# Performance Monitoring

Performance monitoring (PM) parameters are used by service providers to gather, store, set thresholds for, and report performance data for early detection of network issues. You can configure and retrieve PM counters for the various controllers in 30-second, 15-minute, or 24-hour intervals. These parameters simplify troubleshooting operations and enhance data that can be collected directly from the equipment.


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# Configuring PM Parameters

***Table 1: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| PM History Persistence | Cisco IOS XR Release 7.7.1 | PM history parameters for Optics, Ethernet, and coherent DSP controllers are now retained even after operation disruptive events like:<br>• Various reload procedures<br>• Power cycle<br>• Operating system upgrade of the NCS 1004 chassis<br>This functionality maintains prolonged access to performance history that is useful for device health monitoring. |

You can configure and view the performance monitoring parameters for the Optics, Ethernet, and coherent DSP controllers.

To configure PM parameters, use the following commands.

**configure**

**controller** *controllertype R/S/I/P* { **pm** { **15-min** | **30-sec** | **24-hour** } { **optics** | **ether** | **pcs** | **fec** | **otn** | **ocn** | **stm** } { **report** | **threshold** } *value* }

**commit**

**Restriction** Current and History PM counters do not support flex and 30 second bucket types for OC192 and STM64 controllers.

### Examples

The following is a sample in which the performance monitoring parameters of the Optics controller are configured at 24-hour intervals.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/1/5 pm 24-hour optics threshold osnr max
345
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the performance monitoring parameters of the Ethernet controller are configured at 15-minute intervals.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/3/0/0 pm 15-min pcs report bip
enable
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which performance monitoring parameters of a Coherent DSP controller are configured 30-second intervals.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/0/1/1 pm 30-sec fec threshold post-fec-ber
 max OE-15
RP/0/RP0/CPU0:ios(config)#commit
```

### Viewing PM Parameters

To view the performance monitoring parameters for Optics, Ethernet, and Coherent DSP controllers, use this command:

**show controllers** *controllertype R/S/I/P* **{ pm { current | history } { 30 sec | 15-min | 24-hour } { optics | ether | fec | otn | prbs}** *linenumber* }

**Example 1:** Displays the current performance monitoring parameters of the Optics controller at 15-minute intervals. Client optics have four lanes.

```
RP/0/RP0/CPU0:ios#show controller optics 0/1/0/3 pm current 15-min optics 3

Sat Feb 9 19:33:42.480 UTC

Optics in the current interval [19:30:00 - 19:33:42 Sat Feb 9 2019]

Optics current bucket type : Valid
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                        Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[% ]      : 0.0       0.0       0.0      0.0               NA              NO   100.0
```

```
          NA              NO
OPT[dBm]      : -40.00    -40.00    -40.00   -30.00            NA              NO   63.32
          NA              NO
OPR[dBm]      : -40.00    -40.00    -40.00   -30.00            NA              NO   63.32
          NA              NO
FREQ_OFF[Mhz]: 0          0         0        0                 NA              NO   0
          NA              NO
```

**Example 2:** Displays the current performance monitoring parameters of the Optics controller 15-minute intervals. Trunk optics have one lane.

```
RP/0/RP0/CPU0:ios#show controller optics 0/2/0/1  pm  current 15-min optics 1

Sat Feb  9 11:19:15.234 UTC

Optics in the current interval [11:15:00 - 11:19:15 Sat Feb 9 2019]

Optics current bucket type : Valid
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                          Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[% ]       : 0.0       0.0       0.0      0.0               NA              NO   100.0
          NA              NO

OPT[dBm]      : -1.51     -1.49     -1.48    -30.00            NA              NO   63.32
          NA              NO

OPR[dBm]      : -9.11     -9.07     -9.03    -30.00            NA              NO   63.32
          NA              NO

CD[ps/nm]     : 13        15        18       -180000           NA              NO   180000
          NA              NO

DGD[ps ]     : 2.00      2.33      3.00     0.01             NA             NO   21474836.46
      NA              NO

SOPMD[ps^2]  : 5.00      33.02     79.00    0.01             NA             NO   21474836.46
      NA              NO

OSNR[dB]     : 31.50     31.97     32.50    0.01             NA             NO   21474836.46
      NA              NO

PDL[dB]      : 0.20      0.34      0.50     0.01             NA             NO   21474836.46
      NA              NO

PCR[rad/s]   : 0.00      19.92     93.00    0.01             NA             NO   21474836.46
      NA              NO

