NCS 5500系列QoS故障排除指南

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简介

本文档介绍思科网络融合系统(NCS)5500系列的QoS故障排除指南。

NCS5500上的QoS实施

- NCS5500中的QoS在NPU的入口和出口TM上执行。NCS5500实施虚拟输出队列架构，其中出口队列基于信用请求和授权方案。
- 实际缓冲发生在入口转发设备上。出口转发设备通过向任何请求信用的入口转发设备授予信用来确定可发送多少流量。
- 任何出口接口或调度元素的所有队列都复制到所有希望将数据包发送到该接口的入口设备。这些队列称为虚拟输出队列(VOQ)。
- 每个接口或调度元素实际上支持8个队列。在出口处，调度元素支持优先级、最小值、最大值和超额。计划是根据这些属性提供积分。
- 因此，在出口处配置接口的调度属性，而在入口处配置拥塞控制和拥塞避免值。
- 当IRPP决定将数据包发送到给定目标/输出端口时，它会将该数据包放入特定VOQ。 在数据包的排队过程中，将验证数据包是否可以基于其入队。
- 在VOQ的缓冲区占用率和入口接口的虚拟统计队列(VSQ)设置上。VSQ是基于流量类的缓冲

区管理方案。

- 如果超过缓冲区，则根据相应的用户配置丢弃数据包或向入口端口发送流量控制。默认情况下，如果数据包未通过入队检查，则会将其丢弃。
- NCS5500的LC没有单独的队列ASIC。该平台实现了基于调度的基于虚拟输出的排队。因此没有入口队列的概念。入口服务 — 仅支持标记操作和策略管制的策略。
- NCS5500实施了一个不同的标记和排队概念。它基于qos-group和traffic-class。在出口上，这两个参数匹配为流量添加备注和选择队列。

各种命令存在的限制。有关详情，请参阅。

故障排除指南

入口QoS

show qos interface <interface> input|output是最有用且最重要的命令之一

它提供有关您应用的服务策略的有用信息。它显示配置和转换的参数（在监察器、整形器、尾部丢弃阈值等情况下）、虚拟队列ID、记帐类型等。

从简单入口策略开始。

<#root>

```
class-map match-any i_match
match precedence ipv4 3
match mpls experimental topmost 3
end-class-map
!

policy-map
ingress_marking


 class i_match


 set qos-group 3


 set discard-class 2


!
 class class-default


!
end-policy-map
```

```
!



RP/0/RP0/CPU0:xrg-ncs-04#
show qos interface hundredGigE 0/0/0/35 input


Mon Dec 4 21:30:44.131 UTC
NOTE:- Configured values are displayed within parentheses
Interface HundredGigE0/0/0/35 ifh 0x138 -- input policy
NPU Id: 5
Total number of classes: 2


Interface Bandwidth: 100000000 kbps
Policy Name:
ingress_marking


Accounting Type: Layer1 (Include Layer 1 encapsulation and above)
------------------------------------------------------------------------------
Level1 Class =
i_match


New qos group = 3


New discard class = 2



Default Policer Bucket ID = 0x21
Default Policer Stats Handle = 0x0
Policer not configured for this class

Level1 Class =
class-default


Default Policer Bucket ID = 0x20
Default Policer Stats Handle = 0x0
Policer not configured for this class
```

qos_ea正在对LC上的硬件中的策略进行编程。通过show feature-mgr client qos-ea policy summary location<node>，您可以获得LC上已配置策略的概述。

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#
```

show feature-mgr client qos-ea policy summary location 0/0/CPU0

```
Mon Dec 4 22:03:12.371 UTC
Pol-Num Flags Classes Ref-cnt In-Hash Compiled Policy Name
------- ---------- ------- ------- ------- -------- -----------
19 0x00004000 2 4 Yes Yes
```

ingress_marking

如果查看此命令的详细视图，您可以看到它在类中的匹配位置：

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#
```

show feature-mgr client qos-ea policy policy ingress_marking location 0/0/CPU0

```
Mon Dec 4 22:07:53.134 UTC

Policy name:
```

ingress_marking

```
Policy Number: 19
Flags: 0x4000 [DNX_FM_POL_TOS]
Class Number: 2
Reference Count: 4
In Hash: Yes
Is Compiled: Yes

Level: 0 Class Number: 0 Class Name: i_match
Match Count: 2 Flags: 0x0 Logical Op:
```

