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FAQs



Quality of Service on Catalyst 4500/4000 Switches Running CatOS FAQ

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Introduction

This document addresses frequently asked questions (FAQ) on the Quality of Service (QoS) feature of the Cisco Catalyst 4500/4000 (Supervisor Engine I and Supervisor Engine II) series, Catalyst 2948G, Catalyst 2980G, and Catalyst 4912G switches that run Catalyst OS (CatOS). This document refers to these switches as "Catalyst 4000 switches that run CatOS". For QoS features on Catalyst 4500/4000 switches that run Cisco IOS® Software, refer to the document [Configuring QoS](#).

For more information on document conventions, refer to the [Cisco Technical Tips Conventions](#).

Q. Which QoS features do Catalyst 4500/4000 switches that run CatOS support?

A. Catalyst 4500/4000 switches that run CatOS support input classification and output scheduling on Layer 2 (L2) ports. Refer to the document [Installation and Configuration Note for the Catalyst 4000 Layer 3 Services Module](#) for additional features that are available on Layer 3 (L3) Gigabit Ethernet interfaces.

Q. What is the minimum software that is necessary for QoS on Catalyst 4500/4000 switches that run CatOS?

A. You need Supervisor Engine software version 5.4(2) and later on the Catalyst 4500/4000 (Supervisor Engine I and Supervisor Engine II), Catalyst 2948G, Catalyst 2980G, and Catalyst 4912G to support the QoS features.

Q. Do the Catalyst 4500/4000 switches that run CatOS support rate-limiting or policing on ports or VLANs?

A. Catalyst 4500/4000 switches that run CatOS do not provide policing or rate-limiting on Layer 2 (L2) ports. Rate-limiting is supported on Layer 3 (L3) Gigabit Ethernet interfaces. Refer to the [Installation and Configuration Note for the Catalyst 4000 Layer 3 Services Module](#) for additional information. Policing is supported on the Catalyst 4500/4000 switches that run Cisco IOS Software. For more information, refer to the document [QOS Policing and Marking with Catalyst 4000/4500 IOS-Based Supervisor Engines](#).

Q. Can the Catalyst 4500/4000 switches that run CatOS mark or rewrite IP precedence Type of Service (ToS) bits in an IP packet?

A. Catalyst 4500/4000 switches that run CatOS do not provide Layer 3 (L3) marking or rewriting on Layer 2 (L2) ports. The L3 ToS bits of an incoming packet are passed through the L2 switch untouched. The incoming IP precedence on L3 module Gigabit Ethernet interfaces is honored. Refer to the [Installation and Configuration Note for the Catalyst 4000 Layer 3 Services Module](#) for additional information. Marking and rewriting of IP precedence/differentiated services code point (DSCP) is supported in a Catalyst 4500/4000 that runs Cisco IOS Software. For more information, refer to the document [QOS Policing and Marking with Catalyst 4000/4500 IOS-Based Supervisor Engines](#).

Q. What kind of input scheduling do the Catalyst 4500/4000 switches that run CatOS provide?

A. Line cards of Catalyst 4500/4000 switches that run CatOS have FIFO input scheduling on Layer 2 (L2) ports. Refer to the [Installation and Configuration Note for the Catalyst 4000 Layer 3 Services Module](#) for additional information on Layer 3 (L3) module features.

Q. Can the Catalyst 4500/4000 switches that run CatOS change the incoming Class of Service (CoS) value in IEEE 802.1Q (dot1q) tags?

A. No. The Catalyst 4500/4000 switches that run CatOS support frame classification and marking only on unclassified frames entering the switch and cannot change CoS values on already tagged packets. Catalyst 4500/4000 switches that run Cisco IOS Software can classify or reclassify tagged/untagged packets. For more information, refer to the document [Understanding and Configuring QoS](#).

Q. My server cannot tag Class of Service (CoS) values. Can the Catalyst 4500/4000 switches that run CatOS tag the traffic from the server for a specific CoS value?

A. Yes, but remember that the default CoS for untagged packets is switch-wide and not on a per-port basis. So, all untagged packets are marked the same CoS value. Catalyst 4500/4000 switches that run Cisco IOS Software do support tagging on a per-port basis. For more information, refer to [Understanding and Configuring QoS](#).

Q. Do the Catalyst 4500/4000 switches that run CatOS honor the incoming Class of Service (CoS) value in IEEE 802.1Q (dot1q) tags from my IP phones?

A. Yes, Catalyst 4500/4000 switches that run CatOS do honor the incoming CoS value in the dot1q tag. Since dot1q does not tag the native VLAN, you need to use the switch-wide CoS configuration to tag such packets. These tags are retained through the switch and used in output scheduling. If the outgoing port is a trunk, the original CoS value or the new value (for packets that arrive untagged on native VLAN) is tagged in the packet.

Q. Can the Catalyst 4500/4000 switches that run CatOS extend the trust or override the incoming Class of Service (CoS) value of devices connected to the IP phones?