RX_SIG[dBm]  : -9.05     -9.02     -8.99    -30.00            NA              NO   63.32
          NA              NO

FREQ_OFF[Mhz]: -302      -178      -74      -1500             NA              NO   1500
          NA              NO
```

**Example 3:** Displays the current performance monitoring parameters of the Ethernet controller 15-minute intervals.

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/1/0/2 pm current 15-min ether
Fri Aug 30 00:37:53.527 UTC
```

```
ETHER in the current interval [00:30:00 - 00:37:53 Fri Aug 30 2019]

ETHER current bucket type : Valid
RX-UTIL[%]                : 100.00              Threshold : 0.00          TCA(enable) : NO
TX-UTIL[%]                : 10.00               Threshold : 0.00          TCA(enable) : NO
RX-PKT                    : 3852414442          Threshold : 0             TCA(enable) : NO
STAT-PKT                  : 0                   Threshold : 0             TCA(enable) : NO
OCTET-STAT                : 5847965122956       Threshold : 0             TCA(enable) : NO
OVERSIZE-PKT              : 0                   Threshold : 0             TCA(enable) : NO
FCS-ERR                   : 0                   Threshold : 0             TCA(enable) : NO
LONG-FRAME                : 0                   Threshold : 0             TCA(enable) : NO
JABBER-STATS              : 0                   Threshold : 0             TCA(enable) : NO
64-OCTET                  : 0                   Threshold : 0             TCA(enable) : NO
65-127-OCTET              : 0                   Threshold : 0             TCA(enable) : NO
128-255-OCTET             : 0                   Threshold : 0             TCA(enable) : NO
256-511-OCTET             : 0                   Threshold : 0             TCA(enable) : NO
512-1023-OCTET            : 0                   Threshold : 0             TCA(enable) : NO
1024-1518-OCTET           : 0                   Threshold : 0             TCA(enable) : NO
IN-UCAST                  : 0                   Threshold : 0             TCA(enable) : NO
IN-MCAST                  : 0                   Threshold : 0             TCA(enable) : NO
IN-BCAST                  : 0                   Threshold : 0             TCA(enable) : NO
OUT-UCAST                 : 0                   Threshold : 0             TCA(enable) : NO
OUT-BCAST                 : 0                   Threshold : 0             TCA(enable) : NO
OUT-MCAST                 : 0                   Threshold : 0             TCA(enable) : NO
TX-PKT                    : 7053588067          Threshold : 0             TCA(enable) : NO
OUT-OCTET                 : 451429636288        Threshold : 0             TCA(enable) : NO
IFIN-ERRORS               : 0                   Threshold : 0             TCA(enable) : NO
IFIN-OCTETS               : 0                   Threshold : 0             TCA(enable) : NO
STAT-MULTICAST-PKT        : 0                   Threshold : 0             TCA(enable) : NO
STAT-BROADCAST-PKT        : 0                   Threshold : 0             TCA(enable) : NO
STAT-UNDERSIZED-PKT       : 0                   Threshold : 0             TCA(enable) : NO
IN_GOOD_BYTES             : 5847965122956       Threshold : 0             TCA(enable) : NO
IN_GOOD_PKTS              : 3852414442          Threshold : 0             TCA(enable) : NO
IN_DROP_OTHER             : 0                   Threshold : 0             TCA(enable) : NO
OUT_GOOD_BYTES            : 451429636288        Threshold : 0             TCA(enable) : NO
OUT_GOOD_PKTS             : 7053588067          Threshold : 0             TCA(enable) : NO
IN_PKT_64_OCTET           : 0                   Threshold : 0             TCA(enable) : NO
IN_PKTS_65_127_OCTETS     : 0                   Threshold : 0             TCA(enable) : NO
IN_PKTS_128_255_OCTETS    : 0                   Threshold : 0             TCA(enable) : NO
IN_PKTS_256_511_OCTETS    : 0                   Threshold : 0             TCA(enable) : NO
IN_PKTS_512_1023_OCTETS   : 0                   Threshold : 0             TCA(enable) : NO
IN_PKTS_1024_1518_OCTETS  : 3852414442          Threshold : 0             TCA(enable) : NO
OUT_PKT_64_OCTET          : 7053588067          Threshold : 0             TCA(enable) : NO
OUT_PKTS_65_127_OCTETS    : 0                   Threshold : 0             TCA(enable) : NO
OUT_PKTS_128_255_OCTETS   : 0                   Threshold : 0             TCA(enable) : NO
OUT_PKTS_256_511_OCTETS   : 0                   Threshold : 0             TCA(enable) : NO
OUT_PKTS_512_1023_OCTETS  : 0                   Threshold : 0             TCA(enable) : NO
OUT_PKTS_1024_1518_OCTETS : 0                   Threshold : 0             TCA(enable) : NO
TX_UNDERSIZED_PKT         : 0                   Threshold : 0             TCA(enable) : NO
TX_OVERSIZED_PKT          : 0                   Threshold : 0             TCA(enable) : NO
TX_JABBER                 : 0                   Threshold : 0             TCA(enable) : NO
TX_BAD_FCS                : 0                   Threshold : 0             TCA(enable) : NO
```

