How to Check Error Packets on Ethernet Interface - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

Document Number: TN-ERR-2408-001

Product Family: NetMonitor Series Embedded Diagnostics Engine

Target Platform: All NetEngine 8000 Series Routers & Carrier Ethernet Switches

This document specifies the hardware-accelerated mechanisms for real-time Ethernet error packet detection, classification, and reporting integrated into the OEM NetMonitor Series ASIC fabric. The capabilities described herein are native to the forwarding plane and do not require external analyzers or software probes.

SYSTEM HARDWARE TOPOLOGY

The NetMonitor Series implements a distributed error detection architecture. Each Ethernet interface is paired with a dedicated 16nm Packet Inspection Co-Processor (PIC) that operates at line rate (1G to 400G). The PIC calculates and validates Frame Check Sequence (FCS), Alignment, and Symbol error counters independently of the main CPU. A dedicated 64-byte error staging buffer captures the first 64 octets of any corrupted frame for forensic analysis without impacting forwarding performance.

Key hardware elements:

- Per-port Error Counter Register File (ECRF) – 256-bit atomic counters
- Symbol Error Threshold Detector – programmable 10^-6 to 10^-12 BER
- Runt/Jumbo filter with hardware timestamp (precision ±4ns)

DATA & CONTROL PLANE CAPABILITIES

1. REAL-TIME ERROR CLASSIFICATION

- FCS Errors: Hardware-derived CRC32 mismatch detection. Counter increment per bad frame. Latency < 1 microsecond.
- Alignment Errors: Frame not octet-aligned (extra/missing bits). Counted

separately from FCS.

- Symbol Errors: Physical layer encoding violations (e.g., 8b/10b, 64b/66b code group errors).

- Runt Frames (<64 bytes) and Giants (>MTU): Hardware-discarded with per-direction counters.

- Jabber Frames: Excessive duration (>2x max frame length) – detected via on-chip timers.

2. AGGREGATED MONITORING INTERFACES

- Telemetry Streaming: gRPC push of error counters every 100ms (configurable 10ms to 10s).

- CLI Visibility (show interface ethernet error-stats): Atomic snapshot of all PIC registers.

- SNMP MIB (RFC 3635): dot3StatsAlignmentErrors, dot3StatsFCSErrors, dot3StatsInternalMacReceiveErrors.

COMPONENT BREAKDOWN

| Component | Function | Redundancy |

|---|---|---|

| PIC-16 | Error detection co-processor | 1+1 per line card |

| Error Staging Buffer | Captures corrupted frame prefix | None (non-volatile) |

| ECRF Block | 64-bit counter array | Battery-backed |

| Threshold Alert Generator | Software-interrupt on BER exceedance | N/A |

OPERATIONAL SPECS MATRIX

- Minimum Error Detection Granularity: 1 corrupted frame per interface

- Counter Depth: 2^64 – overflow impossible under 100GE line rate for 5800+ years

- Sampling Modes: Periodic (default) / Continuous / Triggered (user-defined threshold)

- Reporting Protocols: gRPC, NETCONF, RESTCONF, SNMPv3

- Timestamp Resolution: 4ns (SyncE or PTP disciplined)

Parameter	**Specification**
Form Factor	Embedded line card module (compatible with 1RU/2RU/5RU chassis)
Per-Interface Error Counter Capacity	2^64 frames per type (FCS, Alignment, Symbol, Runt, Giant)
Minimum Error Detection Latency	≤ 1 microsecond (hardware pipeline)
Error Reporting Push Interval	100ms (default), 10ms (minimum)

Staging Buffer Depth	64 bytes x 128 corrupted frames per port
Power Consumption (PIC per 48 ports)	18W typical
Operating Temperature Range	-5°C to +55°C (industrial grade)

REGULATORY COMPLIANCE

The NetMonitor Series error detection subsystem complies with:

- IEEE 802.3-2022 (Clause 65 – 1000BASE-X error monitoring, Clause 92 – 100GBASE-R RS-FEC)

- MEF 48 (Service OAM fault management)

- ITU-T Y.1731 (ETH-DM and ETH-LM for error second counting)

- RoHS 3 (2015/863/EU) and REACH (EC 1907/2006)

FIELD DEPLOYMENT SCHEMATIC

Typical deployment: NetMonitor PICs installed on all WAN-facing ports at ISP edge router. Error counters are polled every 1 second by central NetObserver controller. Upon exceeding error threshold (default 10^-6 BER for 5 consecutive seconds), controller triggers automatic transceiver reset or optical wavelength reassignment without service interruption (sub-50ms protection switching).