A. No, Catalyst 4500/4000 switches that run CatOS cannot extend the trust or override the incoming CoS value of traffic from devices connected to the IP phones. Catalyst 4500/4000 switches that run Cisco IOS Software can support extended trust. Refer to the document [Configuring Voice Interfaces](#).

Q. What kind of output scheduling do the Catalyst 4500/4000 switches that run CatOS provide?

A. Line cards of Catalyst 4500/4000 switches that run CatOS support two output queues per port with one threshold at 100 percent. This 2 Queues, 1 Threshold (2Q1T) method is not configurable. It does offer user configuration for Class of Service (CoS) value maps for the two queues. For example, you can configure packets with a CoS value of 0–3 to use the first queue and 4–7 to use the second queue. Catalyst 4500/4000 only supports CoS mappings in pairs, 0–1, 2–3, 4–5, 6–7. You cannot set one CoS value unless you specify the corresponding partner CoS. For example, you cannot specify 0–4 for the first queue because you must pair 5 with the partner, 4. The two queues are serviced in a round-robin fashion.

Refer to the [Installation and Configuration Note for the Catalyst 4000 Layer 3 Services Module](#) for additional information on Layer 3 module features. For Catalyst 4500/4000 switches that run Cisco IOS Software features, refer to the document [Understanding and Configuring QoS](#).

Q. I enabled QoS on a Catalyst 4500/4000 switch that runs CatOS and now I see performance issues. What is wrong?

A. When QoS is disabled, unicast traffic is assigned to queue 1 and broadcast, multicast, and unknown traffic is assigned to queue 2. If you enable QoS but do not modify the Class of Service (CoS)-to-transmit queue mappings, switch performance can be affected because all traffic is assigned to queue 1. If you enable QoS, modify the CoS-to-transmit queue mappings.

Q. How do the QoS features on the Catalyst 4500/4000 switches that run CatOS compare to Catalyst 4500/4000 switches that run Cisco IOS Software? How do the features compare with the features of the Layer 3 (L3) switching module?

A. The Catalyst 4500/4000 is available in three configurations that vary with the supported QoS features. This table summarizes these variations:

	Supervisor Engine I/II (Which Includes L2¹ Ports on an L3 Module That Runs CatOS)	WS-X4232-L3 Module (L3 Gigabit Ports Only)	Cisco IOS Software (Supervisor Engine II+, III, IV, and V)
MQC ² support	No	No	Yes
Switch-wide QoS	Yes	N/A	Yes
Per-port QoS	No	Yes	Yes
Transmit queues per port	2Q1T ³ — Map CoS ⁴ values to queues with the set qos map command	4Q ⁵	4Q
Receive queues per port	N/A	N/A	N/A ⁶

Scheduling	Round-robin	WRR ⁷ with the qos mapping precedence value wrr-weight weight command	Round-robin, WRR, or strict priority
Strict priority queue	No	No	Yes, with the tx-queue 3 priority high command
Congestion avoidance	No	No	Yes, DBL ⁸ is available on Supervisor Engine IV
Policers (ingress)	N/A	Yes, with the rate-limit input command	Yes, up to 1K policers ⁹
Policers (egress)	N/A	Yes, with the rate-limit output command	Yes, up to 1K policers ⁹
Input/output policer definition with L3 and L4 ¹⁰ headers	No	No, applies to all IP and non-IP traffic per port	Yes
Output shaping	No	Yes, as of Cisco IOS Software Release 12.0 (10)W5(18e) with the traffic-shape rate command	Yes, per-egress queue with the shape command
Classification with an IP DSCP ¹¹ basis	No	Yes, IP precedence bits only	Yes, on the basis of "trusted" values of arriving packets or via the configuration of per-port, ACL-based ¹² ,

			or class-based marking
Classification based on IEEE 802.1p (CoS)	Yes	N/A	Yes, based on "trusted" values of arriving packets or via configured marking rules
Classification based on ACLs or traffic classes	No	No, applies to all IP and non-IP traffic, except high-priority packets destined to the CPU	Yes
Marking based on ISL ¹³ , 802.1p, and IP ToS ¹⁴	Yes, switchwide settings only with set qos defaultcos command and only on unclassified or untagged frames	No, honors existing IP precedence values for input classification and output scheduling.	Yes

¹ L2 = Layer 2

² MQC = Modular QoS command-line interface (CLI)

³ 2Q1T = 2 Queues, 1 Threshold

⁴ CoS = Class of Service

⁵ 4Q = 4 Queues

⁶ The Supervisor Engine provides nonblocking switch architecture to obviate the need for input queuing.

⁷ WRR = weighted round-robin

⁸ DBL = Dynamic Buffer Limiting

⁹ Be aware of Cisco bug ID [CSCdz48041](#)  ([registered](#) customers only) , which might cause

exhaustion of tags for policers when configuring policers on many interfaces.

¹⁰ L4 = Layer 4

¹¹ DSCP = differentiated services code point

¹² ACL = access control list

¹³ ISL = Inter-Switch Link Protocol

¹⁴ ToS = Type of Service

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Related Information

- [QOS Policing and Marking with Catalyst 4000/4500 IOS-Based Supervisor Engines](#)
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