 5. Input Discards while an Access/Trunk port transitions into STP Forwarding State

Send packets where Eth1/9 is just a wide trunk (or access port) - This is registered as an Input Discard while the port transitions into an STP forwarding state.

```
Nexus-R(config)# int e1/9
Nexus-R(config-if)# switchport mode trunk
Nexus-R# bcm-shell mod 1 "diag counters g" | i i --|IQM|ENQ_DISCARD|Rejects
+--------------------------------------------+-------------------------------------------+-------
-------------------------------------+-------------------------------------------+
+--------------------------------------------+-------------------------------------------+-------
-------------------------------------+-------------------------------------------+
+--------------------------------------------+-------------------------------------------+-------
-------------------------------------+-------------------------------------------+
+--------------------------------------------+-------------------------------------------|
PQP_MC_PKT_CNT                                = 1,678,949                             |
|                                          IQM                                           |
PQP_DSCRD_MC_PKT_CNT                         = 11,369,033                           |
|  ENQ_DISCARDED_PACKET_COUNTER                 = 1,289,182                           |
DELETED_PKT_CNT                              = 11,369,081                           |
|   Rejects: QUEUE_NOT_VALID_STATUS                                                    |
Discards: SRC_EQUAL_DEST                                                           |
+--------------------------------------------+--------------------------------------------+-------
-----------------------------------+--------------------------------------------+

Nexus-R# show span int e1/9

Vlan Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
VLAN0001 Desg BLK 2 128.9 P2p
VLAN0010 Desg BLK 2 128.9 P2p
<snip>
```

QUEUE_NOT_VALID_STATUS is a drop due to the Packet Processor's (PP) decision to drop or an invalid destination received from the Packet Processor (PP) Blocks.

Step 6. Input Discards due to Eth1/9 Exceeding Line Rate.

Sends 10G+ into Eth1/9 would result in a different type of drop as you are maxing out Eth1/9 in the fist place - Does still count as an Input Discard:

```
bcm-shell.0> diag counters g

                                           |
/|\
                                           |          J E R I C H O   N E T W O R K   I N T E
R F A C E           |
                                          \|/
|
+--------------------------------------------+--------------------------------------------+-------
-----------------------------------+--------------------------------------------+
|                                                                                          NBI
|
|  RX_TOTAL_BYTE_COUNTER                        = 53,913,106,009                      |
TX_TOTAL_BYTE_COUNTER                        = 1,164,231                            |
|  RX_TOTAL_PKT_COUNTER                         = 54,145,395                          |
TX_TOTAL_PKT_COUNTER                         = 17,029                               |
|  RX_TOTAL_DROPPED_EOPS                        = 0                                   |
|
+--------------------------------------------+--------------------------------------------+-------
-----------------------------------+--------------------------------------------+
|                                          IRE                                         |
EPNI                                          |
|  CPU_PACKET_COUNTER                           = 17,010                              |
|
|  NIF_PACKET_COUNTER                           = 54,145,476                          |
EPE_BYTES_COUNTER                            = 5,721,307                            |
|  OAMP_PACKET_COUNTER                          = 0                                   |
EPE_PKT_COUNTER                              = 50,703                               |
|  OLP_PACKET_COUNTER                           = 0                                   |
EPE_DSCRD_PKT_CNT                            = 0                                    |
|  RCY_PACKET_COUNTER                           = 16,837                              |
|
|  IRE_FDT_INTRFACE_CNT                         = 0                                   |
|
+--------------------------------------------+--------------------------------------------+-------
-----------------------------------+--------------------------------------------+
|                                          IDR                                         |
EGQ                                          |
|                                                                                        |
|
|  MMU_IDR_PACKET_COUNTER                        = 54,128,577                            |
FQP_PACKET_COUNTER                            = 50,703                                |
|  IDR_OCB_INTERFACE_COUNTER                     = 0                                     |
PQP_UNICAST_PKT_CNT                           = 50,683                                |
|                                                                                        |
PQP_DSCRD_UC_PKT_CNT                          = 0                                     |
|                                                                                        |
PQP_UC_BYTES_CNT                              = 5,216,716                             |
+-------------------------------------------+--------------------------------------------|
PQP_MC_PKT_CNT                                = 20                                    |
|                                          IQM                                           |
PQP_DSCRD_MC_PKT_CNT                          = 20                                    |
|                                                                                        |
PQP_MC_BYTES_CNT                              = 2,079                                 |
|  ENQUEUE_PKT_CNT                               = 5,463,323                             |
EHP_UNICAST_PKT_CNT                           = 50,683                                |
|  DEQUEUE_PKT_CNT                               = 5,594,400                             |
EHP_MC_HIGH_PKT_CNT                           = 20                                    |
|  DELETED_PKT_CNT                               = 0                                     |
EHP_MC_LOW_PKT_CNT                            = 0                                     |
|  ENQ_DISCARDED_PACKET_COUNTER                  = 48,716,055                            |
DELETED_PKT_CNT                               = 40                                    |
|   Rejects: VOQ_MX_QSZ_STATUS                                                           |
|
<snip>
```