MATCH_ANY

```
ACE: 0 Class:0 Match:0 proto IPV4 Flags:0x8011 [Grant]
Source IPv4 Address: 0.0.0.0 (255.255.255.255)
Destination IPv4 Address: 0.0.0.0 (255.255.255.255)
```

Precedence Value: 3

```
UNKNOWN: UNKNOWN: UNKNOWN: ACE: 0 Class:0 Match:1 proto MPLS Flags:0x208040 [Grant]
```

MPLS EXP Value: 3

```
UNKNOWN: UNKNOWN: UNKNOWN: Final List
ACE: 0 Class:0 Match:0 proto IPV4 Flags:0x8011 [Grant]
Source IPv4 Address: 0.0.0.0 (255.255.255.255)
Destination IPv4 Address: 0.0.0.0 (255.255.255.255)
Precedence Value: 3
UNKNOWN: UNKNOWN: UNKNOWN: ACE: 1 Class:0 Match:1 proto MPLS Flags:0x208040 [Grant]
MPLS EXP Value: 3
UNKNOWN: UNKNOWN: UNKNOWN:
Level: 0 Class Number: 1 Class Name:
```

class-default

```
Match Count: 1 Flags: 0x0 Logical Op:
```

MATCH_ANY

```
ACE: 0 Class:1 Match:0 proto ANY Flags:0x28000 [Grant][Default]
UNKNOWN: UNKNOWN: UNKNOWN: Final List
ACE: 2 Class:1 Match:0 proto ANY Flags:0x28000 [Grant][Default]
UNKNOWN: UNKNOWN: UNKNOWN:
```

QOS_EA信息也可以从功能管理器的角度显示。首先显示摘要：

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#
```

show feature-mgr client qos-ea feature summary location 0/0/CPU0

```
Mon Dec 4 22:30:09.362 UTC
IFH NPU DIR Lookup-type ACL-ID Refcnt Feature-Name
---------- --- --- -------------------- ------ ------ ------------
0x138 5 IN IPV4_QOS 14 1 ingress_marking:0
0x138 5 IN IPV6_QOS 14 1 ingress_marking:0
0x138 5 IN MPLS_QOS 14 1 ingress_marking:0
0x138 5 IN L2_QOS 14 1 ingress_marking:0
```

在下一步中，您可以显示详细信息：

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#
```

show feature-mgr client qos-ea feature feature-name ingress_marking:0 direction ingress lookup mpls inte

```
Mon Dec 4 22:31:20.588 UTC

Feature name: ingress_marking:0
Lookup Type: MPLS_QOS
Direction: IN
Reference Count: 1
NPU: 5
Interfaces Attached: HundredGigE0_0_0_35
Number of Entries: 2
Number of Verified Entries: 0
Number of ACEs: 2
ACL ID: 14
ACL ID Ref Cnt: 4
ACL ID Min Length(bits): 0
ACL ID Max Length(bits): 5
ACL ID Num Entries: 30
ACL ID Num Free Entries: 29
```

```
Compression Level: 0(UNCOMPRESSED)
```