**Note** Performance monitoring statistics are not supported for IN-UCAST and OUT-UCAST counters for Ethernet clients.

**Note** If you set the LC mode on the OTN-XP card to 4x100G-MXP-400G-TXP-LC, the performance monitoring parameters for the 400GE controllers (fourHundredGigECtrlr) are unsupported in the card.

**Example 4:** Displays the current *FEC* performance monitoring parameters of the Coherent DSP controller at 15-minute intervals.

```
RP/0/RP0/CPU0:ios#show controller coherentDSP 0/2/0/1 pm current 15-min  fec


Sat Feb  9 11:23:42.196 UTC

g709 FEC in the current interval [11:15:00 - 11:23:42 Sat Feb 9 2019]

FEC current bucket type : Valid
    EC-BITS   : 291612035786            Threshold : 903330                 TCA(enable)  :
YES
    UC-WORDS  : 0                       Threshold : 5                      TCA(enable)  :
YES

                MIN       AVG        MAX    Threshold   TCA     Threshold   TCA
                                              (min)    (enable)   (max)    (enable)
PreFEC BER  : 7.1E-03   7.2E-03   8.1E-03     0E-15        NO     0E-15       NO
PostFEC BER :   0E-15     0E-15     0E-15     0E-15        NO     0E-15       NO
```

**Example 5:** Displays the current *PRBS* performance monitoring parameters of the Coherent DSP controller 15-minute intervals.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/0/0/1 pm current 15-min prbs


Mon Feb 13 00:58:48.327 UTC
PRBS in the current interval [00:45:00 - 00:58:48 Mon Feb 13 2019]
PRBS current bucket type : Valid
EBC : 40437528165
FOUND-COUNT : 1 FOUND-AT-TS : 00:51:22 Mon Feb 13 2019
LOST-COUNT : 1 LOST-AT-TS : 00:52:52 Mon Feb 13 2019
CONFIG-PTRN : PRBS_PATTERN_PN31
Last clearing of "show controllers OTU" counters never
```

**Example 6:** Displays the current PCS performance monitoring parameters of the Coherent DSP controller 30-second intervals.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/0/0/2 pm current 30-sec pcs
Tue Nov 19 09:17:26.684 UTC

Ethernet PCS in the current interval [09:17:00 - 09:17:26 Tue Nov 19 2019]

Ethernet PCS current bucket type : Valid
BIP[00] : 0 Threshold : 0 TCA(enable) : NO
BIP[01] : 0 Threshold : 0 TCA(enable) : NO
BIP[02] : 0 Threshold : 0 TCA(enable) : NO
BIP[03] : 0 Threshold : 0 TCA(enable) : NO
BIP[04] : 0 Threshold : 0 TCA(enable) : NO
BIP[05] : 0 Threshold : 0 TCA(enable) : NO
BIP[06] : 0 Threshold : 0 TCA(enable) : NO
BIP[07] : 0 Threshold : 0 TCA(enable) : NO
BIP[08] : 0 Threshold : 0 TCA(enable) : NO
BIP[09] : 0 Threshold : 0 TCA(enable) : NO
BIP[10] : 0 Threshold : 0 TCA(enable) : NO
BIP[11] : 0 Threshold : 0 TCA(enable) : NO
BIP[12] : 0 Threshold : 0 TCA(enable) : NO
```

```
BIP[13] : 0 Threshold : 0 TCA(enable) : NO
BIP[14] : 0 Threshold : 0 TCA(enable) : NO
BIP[15] : 0 Threshold : 0 TCA(enable) : NO
BIP[16] : 0 Threshold : 0 TCA(enable) : NO
BIP[17] : 0 Threshold : 0 TCA(enable) : NO
BIP[18] : 0 Threshold : 0 TCA(enable) : NO
BIP[19] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[00] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[01] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[02] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[03] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[04] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[05] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[06] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[07] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[08] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[09] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[10] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[11] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[12] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[13] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[14] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[15] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[16] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[17] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[18] : 0 Threshold : 0 TCA(enable) : NO
FRM-ERR[19] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[00] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[01] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[02] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[03] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[04] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[05] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[06] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[07] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[08] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[09] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[10] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[11] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[12] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[13] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[14] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[15] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[16] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[17] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[18] : 0 Threshold : 0 TCA(enable) : NO
BAD-SH[19] : 0 Threshold : 0 TCA(enable) : NO
ES : 0 Threshold : 0 TCA(enable) : NO
SES : 0 Threshold : 0 TCA(enable) : NO
UAS : 0 Threshold : 0 TCA(enable) : NO
ES-FE : 0 Threshold : 0 TCA(enable) : NO
SES-FE : 0 Threshold : 0 TCA(enable) : NO
UAS-FE : 0 Threshold : 0 TCA(enable) : NO

Last clearing of "show controllers ETHERNET " counters never
RP/0/RP0/CPU0:BH1_P2A4#
```

