Configuring Network QoS

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About Network QoS

The network QoS policy defines the characteristics of QoS properties network wide. With a network QoS policy, you can configure the following:

- Pause behavior—You can decide whether a QoS group requires the lossless behavior. The lossless behavior is provided by using a priority flow control (PFC) mechanism that prevents packet loss during congestion. You can configure drop (frames with this value that can be dropped) and no drop (frames with this value that cannot be dropped). For the drop and no drop configuration, you also need to enable PFC per port. For more information about PFC, see the "Configuring Priority Flow Control" section.

Prerequisites for Network QoS

The network QoS policy has the following prerequisites:

- You must be familiar with using modular QoS CLI.
- You are logged on to the device.

Guidelines and Limitations for Network QoS

The network QoS policy has the following guidelines and limitations:

- PVLANs do not provide support for PVLAN QoS.
- **show** commands with the **internal** keyword are not supported.

- Changing the network QoS policy is a disruptive operation, and it can cause traffic drops on any or all ports.
- When enabling jumbo MTU, the default network QoS policy can support jumbo frames. Under the network QoS policy, the MTU is used only for buffer carving when no-drop classes are configured. No additional MTU adjustments are required under the network QoS policy to support jumbo MTU.
- NX-OS does not allow more than 2 no-drop classes per policy-map.
- Network QoS is not supported on the Cisco Nexus 9508 switch.
- Beginning with NX-OS 7.0(3)I7(4), you can enable a network QoS pause configuration per QoS class with the **pause pfc-cos** *cos-list* **receive** command for the receive-only PFC option. When specifying this option, PFC pause frame generation is disabled for a particular queueing policy class or queue.

  A network QoS policy can have a maximum combined total of six asymmetric PFC (APFC) and PFC classes.

Note PFC is required to be enabled on a port to support APFC on that port.

- The following section describes the guidelines and limitations for Dynamic Packet Prioritization:
- Beginning with Cisco NX-OS Release 10.3(1)F, Network QoS and DPP are not supported on the Cisco Nexus 9800 platform switches.
- Beginning with Cisco NX-OS Release 10.4(1)F, QoS is supported on the Cisco Nexus 9332D-H2R switches.
- Beginning with Cisco NX-OS Release 10.4(2)F, QoS is supported on the Cisco Nexus 93400LD-H1 switches.
- Beginning with Cisco NX-OS Release 10.4(3)F, QoS is supported on the Cisco Nexus 9364C-H1 switches.

Dynamic Packet Prioritization

Dynamic Packet Prioritization (DPP) prioritizes a configured number of packets of every new flow in a particular class of traffic is prioritized and sent through a configured class of traffic that DPP is mapped to.

When the number of packets in a flow reaches a specific threshold, prioritization ends and the subsequent packets in the flow go to the normal class.

Note Default number of packets is 120.

- Maximum number of packets:
  - Application Spine Engine (ASE2) enabled switches — 256
  - Leaf Spine Engine (LSE) enabled switches — 1024

Flows seen during a reload might not be prioritized by DPP. Flows are prioritized only after the forwarding path is re-established.

Beginning with Cisco NX-OS Release 9.3(3), Cisco Nexus 9300-GX platform switches support the DPP feature.

DPP uses an age-out timer to evict idle flows.

Note Default age-period is 5 msec.

The DPP feature is enabled on a queue using the **dpp set-qos-group** command under a network QoS policy configuration.

Note A DPP enabled queue cannot be a no-drop queue (For example, both pause pfc-cos and dpp cannot be enabled on the same queue.)

Configuring and applying the policy are as follows:

```
switch(config)# policy-map type network-qos dpp
switch(config-pmap-nqos)# class type network-qos c-8q-nq1
switch(config-pmap-nqos-c)# dpp set-qos-group 7

switch(config)# system qos
switch(config-sys-qos)# service-policy type network-qos dpp
```

Configuring the age-period and the max-num-packets are as follows:

```
switch(config)# hardware qos dynamic-packet-prioritization age-period 5000 usec

switch(config)# hardware qos dynamic-packet-prioritization max-num-pkts 120
```

Configuring Network QoS Policies

You can configure a network QoS policy by following one of these methods:

- Predefined policies—You can apply a predefined network QoS policy that fits your requirement. By default, default-nq-policy is configured.
- User-defined policy—You can create a network QoS policy that conforms to one of the system-defined policies.