qos_ea跟踪显示在接口上应用服务策略时事件的顺序。如果发生故障，它将显示问题。

```
<#root>

RP/0/RP0/CPU0:xrg-ncs-04#

show qos ea trace all reverse location 0/0/CPU0


Mon Dec 4 22:17:26.297 UTC
3077 wrapping entries (36992 possible, 18816 allocated, 0 filtered, 3077 total)
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: (line# 2882) : Responded to IM (batch size: 1)
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: post_caps_processing : Registering with ETHER
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: caps_add_notify_remote Input num of interfaces

Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: process_caps_add : End: count = 1 ok_count 1. M


Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 SCOL: scol_interface_add : ifh 0x138 ea_intf_type Ma
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 SCOL: scol_interface_add_internal : ifh 0x138: after
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 UTIL: (line# 1665) Child info aggr bw add: Current p
Dec 4 21:30:18.280 qos_ea/int_evts 0/0/CPU0 t14563 UTIL: insert_if_qos_from_list_by_npu_ctx : Inserting

Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: results_add for ifh 0x138 with pmap ingress_mar


Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: fm_program : npu_id 5 ifh 0x138 policy_name ing


Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: (line# 1597) : class_name class-default offset
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : cir_kbps 720000000 cir_bu
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : ifh 0x138 npu 5 offset 0
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : for ifh 0x138 for npu 5 o
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: (line# 1597) : class_name i_match offset 1 pol
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : cir_kbps 720000000 cir_bu
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : ifh 0x138 npu 5 offset 1
Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : for ifh 0x138 for npu 5 o

Dec 4 21:30:18.217 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: mark_actn_process Unconditional mark set for cm


Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: resource_cfg for ifh 0x138 ul_ifh 0x0 with pma
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CMAP: classmap_process : chd 0x7feedd339b98, if_qos
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: preprocess_action : ifh 0x138 ul_ifh 0x0 poli
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: pwalk_process_class : depth 0, usr_data->clas
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CMAP: classmap_process : chd 0x7feedd33b478, if_qos
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: preprocess_action : ifh 0x138 ul_ifh 0x0 poli
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: pwalk_process_class : depth 0, usr_data->clas
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: pwalk_start_level : depth 0, stack 0x7fff8a11
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 PWALK: policy_walk : policy_oper 0 policy_name ingre
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 UTIL: if_qos_insert_to_db : Inserting to hash table:
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 RATE: dnx_qosea_policy_resolve : policy_name ingress
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: policy_add : npu_id 5 ifh 0x138 ul_ifh 0x0 dir

Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 VRFY: policy_verify : Verifying policy ingress_markin
```

```
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 UTIL: if_qos_init : Initializing if_qos 0x3087c0bb78
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 VRFY: check_policy_on_parent_subintf : Did not find
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 VRFY: check_policy_on_parent_subintf : parent_ifh: 0
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 UTIL: intf_bw_get : Banwdith of ifh 0x138 is intf_kb
Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: caps_add_int : ifh 0x138 ea_intf_type MainIf d
```

Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: caps_add : ifh 0x138 ea_intf_type MainIf dir in

Dec 4 21:30:18.100 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: process_caps_add : 1 of 1 direction ingress on

```
Dec 4 21:30:18.093 qos_ea/int_evts 0/0/CPU0 t14563 CAPS: process_caps_add : batch count = 1 . Current n
Dec 4 21:30:18.093 qos_ea/int_evts 0/0/CPU0 t14563 INT: im_msg_handler : Rx: caps add message (batch si
```

当您更改策略并将策略器添加至类i_match时，该策略将在qos_ea跟踪中显示。NCS5500支持策略映射的就地修改。

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04(config-pmap-c)#police rate percent 50
RP/0/RP0/CPU0:xrg-ncs-04(config-pmap-c-police)#commit

Dec 4 22:49:39.567 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : for ifh 0x138 for npu 5 o
```

Dec 4 22:49:39.567 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: (line# 147) : cir_kbps 50000000 cir_burs

```
Dec 4 22:49:39.567 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: (line# 144) : ifh 0x138 npu 5 offset 1
Dec 4 22:49:39.567 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: (line# 1822) : class_name i_match offset 0 pol
Dec 4 22:49:39.567 qos_ea/int_evts 0/0/CPU0 t14563 ACTN: (line# 1597) : class_name i_match offset 1 pol
```

show qos interface命令也反映了添加的内容：

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#show qos interface hundredGigE 0/0/0/35 input
Mon Dec 4 23:25:19.684 UTC
NOTE:- Configured values are displayed within parentheses
Interface HundredGigE0/0/0/35 ifh 0x138 -- input policy
NPU Id: 5
Total number of classes: 2
Interface Bandwidth: 100000000 kbps
Policy Name: ingress_marking
Accounting Type: Layer1 (Include Layer 1 encapsulation and above)
------------------------------------------------------------------------------
Level1 Class = i_match
New qos group = 3
New discard class = 2

Policer Bucket ID = 0x21
Policer Stats Handle = 0x0
```

```
Policer committed rate = 49680000 kbps (50 %)


Policer conform burst = 4194304 bytes (default)


Level1 Class = class-default

Default Policer Bucket ID = 0x20
Default Policer Stats Handle = 0x0
Policer not configured for this class
```

