QoS Priority Queuing CoS DSCP - Carrier Ethernet Technical Standard Compliance Register

CARRIER ETHERNET TECHNICAL STANDARD COMPLIANCE REGISTER: QOS PRIORITY QUEUING COS DSCP

EXECUTIVE SUMMARY

This document serves as the official Technical Standard Compliance Register for the implementation of Quality of Service (QoS) Priority Queuing, Class of Service (CoS), and Differentiated Services Code Point (DSCP) mechanisms within our Carrier-Grade Ethernet switching and routing platforms. This register validates full alignment with IEEE 802.1Q, IETF RFC 2474, and MEF 10.3 standards for traffic classification, marking, and congestion management. Network architects leverage this hardware-accelerated engine to guarantee deterministic latency for real-time traffic, eliminate packet loss for business-critical applications, and maximize WAN utilization through hierarchical scheduling.



HARDWARE-ACCELERATED QOS ARCHITECTURE & SILICON

The forwarding ASIC integrates a 16-stage pipeline for multi-field packet inspection. The engine performs parallel Lookups on VLAN PCP (802.1p), IPv4 DSCP (ToS), and IPv6 Traffic Class headers. Each physical port is equipped with 10 hardware queues per egress direction. The scheduler supports Strict Priority (SP), Deficit Weighted Round Robin (DWRR), and Weighted Random Early Detection (WRED). Dynamic buffer pools allocate 12MB of on-chip shared memory with per-queue thresholding to prevent head-of-line blocking.

KEY FEATURES & CLASSIFICATION LOGIC

- TRUST & REMARKING MODES: Trusted port mode passes original DSCP/COS values unaltered. Untrusted ports rewrite all ingress frames based on

administrative policies.

- DSCP TO COS MUTUAL MAPPING: Automatic hardware translation table supporting AF (Assured Forwarding), EF (Expedited Forwarding), and BE (Best Effort) classes.

- EGRESS POLICING: Dual-rate Three Color Marker (trTCM) per queue with configurable CBS and EBS.

- MICROFLOW CLASSIFICATION: 4K ACL entries for matching 5-tuple (IP SA, IP DA, protocol, L4 ports) to override default CoS.

- CONGESTION AVOIDANCE: Tail drop and WRED with 8 configurable drop thresholds per queue.

- LATENCY MEASUREMENT: Hardware timestamping for 1588v2 PTP to verify queueing delay.

QOS COMPLIANCE & STANDARDS MATRIX

The platform adheres to the following normative references:

- IEEE 802.1Q-2022: VLAN Tagging and PCP encoding (3 user priority bits).

- IETF RFC 2474: Definition of the DSCP field in IPv4 and IPv6 headers.

- IETF RFC 2597: Assured Forwarding PHB Group (AF classes AF11-AF43).

- IETF RFC 3246: An Expedited Forwarding PHB (EF).

- MEF 10.3: Ethernet Services Attributes Phase 3 (Bandwidth Profiles).

- ITU-T Y.1291: QoS architecture for IP networks.

TECHNICAL SPECIFICATIONS

Parameter	Specification
Form Factor	1RU / 2RU Fixed or Modular 5-Slot Chassis
Switching Capacity	Up to 2.56 Tbps (non-blocking)
Power Supply	Dual Hot-Swappable Redundant AC (100-240V) or DC (-48V)
Forwarding Rate	1,488 Mpps (for 1GE ports) / 11,904 Mpps (for 100GE)
Supported DSCP Classes	CS0-CS7, AF11-AF43, EF, VA
Interface Types	10/100/1000BASE-T, 1G/10G/25G/40G/100G SFP/QSFP

PERFORMANCE METRICS

- Maximum Queues per Port: 10 egress / 8 ingress (hardware)

- Scheduling Algorithms: SP, DWRR (Weighted), SP+DWRR hybrid

- DSCP Map Entries: 64 entry table (0-63 code points)

- COS Map Entries: 8 entry table (0-7 priority)

- Policing Granularity: 1 Mbps to 10 Gbps, step 1 Mbps

- Burst Size (CBS): 64 Bytes to 64 MB

- Jitter (EF Queue): < 5 microseconds (line rate)

- Buffer Memory: 12 MB shared, 2 MB dedicated per queue group

- ACL for QoS Classification: 4096 entries (IPv4/IPv6)



OPERATIONAL ADVANTAGES

Deploying this hardware-native QoS engine eliminates the performance penalties of software-based queuing. Service providers can guarantee sub-50ms failover without voice quality degradation. Enterprises achieve true convergence of storage (iSCSI), voice (VoIP), video conferencing, and best-effort web traffic on a single physical infrastructure. The comprehensive compliance register simplifies regulatory audits for SLAs and carrier interconnection agreements.