Copying a Predefined Network QoS Policy

SUMMARY STEPS

1. **qos copy policy-map type network-qos default-nq-policy** {**prefix** *prefix* | **suffix** *suffix*}
2. **show policy-map type network-qos my_nq**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**qos copy policy-map type network-qos default-nq-policy** {**prefix** *prefix* | **suffix** *suffix*} **Example:** `switch# qos copy policy-map type network-qos default-nq-policy prefix my_nq`	Copies a predefined network QoS policy and adds a suffix or prefix to its name. A prefix or suffix name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
Step 2	**show policy-map type network-qos my_nq** **Example:** `switch# show policy-map type network-qos my_nq`	(Optional) Displays the type network-qos policy map.

Configuring a User-Defined Network QoS Policy

SUMMARY STEPS

1. **configure terminal**
2. **class-map type network-qos match-any** *class-name*
3. **match qos-group** *group*
4. **exit**
5. **policy-map type network-qos** *policy-map-name*
6. **class type network-qos** {*class-name* | **class-default**}
7. **pause** *group*

DETAILED STEPS

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**class-map type network-qos match-any** *class-name*
	Example:
	`switch(config)# class-map type network-qos match-any c-nq2`
	`switch(config-cmap-nqos)#`
		Configures the class map of the type network-qos and enters class-map mode. Class network-qos names are listed in previous System-Defined Type network-qos Class Maps table.

Step 3	**match qos-group** *group* **Example:**	Specifies the QoS group to match. The range is from 0 to 3.

	Command or Action	Purpose
	`switch(config-cmap-nqos)# match qos-group 2`	

Step 4	**exit**
	Example:
	`switch (config-cmap-nqos)# exit`
	`switch (config)#`
		Exits class-map mode and enters global configuration mode.

Step 5	**policy-map type network-qos** *policy-map-name* **Example:** `switch(config)# policy-map type network-qos map2`	Creates a policy map. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
Step 6	**class type network-qos** {*class-name* | **class-default**} **Example:** `switch(config-pmap-nqos)# class type network-qos c1-nq2`	Refers to the class map of type network-qos as configured in Step 2.
Step 7	**pause** *group* **Example:** `switch(config-pmap-nqos-c)# pause pfc-cos 2`	Specifies no-drop for the QoS group. **Note** For 7.0(3)I1(1) and earlier, the no-drop queuing configuration is not supported in the network-qos policy for the Cisco Nexus 9300 platform.

Applying a Network QoS Policy on a System

You apply a network QoS policy globally on a system. Applying a network QoS policy also automatically applies the corresponding queuing policies.

SUMMARY STEPS

1. **configure terminal**
2. **system qos**
3. **service-policy type network-qos** {*policy-map-name* | **default-nq-policy**}

DETAILED STEPS

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

	Command or Action	Purpose

Step 2	**system qos**
	Example:
	`switch (config)# system qos`
	`switch (config-sys-qos)#`
		Enters system qos mode.

Step 3	**service-policy type network-qos** {*policy-map-name* | **default-nq-policy**} **Example:** `switch (config-sys-qos)# service-policy type network-qos map1`	Specifies the policy map to use as the service policy for the system. **Note** To restore the system to the default network QoS service policy, use the **no** form of this command. **Note** All Layer 4 class-maps under the network-qos policy-map must be configured before applying it under the system qos level.

Verifying the Network QoS

To display the policing configuration information, perform one of the following tasks:

Command	Purpose
show class-map type network-qos	Displays the type network-qos class maps.
show policy-map type network-qos	Displays the type network-qos policy maps.
show policy-map system type network-qos	Displays the active type network-qos class maps.