执行上述命令时，qos_ea跟踪也会显示转换的值。

监察器使用22 kbps的增量步长。在线路卡的公式中使用时，配置值四舍五入为最接近的22kbps倍数。

<#root>

```
Dec 4 23:25:19.773 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : cir_kbps 49680000 cir_burs


Dec 4 23:25:19.773 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : ifh 0x138 npu 5 offset 1 
Dec 4 23:25:19.773 qos_ea/int_evts 0/0/CPU0 t14563 POLICER-INT: policer_get : for ifh 0x138 for npu 5 o
```

出口QoS

出口QoS支持排队操作。在NCS5500上，一个可以在出口方向具有两个服务策略。一个用于标记，一个用于排队。这是用于标记操作：

<#root>

```
class-map match-any e_mark
match qos-group 3
end-class-map
!

policy-map

egress_marking


class e_mark
set mpls experimental imposition 2
!
class class-default
!
end-policy-map
!

RP/0/RP0/CPU0:xrg-ncs-06#show feature-mgr client qos-ea policy summary location 0/0/CPU0
```

```
Thu Dec 21 10:44:33.978 UTC
Pol-Num Flags Classes Ref-cnt In-Hash Compiled Policy Name
------- ---------- ------- ------- ------- -------- -----------
1 0x01000000 2 1 Yes Yes
```

egress_marking

```
RP/0/RP0/CPU0:xrg-ncs-06#show feature-mgr client qos-ea feature summary location 0/0/CPU0
Thu Dec 21 10:59:08.872 UTC
IFH NPU DIR Lookup-type ACL-ID Refcnt Feature-Name
---------- --- --- -------------------- ------ ------ ------------
0x340 0 OUT MAP_ID_QOS 0 1
```

egress_marking:0

出口队列策略

<#root>

```
class-map match-any tc1
 match traffic-class 1
 end-class-map
!
class-map match-any tc2
 match traffic-class 2
 end-class-map
!
class-map match-any tc3
 match traffic-class 3
 end-class-map
!
class-map match-any tc4
 match traffic-class 4
 end-class-map
!
class-map match-any tc5
 match traffic-class 5
 end-class-map
!
policy-map POLICY_QOS_OUT
 class tc1
```

priority

level 1

shape average percent 19

```
  queue-limit 500 us
 !
 class tc2
```

priority

level 2

shape average percent 20

```
  queue-limit 500 us
 !
 class tc3
```

bandwidth percent 1

```
 !
 class tc4
```

bandwidth percent 20

```
 !
 class tc5
  bandwidth percent 20
 !
 class class-default
  bandwidth percent 20
 !
 end-policy-map
!
```

One can quick verify where a QoS policy is applied.

RP/0/RP0/CPU0:xrg-ncs-04#

show policy-map targets pmap-name POLICY_QOS_OUT location 0/0/CPU0

Mon Dec 18 21:13:01.463 UTC
1) Policymap:

POLICY_QOS_OUT

Type: qos
Targets (applied as main policy):

HundredGigE0/0/0/35 output

Total targets: 1

Targets (applied as child policy):
Total targets: 0

show QoS interface命令显示已配置的参数以及配置了排队操作的每个类的队列ID。此外，还可以获取类似队列大小的默认值。

<#root>

```
RP/0/RP0/CPU0:xrg-ncs-04#show qos interface hundredGigE 0/0/0/35 output

Thu Dec 14 20:56:29.796 UTC

NOTE:- Configured values are displayed within parentheses

Interface HundredGigE0/0/0/35 ifh 0x138  -- output policy

NPU Id:                        5

Total number of classes:       6

Interface Bandwidth:           100000000 kbps

VOQ Base:                      1032


Accounting Type:               Layer1 (Include Layer 1 encapsulation and above)

------------------------------------------------------------------------------

Level1 Class (

HP1

)                      =   tc1

Egressq Queue ID                         =   1033 (HP1 queue)


Queue Max. BW.                           =   0 kbps (19 %)

Guaranteed service rate                  =   19000000 kbps


TailDrop Threshold                       =   1187840 bytes / 500 us (500 us)

WRED not configured for this class


Level1 Class (

HP2

)                      =   tc2

Egressq Queue ID                         =   1034 (HP2 queue)

Queue Max. BW.                           =   0 kbps (20 %)

Guaranteed service rate                  =   20000000 kbps
```

TailDrop Threshold = 1253376 bytes / 501 us (500 us)

WRED not configured for this class

Level1 Class = tc3

Egressq Queue ID = 1035 (LP queue)