**Example 7:** Displays the history *PCS* performance monitoring parameters of the 100GE controller at 30-second intervals.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/0/0/2 pm history 30-sec pcs 1
Tue Nov 19 09:27:49.169 UTC

Ethernet PCS in the current interval [09:27:00 - 09:27:30 Tue Nov 19 2019]
```

```
Ethernet PCS current bucket type : Valid
BIP[00] : 0
BIP[01] : 0
BIP[02] : 0
BIP[03] : 0
BIP[04] : 0
BIP[05] : 0
BIP[06] : 0
BIP[07] : 0
BIP[08] : 0
BIP[09] : 0
BIP[10] : 0
BIP[11] : 0
BIP[12] : 0
BIP[13] : 0
BIP[14] : 0
BIP[15] : 0
BIP[16] : 0
BIP[17] : 0
BIP[18] : 0
BIP[19] : 0
FRM-ERR[00] : 0
FRM-ERR[01] : 0
FRM-ERR[02] : 0
FRM-ERR[03] : 0
FRM-ERR[04] : 0
FRM-ERR[05] : 0
FRM-ERR[06] : 0
FRM-ERR[07] : 0
FRM-ERR[08] : 0
FRM-ERR[09] : 0
FRM-ERR[10] : 0
FRM-ERR[11] : 0
FRM-ERR[12] : 0
FRM-ERR[13] : 0
FRM-ERR[14] : 0
FRM-ERR[15] : 0
FRM-ERR[16] : 0
FRM-ERR[17] : 0
FRM-ERR[18] : 0
FRM-ERR[19] : 0
BAD-SH[00] : 0
BAD-SH[01] : 0
BAD-SH[02] : 0
BAD-SH[03] : 0
BAD-SH[04] : 0
BAD-SH[05] : 0
BAD-SH[06] : 0
BAD-SH[07] : 0
BAD-SH[08] : 0
BAD-SH[09] : 0
BAD-SH[10] : 0
BAD-SH[11] : 0
BAD-SH[12] : 0
BAD-SH[13] : 0
BAD-SH[14] : 0
BAD-SH[15] : 0
BAD-SH[16] : 0
BAD-SH[17] : 0
BAD-SH[18] : 0
BAD-SH[19] : 0
ES : 0
SES : 0
```

```
UAS : 0
ES-FE : 0
SES-FE : 0
UAS-FE : 0

Last clearing of "show controllers ETHERNET " counters never
RP/0/RP0/CPU0:BH1_P2A4#
```

**Example 8:** Displays the current performance monitoring parameters of the optics controller at 10-second intervals as flexi-bin.

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/0 pm current flex-bin optics 1
Thu May 21 07:43:38.964 UTC

Optics in the current interval [07:43:30 - 07:43:38 Thu May 21 2020]

Flexible bin interval size: 10 seconds

Optics current bucket type : Valid
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                          Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[% ]      : 0.0       0.0       0.0      0.0              NA              NO   0.0
          NA              NO
OPT[dBm]     : -0.13     -0.10     -0.06    0.00             NA              NO   0.00
          NA              NO
OPR[dBm]     : -3.01     -2.96     -2.92    0.00             NA              NO   0.00
          NA              NO
CD[ps/nm]    : -3        -2        -1       0                NA              NO   0
          NA              NO
DGD[ps ]     : 1.00      1.67      2.00     0.00             NA              NO   0.00
          NA              NO
SOPMD[ps^2]  : 17.00     37.00     81.00    0.00             NA              NO   0.00
          NA              NO
OSNR[dB]     : 37.60     37.60     37.60    0.00             NA              NO   0.00
          NA              NO
PDL[dB]      : 0.60      0.66      0.70     0.00             NA              NO   0.00
          NA              NO
PCR[rad/s]   : 0.00      29.11     80.00    0.00             NA              NO   0.00
          NA              NO
RX_SIG[dBm]  : -3.49     -3.41     -3.36    0.00             NA              NO   0.00
          NA              NO
FREQ_OFF[Mhz]: 191       241       301      0                NA              NO   0
          NA              NO
SNR[dB]      : 14.50     14.62     14.70    0.00             NA              NO   0.00
          NA              NO
SNR-AX[dB]   : 17.10     17.19     17.30    0.00             NA              NO   0.00
          NA              NO
SNR-AY[dB]   : 11.90     12.06     12.10    0.00             NA              NO   0.00
          NA              NO
SNR-BX[dB]   : 0.00      0.00      0.00     0.00             NA              NO   0.00
          NA              NO
SNR-BY[dB]   : 0.00      0.00      0.00     0.00             NA              NO   0.00
          NA              NO
SOP-S1       : 0.50      0.55      0.59     0.00             NA              NO   0.00
          NA              NO
SOP-S2       : -0.59     -0.52     -0.48    0.00             NA              NO   0.00
          NA              NO
SOP-S3       : -0.67     -0.64     -0.60    0.00             NA              NO   0.00
          NA              NO

Last clearing of "show controllers OPTICS" counters never
```