Queue Max. BW. = 100884395 kbps (default)

Queue Min. BW. = 1020015 kbps (1 %)

Inverse Weight / Weight = 1 / (BWR not configured)

Guaranteed service rate = 1000000 kbps

TailDrop Threshold = 1253376 bytes / 10 ms (default)

WRED not configured for this class

Level1 Class = tc4

Egressq Queue ID = 1036 (LP queue)

Queue Max. BW. = 100824615 kbps (default)

Queue Min. BW. = 20164923 kbps (20 %)

Inverse Weight / Weight = 1 / (BWR not configured)

Guaranteed service rate = 20000000 kbps

TailDrop Threshold = 25034752 bytes / 10 ms (default)

WRED not configured for this class

Level1 Class = tc5

Egressq Queue ID = 1037 (LP queue)

```
Queue Max. BW.                          =   100824615 kbps (default)
Queue Min. BW.                          =   20164923 kbps (20 %)
Inverse Weight / Weight                 =   1 / (BWR not configured)
Guaranteed service rate                 =   20000000 kbps
TailDrop Threshold                      =   25034752 bytes / 10 ms (default)
WRED not configured for this class

Level1 Class                            =   class-default
Egressq Queue ID                        =   1032 (Default LP queue)

Queue Max. BW.                          =   100824615 kbps (default)
Queue Min. BW.                          =   20164923 kbps (20 %)
Inverse Weight / Weight                 =   1 / (BWR not configured)
Guaranteed service rate                 =   20000000 kbps
TailDrop Threshold                      =   25034752 bytes / 10 ms (default)
WRED not configured for this class

RP/0/RP0/CPU0:xrg-ncs-04#show feature-mgr client qos-ea policy summary location 0/0/CPU0
Thu Dec 14 21:27:30.486 UTC
Pol-Num  Flags     Classes Ref-cnt In-Hash Compiled  Policy Name
------- ---------- ------- ------- ------- -------- -----------
3       0x00010000       6       0     Yes       No POLICY_QOS_OUT

2       0x00000000       1       0     Yes       No p_out
1       0x00004000       2       4     Yes       Yes ingress_marking

RP/0/RP0/CPU0:xrg-ncs-04#show feature-mgr client qos-ea policy policy POLICY_QOS_OUT location 0/0/CPU0
Thu Dec 14 21:28:22.182 UTC

Policy name:
POLICY_QOS_OUT

Policy Number:      3
```

```
Flags:              0x10000 [DNX_FM_POL_TC]
Class Number:       6
Reference Count:    0
In Hash:            Yes
Is Compiled:        No

 Level: 0 Class Number: 0 Class Name: tc1
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY
         ACE: 0 Class:0 Match:0 proto ANY Flags:0x8080 [Grant]
                 DNX_FM_RANGE_TC: (1, 1)
                 UNKNOWN:                UNKNOWN:
 Level: 0 Class Number: 1 Class Name: tc2
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY
         ACE: 0 Class:1 Match:0 proto ANY Flags:0x8080 [Grant]
                 DNX_FM_RANGE_TC: (2, 2)
                 UNKNOWN:                UNKNOWN:
 Level: 0 Class Number: 2 Class Name: tc3
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY
         ACE: 0 Class:2 Match:0 proto ANY Flags:0x8080 [Grant]
                 DNX_FM_RANGE_TC: (3, 3)
                 UNKNOWN:                UNKNOWN:
 Level: 0 Class Number: 3 Class Name: tc4
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY
         ACE: 0 Class:3 Match:0 proto ANY Flags:0x8080 [Grant]
                 DNX_FM_RANGE_TC: (4, 4)
                 UNKNOWN:                UNKNOWN:
 Level: 0 Class Number: 4 Class Name: tc5
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY
         ACE: 0 Class:4 Match:0 proto ANY Flags:0x8080 [Grant]
                 DNX_FM_RANGE_TC: (5, 5)
                 UNKNOWN:                UNKNOWN:
 Level: 0 Class Number: 5 Class Name: class-default
```

```
     Match Count: 1 Flags: 0x0 Logical Op: MATCH_ANY

         ACE: 0 Class:5 Match:0 proto ANY Flags:0x28000 [Grant][Default]

                 UNKNOWN:                UNKNOWN:

Adding WRED:

policy-map POLICY_QOS_OUT
class tc4
random-detect
discard-class 1


5 ms


15 ms


!
class class-default
!
end-policy-map
!
end

Level1 Class                          =   tc4

Egressq Queue ID                      =   1036 (LP queue)

Queue Max. BW.                        =   100824615 kbps (default)

Queue Min. BW.                        =   20164923 kbps (20 %)

Inverse Weight / Weight               =   1 / (BWR not configured)

Guaranteed service rate               =   20000000 kbps

TailDrop Threshold                    =   75497472 bytes / 30 ms (default)


WRED profile for
Discard_Class 1



WRED Min. Threshold                   =   12517376 bytes (5 ms)



WRED Max. Threshold                   =   37748736 bytes (15 ms)



Default RED profile
```

```
WRED Min. Threshold                      =   0 bytes (0 ms)

WRED Max. Threshold                      =   0 bytes (0 ms)

RP/0/RP0/CPU0:xrg-ncs-04#show controllers npu voq-usage interface HundredGigE 0/0/0/35 instance 5 locat

Tue Nov  7 17:24:03.570 UTC



------------------------------------------------------------------

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)                                  type   (Gbps)

------------------------------------------------------------------

Hu0/0/0/35   138

5

   0    1   321   1032   1064 local   100

<-

1032

 (Default LP queue) - displays the base queue -> refer to show qos interface commaand.

Display the queue details:

RP/0/RP0/CPU0:xrg-ncs-04#

show controllers fia diagshell 5 "diag cosq voq id=1036 det=1" location 0/0/CPU0    <- 1036 (LP queue) -

Thu Dec 14 21:51:33.184 UTC



Node ID: 0/0/CPU0



Core 0:

Basic info

        Q type: voq

        num cos: 8, cosq class: 4
```

```
        Base queue id: 1032, base queue gport: 0x24000408
Credit request type: BCM_COSQ_DELAY_TOLERANCE_100G_SLOW_ENABLED Adjusted for slow enabled 100Gb ports
        Watchdog enable in common status message mode
        Is queue in credit watchdog queue range:True
        Credit watchdog message time: 0
        Delete queue time: 512
        Backoff enter queue credit balance threshold: 40960
        Backoff exit queue credit balance threshold: 40960
        Backlog enter queue credit balance threshold: 40960
        Backlog exit queue credit balance threshold: 40960
        Empty queue satisfied credit balance threshold: 0
        Max empty queue credit balance threshold: 16384
        Exceed max empty queue credit balance threshold: 1
        Off-To-Slow credit balance threshold: 0
        Off-To-Normal credit balance threshold: 38912
        Slow-To-Normal credit balance threshold: 38912
        Normal-To-Slow credit balance threshold: 38912
        Delay Tolerance is NOT OCB only
        Delay Tolerance is NOT High Q Priority
        Slow Level Thresh Down in slow level number: 0 is: 0
        Slow Level Thresh Down in slow level number: 1 is: 0
        Slow Level Thresh Down in slow level number: 2 is: 0
        Slow Level Thresh Down in slow level number: 3 is: 0
        Slow Level Thresh Down in slow level number: 4 is: 0
        Slow Level Thresh Down in slow level number: 5 is: 0
        Slow Level Thresh Down in slow level number: 6 is: 0
        Slow Level Thresh Up in slow level number: 0 is: 0
        Slow Level Thresh Up in slow level number: 1 is: 0
        Slow Level Thresh Up in slow level number: 2 is: 0
        Slow Level Thresh Up in slow level number: 3 is: 0
        Slow Level Thresh Up in slow level number: 4 is: 0
```

```
        Slow Level Thresh Up in slow level number: 5 is: 0
        Slow Level Thresh Up in slow level number: 6 is: 0
Credit value(local): 1024, Credit value(remote): 2048
Credit discount value: -2
Rate class info
        WRED info:
                Green : enable(False) min_thresh(0) max_thresh(0) drop_probability(0)
Yellow: enable(True) min_thresh(12517376) max_thresh(37748736) drop_probability(9)
                Red   : enable(False) min_thresh(0) max_thresh(0) drop_probability(0)
                Black : enable(False) min_thresh(0) max_thresh(0) drop_probability(0)
        Tail drop info:
                Green : max queue size in bytes(75497472), max queue size in BDs(294912)
                Yellow: max queue size in bytes(75497472), max queue size in BDs(294912)
                Red   : max queue size in bytes(75497472), max queue size in BDs(294912)
                Black : max queue size in bytes(75497472), max queue size in BDs(294912)
        Guaranteed info:
                Green : min queue size in bytes(0), min queue size in BDs(0)
                Yellow: min queue size in bytes(0), min queue size in BDs(0)
                Red   : min queue size in bytes(0), min queue size in BDs(0)
                Black : min queue size in bytes(0), min queue size in BDs(0)
        Fair adaptive tail drop info:
                Enable: True
                Green : alpha(-2)
                Yellow: alpha(-2)
                Red   : alpha(-2)
                Black : alpha(-2)
        ECN wred info: enable(False) min_thresh(0) max_thresh(0) drop_probability(0)
        ECN max queue size in bytes(524288), max queue size in BDs(524288)
VSQ-related
        Category class: 2
```

```
        Traffic class: 4

        Connection class: 0

        Green : Admission-test-templates(0)

        Yellow: Admission-test-templates(0)

        Red   : Admission-test-templates(0)

        Black : Admission-test-templates(0)

        AdmissionTestProfileA[0]:'category, traffic class'

        AdmissionTestProfileB[0]: 'category'
```