**Example 9:** Displays the history performance monitoring parameters of the optics controller at 10-second intervals as flexi-bin.

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/0 pm history flex-bin optics 1 bucket 1
Thu May 21 07:45:44.358 UTC

Optics in interval 1 [07:45:30 - 07:45:40 Thu May 21 2020]

Flexible bin interval size: 10 seconds

Optics history bucket type : Valid
              MIN       AVG       MAX
LBC[% ]     : 0.0       0.0       0.0
OPT[dBm]    : -0.12     -0.10     -0.04
OPR[dBm]    : -3.01     -2.97     -2.91
CD[ps/nm]   : -5        -4        -3
DGD[ps ]    : 1.00      1.50      2.00
SOPMD[ps^2]: 28.00      43.10     66.00
OSNR[dB]    : 37.60     37.60     37.60
PDL[dB]     : 0.60      0.65      0.70
PCR[rad/s]  : 0.00      25.70     75.00
RX_SIG[dBm] : -3.49     -3.44     -3.37
FREQ_OFF[Mhz]: 235       272       330
SNR[dB]    : 14.60     14.64     14.80
SNR-AX[dB]: 17.20      17.25     17.30
SNR-AY[dB]: 11.90      12.02     12.20
SNR-BX[dB]: 0.00       0.00      0.00
SNR-BY[dB]: 0.00       0.00      0.00
SOP-S1     : 0.50      0.53      0.57
SOP-S2     : -0.58     -0.53     -0.49
SOP-S3     : -0.69     -0.65     -0.61
```

**Example 10:** Displays the current *FEC* performance monitoring parameters of the coherentDSP controller as flexi-bin.

```
RP/0/0/CPU0:ios#show controllers coherentDSP 0/2/0/0 pm current flex-bin fec
Thu Apr  9 11:46:55.659 IST

g709 FEC in the current interval [11:46:50 - 11:46:55 Thu Apr 9 2020]

Flexible bin interval size: 10 seconds

FEC current bucket type : Valid
    EC-BITS   : 327                     Threshold : 0                     TCA(enable)  :
NO
    UC-WORDS  : 327                     Threshold : 0                     TCA(enable)  :
NO

                                  MIN       AVG        MAX    Threshold   TCA     Threshold
   TCA
                                                                 (min)    (enable)    (max)
 (enable)
PreFEC BER                    :   5.20E-14 5.40E-14   5.70E-14     0E-15        NO
0E-15       NO
PostFEC BER                   :   5.20E-14 5.40E-14   5.70E-14     0E-15        NO
0E-15       NO
Q[dB]                         :    0.52      0.54      0.57    0.00        NO      0.00
     NO
Q_Margin[dB]                  :    2.52      1.54      4.57    0.00        NO      0.00
     NO
Q_Margin Instantaneous [dB]    :    2.52      1.54      4.57    0.00        NO      0.00
     NO
```

```
Last clearing of "show controllers OTU" counters never
```

**Example 11:** Displays the current OTN path monitor performance monitoring parameters of the ODU4 controller 1-second intervals.