current queue size: 0 bytes, current queue bds size: 0

```
Attached VOQ connector: 0x00000428

Destination sys port: 0x00007fff

OCB eligiblity: True

[SNIP]

output for core 1 is ommitted.
```

要监控队列大小，可以运行上述命令和对应行的grep。

示例：show controllers fia diagshell 5 "diag cosq voq id=1036 core=0 det=1" location 0/0/CPU0 | i当前队列大小

可以使用show policy-map interface命令显示统计信息。

示例：show policy-map interface hundredGigE 0/0/0/35 output location 0/0/CPU0

注意：从其他XR平台可知，输出并不详细。它不会显示相应WRED或RED配置文件的行。

```
RP/0/RP0/CPU0:xrg-ncs-04#show policy-map interface hundredGigE 0/0/0/35 output location 0/0/CPU0

Thu Dec 14 22:05:50.971 UTC


Interface:HundredGigE0/0/0/35 Location: node0_0_CPU0 output: POLICY_QOS_OUT
```

```
Class tc1
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                  0/0                   0
    Transmitted         :                  0/0                   0
    Total Dropped       :                  0/0                   0
  Queueing statistics
    Queue ID                           : 1033
    Taildropped(packets/bytes)         : 0/0
Class tc2
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                  0/0                   0
    Transmitted         :                  0/0                   0
    Total Dropped       :                  0/0                   0
  Queueing statistics
    Queue ID                           : 1034
    Taildropped(packets/bytes)         : 0/0
Class tc3
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                  0/0                   0
    Transmitted         :                  0/0                   0
    Total Dropped       :                  0/0                   0
  Queueing statistics
    Queue ID                           : 1035
    Taildropped(packets/bytes)         : 0/0
Class tc4
  Classification statistics          (packets/bytes)     (rate - kbps)
    Matched             :                  0/0                   0
    Transmitted         :                  0/0                   0
    Total Dropped       :                  0/0                   0
  Queueing statistics
    Queue ID                           : 1036
```

```
    Taildropped(packets/bytes)           : 0/0

Class tc5

  Classification statistics          (packets/bytes)     (rate - kbps)

    Matched             :                  0/0                   0

    Transmitted         :                  0/0                   0

    Total Dropped       :                  0/0                   0

  Queueing statistics

    Queue ID                           : 1037

    Taildropped(packets/bytes)           : 0/0

Class class-default

  Classification statistics          (packets/bytes)     (rate - kbps)

    Matched             :                  0/0                   0

    Transmitted         :                  0/0                   0

    Total Dropped       :                  0/0                   0

  Queueing statistics

    Queue ID                           : 1032

    Taildropped(packets/bytes)           : 0/0
```

监控FMQ

组播流量未计划。它使用交换矩阵组播队列(FMQ)，而不是传统的VOQ。在分数出口组播上，不支持QoS。
要显示FMQ的统计信息，此命令从6.5.2开始可用：

```
RP/0/RP0/CPU0:NCS5508#show controllers npu stats voq base 0 instance 0 location 0/0/CPU0
Mon Jul 8 08:59:22.465 UTC

Asic Instance = 0
VOQ Base = 0
       ReceivedPkts   ReceivedBytes    DroppedPkts     DroppedBytes
-----------------------------------------------------------------
TC_0 = 224            15673            49              3468
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 = 0              0                0               0
```