```
P/0/RP0/CPU0:ios#show controllers odu4 0/2/0/13/8 pm current flex-bin otn pathmonitor
Wed Sep 22 12:47:09.497 UTC

g709 OTN in the current interval [12:47:08 - 12:47:08 Wed Sep 22 2021]

Flexible bin interval size: 1 seconds

OTN current bucket type : Valid
    ES-NE   : 0         Threshold : 0         TCA(enable)   : NO
    ESR-NE  : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    SES-NE  : 0         Threshold : 0         TCA(enable)   : NO
    SESR-NE : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    UAS-NE  : 0         Threshold : 0         TCA(enable)   : NO
    BBE-NE  : 0         Threshold : 0         TCA(enable)   : NO
    BBER-NE : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    FC-NE   : 0         Threshold : 0         TCA(enable)   : NO

    ES-FE   : 0         Threshold : 0         TCA(enable)   : NO
    ESR-FE  : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    SES-FE  : 0         Threshold : 0         TCA(enable)   : NO
    SESR-FE : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    UAS-FE  : 0         Threshold : 0         TCA(enable)   : NO
    BBE-FE  : 0         Threshold : 0         TCA(enable)   : NO
    BBER-FE : 0.00000   Threshold : 0.00000   TCA(enable)   : NO
    FC-FE   : 0         Threshold : 0         TCA(enable)   : NO


Last clearing of "show controllers ODU" counters never
RP/0/RP0/CPU0:ios#
```

**Example 12:** Displays the current performance monitoring parameters of the 16G FC controller for 24 hours.

```
RP/0/RP0/CPU0:ios#show controllers sixteenGigFibreChanCtrlr 0/2/0/1/1 pm current 24-hour
fc
Thu Jan 6 19:13:07.222 UTC

FC in the current interval [00:00:00 - 19:13:07 Thu Jan 6 2022]

FC current bucket type : Valid
IFIN-OCTETS : 8691662359380 Threshold : 0 TCA(enable) : NO
RX-PKT : 4061524467 Threshold : 0 TCA(enable) : NO
IFIN-ERRORS : 0 Threshold : 0 TCA(enable) : NO
RX-BAD-FCS : 0 Threshold : 0 TCA(enable) : NO
IFOUT-OCTETS : 8691662359380 Threshold : 0 TCA(enable) : NO
TX-PKT : 4061524467 Threshold : 0 TCA(enable) : NO
TX-BAD-FCS : 0 Threshold : 0 TCA(enable) : NO
RX-FRAMES-TOO-LONG : 0 Threshold : 0 TCA(enable) : NO
RX-FRAMES-TRUNC : 0 Threshold : 0 TCA(enable) : NO
TX-FRAMES-TOO-LONG : 0 Threshold : 0 TCA(enable) : NO
TX-FRAMES-TRUNC : 0 Threshold : 0 TCA(enable) : NO

Last clearing of "show controllers FC" counters never
RP/0/RP0/CPU0:ios#
```

### Instantaneous Q-Margin

From Release 7.3.1 onwards, instantaneous Q-margin is supported for PM parameters on coherentDSP controller for 1.2T and 1.2TL cards. For more information, see Q-Margin Support.

### Scenarios on Instantaneous Q-margin

In the following scenarios, the initial few PM buckets are displayed as valid although the instantaneous Q-margin values are displayed as invalid in those buckets. The PM is performed for 30 sec, 15 mins, and 24 hours, respectively.

- Shutdown or no shutdown on optics
- BPS change on optics
- Trunk rate change
- Fiber cut

To overcome such situations, avoid the initial PM bucket readings while monitoring the instantaneous Q-margin values for these scenarios.

The following sample illustrates that the initial PM bucket readings for specified scenarios are invalid and at a later point the PM buckets readings are valid although the instantaneous Q-margin value is invalid.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/0 pm history flex-bin fec 1
Mon Sep 14 06:16:03.249 UTC

g709 FEC in interval 1 [06:15:50 - 06:16:00 Mon Sep 14 2020]

Flexible bin interval size: 10 seconds
FEC history bucket type : Invalid. -------> Instantaneous Q_margin is invalid in this
bucket
 EC-BITS   : 38054                    UC-WORDS  : 0

                                 MIN                       AVG                       MAX
PreFEC BER              :    0E-15                     3.26E-08                  1.43E-07
PostFEC BER             :    0E-15                      0E-15                     0E-15
Q                       :    0.00                       5.73                      14.40
Q_margin                :    -5.00                      -0.69                     9.40
Instantaneous Q_margin  :    -21474836.48               -8589934.59               0.00
```

Now, the PM buckets are valid although the instantaneous Q-margin value is invalid.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/0 pm history 30-sec fec 1
Mon Sep 14 06:16:53.490 UTC

g709 FEC in interval 1 [06:16:00 - 06:16:30 Mon Sep 14 2020]

FEC history bucket type : Valid -------> (Instantaneous Q_margin is invalid but the PM
bucket is valid. So these initial bins can be ignored)
 EC-BITS   : 431887                   UC-WORDS  : 0

                                 MIN                       AVG                       MAX
PreFEC BER              :    3.97E-09                  4.83E-08                  1.51E-07
PostFEC BER             :    0E-15                      0E-15                     0E-15
Q                       :    14.40                      14.48                     14.60
Q_margin                :    9.30                       9.46                      9.60
Instantaneous Q_margin  :    -21474836.48               -5010784.19               14.42
```

## Clearing PM Parameters

To clear the performance monitoring parameters for Ethernet and Coherent DSP controllers, use this command:

**clear controller** *controllertype R/S/I/P* **pm**

**Example 1:** Clears the PM parameters on the Coherent DSP controller.

```
RP/0/RP0/CPU0:ios#show controller CD 0/0/0/0 pm current 15-min fec
Mon Jun 10 11:43:39.981 UTC

g709 FEC in the current interval [11:30:00 - 11:43:40 Mon Jun 10 2019]

FEC current bucket type : Invalid
    EC-BITS   : 308360273              Threshold : 903330                TCA(enable)  :
YES
    UC-WORDS  : 131108352              Threshold : 5                     TCA(enable)  :
YES

                MIN       AVG        MAX    Threshold   TCA     Threshold   TCA
                                              (min)    (enable)   (max)    (enable)
PreFEC BER  : 3.44E-02   3.45E-02   3.45E-02     0E-15        NO     0E-15       NO
PostFEC BER :   0E-15     0E-15     0E-15     0E-15        NO     0E-15       NO
Q           :    0.51      0.51      0.51    0.00        NO      0.00       NO
Q_Margin    :    0.00      0.00      0.00    0.00        NO      0.00       NO

Last clearing of "show controllers OTU" counters never
RP/0/RP0/CPU0:ios#clear controller coherentDSP 0/0/0/0 pm
Mon Jun 10 11:44:31.650 UTC
RP/0/RP0/CPU0:ios#show controller CD 0/0/0/0 pm current 15-min fec
Mon Jun 10 11:44:38.804 UTC

g709 FEC in the current interval [11:30:00 - 11:44:38 Mon Jun 10 2019]

FEC current bucket type : Invalid
    EC-BITS   : 0                      Threshold : 903330                TCA(enable)  :
YES
    UC-WORDS  : 0                      Threshold : 5                     TCA(enable)  :
YES

                MIN       AVG        MAX    Threshold   TCA     Threshold   TCA
                                              (min)    (enable)   (max)    (enable)
PreFEC BER  : 3.44E-02   3.44E-02   3.45E-02     0E-15        NO     0E-15       NO
PostFEC BER :   0E-15     0E-15     0E-15     0E-15        NO     0E-15       NO
Q           :    0.51      0.51      0.51    0.00        NO      0.00       NO
Q_Margin    :    0.00      0.00      0.00    0.00        NO      0.00       NO

Last clearing of "show controllers OTU" counters 00:00:07
```

**Example 2:** Clears the PM parameters on the Ethernet controller.

```
RP/0/RP0/CPU0:ios#clear controller HundredGigECtrlr 0/0/0/2 pm
```

### Viewing PM Statistics

To view PM statistics for the Ethernet controllers, use this command:

```
RP/0/RP0/CPU0:ios#show controllers HundredGigECtrlr 0/0/0/2 stats
Fri Aug 30 13:10:33.123 IST
Statistics for interface HundredGigECtrlr0/0/0/2 (cached values):

Ingress:
    Input total bytes           = 1702197139760640
    Input good bytes            = 1702197139760640

    Input total packets         = 13298415154380
```

```
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 0
    Input pkts 65-127 bytes     = 0
    Input pkts 128-255 bytes    = 13298415154380
    Input pkts 256-511 bytes    = 0
    Input pkts 512-1023 bytes   = 0
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 0

    Input good pkts             = 13298415154380
    Input unicast pkts          = 0
    Input multicast pkts        = 0
    Input broadcast pkts        = 0

    Input drop overrun          = 0
    Input drop abort            = 0
    Input drop invalid VLAN     = 0
    Input drop invalid DMAC     = 0
    Input drop invalid encap    = 0
    Input drop other            = 0

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
    Input error symbol          = 0
    Input error other           = 0

    Input MIB giant             = 0
    Input MIB jabber            = 0
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 1702197139760640
    Output good bytes           = 1702197139760640