也可以跟踪NPU上的数据包，并检查是否应用了适当的流量类(TC)。请查看

部分按照中转数据包执行相应的diag shell命令和过滤器。

要收集的其他命令

以下是一些附加命令：

- show tech-support qos pi
- 显示技术支持qos平台
- show tech cef platform

如果怀疑某个接口存在问题：

- show run interface <name>
- show run policy-map <>（适用于接口上应用的策略映射）
- show qos interface <name> input|output
- show policy-map interface <name>
- show qos remote location <node>（用于出口策略）

如果接口是捆绑包，请提供完整的捆绑包成员信息。

- show bundle <>

限制/警告

标记

- 同一策略映射中不支持L2(COS， DEI)和L3(MPLS EXP)标记

- 当策略与set discard-class组合时，策略器无法正常工作。

- match qos-group仅用于标记。
- qos-group 0保留用于默认类。
- 标记策略的统计信息和计数器不会显示。

带宽

- 策略映射中的所有bandwidth语句的总和不得大于100%
- 策略映射中的所有剩余带宽语句的总和不得大于100%
- 整形器不在类之间共享，因此对bandwidth语句的摘要没有限制。

入口QoS

入口服务策略中不支持队列操作。

出口QoS

- 标记功能/操作非常有限。
- 仅支持流量类(TG)、qos组(QG)和丢弃类(DC)上的出口策略匹配。
  - TC — 用于排队操作
  - QG — 用于标记操作
  - DC - WRED
- 连接以下策略映射的服务策略将在出口接口上被拒绝：\

```
policy-map SET-AND-QUEUE-OUT
    class GOLD
      priority level 1
      shape average percent 20
      queue-limit 500 us
      set mpls experimental imposition 5
```

您得到的错误消息是： !!%“DNX_QOSEA”检测到“警告”条件“出口策略映射配置无效。使用qos-group标记功能，使用traffic-class排队功能”。

可以应用两个不同的服务策略，一个用于标记，另一个用于排队。

HQoS

- 在子接口上应用服务策略时，如果HQoS配置文件是平面的，则它需要独立于该配置文件。
- 在包含优先级类的子接口上应用服务策略时，如果该类是分层式或平面式，则需要与该类无关的整形器。

- 在HQoS模式下，优先级类必须具有速率限制配置（整形器）。 将有效整形器值作为优先级带宽预留。

- 在HQoS模式下，相同的策略映射配置下不支持同时支持带宽(BW)和剩余带宽(BWR)。可以在同一策略映射中配置带宽或剩余带宽。
- 版本6.3.1之前的同一策略映射不支持BW各自BWR以及形状。
- 父类中不允许使用WRED
- HQoS模式最多支持4个优先级
- 入口HQoS策略与入口对等配置文件一起不受支持。
- 对于二级策略，不支持父级别的用户定义的类。
- 由于TCAM限制，基于策略的隧道选择(PBTS)在启用HQoS配置文件时不起作用。

提交后出现不支持的配置警告

在某些情况下，您在提交QoS配置后可能会看到警告日志，如下例所示：

由于提交操作而检测到的验证警告百分比。请发出“show configuration warnings”查看警告

如果您执行建议的CLI，您会看到：

```
!! SEMANTIC ERRORS: This configuration was rejected by
!! the system due to semantic errors. The individual
!! errors with each failed configuration command can be
!! found below.
```

<此处打印原因>

但是，配置已应用。在这种情况下，它可能来自杨氏验证。

请检查是否配置了启用配置验证。

如果是这种情况，那么杨的规则可能已经触发。

您可以打开debug configuration validation ccv detail，然后重新提交配置。

您应该看到yang规则，该规则在调试输出中触发“不支持”消息。

<#root>

```
Example:

RP/0/RP0/CPU0:Jan 22 15:57:44.441 UTC: ccv[189]: ...essage : 'Service Policy on interface "TenGigE0/0/0
cac-ser-pol-qos-in-unsupp-intf
').
```

在这种情况下，请联系QoS PI团队。

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