    Output total packets        = 13298415154380
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 0
    Output pkts 65-127 bytes    = 0
    Output pkts 128-255 bytes   = 13298415154380
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 13298415154380
    Output unicast pkts         = 0
    Output multicast pkts       = 0
    Output broadcast pkts       = 0

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0

RP/0/RP0/CPU0:ios#
```

**Note** Performance monitoring statistics are not supported for the input unicast packets, output unicast packets, and input error fragments counters for Ethernet clients.

### Configuring PM with Flexible Bin Interval as 1 Second

To configure PM with flexible bin interval as 1 second, use the following commands:

```
RP/0/RP0/CPU0:ios#configure terminal
Thu Sep 30 10:38:39.729 UTC
RP/0/RP0/CPU0:ios(config)#performance-monitor-engine flex-bin interval 1
RP/0/RP0/CPU0:ios(config)#commit
Thu Sep 30 10:38:57.987 UTC
RP/0/RP0/CPU0:ios(config)#
```

To view PM statistics for *OTN path monitor* with flexible bin interval as 1 second, use this command:

```
P/0/RP0/CPU0:ios#show controllers odu4 0/2/0/13/8 pm current flex-bin otn pathmonitor
Wed Sep 22 12:47:09.497 UTC

g709 OTN in the current interval [12:47:08 - 12:47:08 Wed Sep 22 2021]

Flexible bin interval size: 1 seconds

OTN current bucket type : Valid
    ES-NE   : 0         Threshold : 0        TCA(enable)  : NO
    ESR-NE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-NE  : 0         Threshold : 0        TCA(enable)  : NO
    SESR-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-NE  : 0         Threshold : 0        TCA(enable)  : NO
    BBE-NE  : 0         Threshold : 0        TCA(enable)  : NO
    BBER-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-NE   : 0         Threshold : 0        TCA(enable)  : NO

    ES-FE   : 0         Threshold : 0        TCA(enable)  : NO
    ESR-FE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-FE  : 0         Threshold : 0        TCA(enable)  : NO
    SESR-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-FE  : 0         Threshold : 0        TCA(enable)  : NO
    BBE-FE  : 0         Threshold : 0        TCA(enable)  : NO
    BBER-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-FE   : 0         Threshold : 0        TCA(enable)  : NO


Last clearing of "show controllers ODU" counters never
```

### PM History Persistence

From Release 7.7.1, PM history parameters for Optics, Ethernet, and coherent DSP controllers are retained even after a line card cold reload, line card warm reload, XR reload, Calvados reload, RP reload, Hw-module all reload, power cycle, or upgrade of the NCS 1004 chassis.

**Note** PM history persistence is not supported on NCS1K4-QXP-K9.

After a software upgrade to the latest release, you can view the history performance monitoring parameters from the previous release. The PM history persistence is supported for 30-second, 15-minute, and 24-hour bucket types. After upgrade from Release 7.7.1 to a higher version, if new PM parameters are available in the new version, below error is displayed while fetching PM data.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/0/0/8 pm history 15-min ether 5
Tue Apr  5 22:05:56.750 UTC
pm_display_int_15min_ether_index: bag_decode failed ('bag' detected the 'fatal' condition
'An irresolvable version conflict prevented the specified bag from being decoded')
```

However, the following list describes the time that is required to fill all historical buckets of each bucket type, later while fetching PM historical data, no error appears.

- For 30-second bucket type, 15 minutes is required to fill 30 historical buckets.
- For 15-minute bucket type, 8 hours is required to fill 32 historical buckets.
- For 24-hour bucket type, 24 hours is required to fill 1 historical bucket.

PM counters are updated continuously in current bucket for all bucket types (flex, 30-second, 15-minute, and 24-hour). After the timer expires for the respective bucket type, the current PM data is moved to the historical PM bucket. This process of moving PM data to the historical bucket is called Rollover. After rollover, you can access the current PM data as historical PM data.

In case of deletion or removal of the controller, the PM data is persistent for 3 hours. Unless the controller is brought up within 3 hours, the PM data is cleared because the controller is considered to be not in use.

**Limitations**

If NCS 1004 reload happens during the rollover time, one of the following scenarios occurs:

- The complete PM bucket is missing and the next PM bucket is marked as *Invalid*.
- PM bucket expiry message appears as follows:

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/3/0/2 pm history 30-sec ether 29
Fri Apr  1 01:32:20.646 UTC
History data is empty, Verify at least one collection period is expired
```

- PM bucket interval is marked as *Invalid* and counters are updated as zero.
- PM bucket interval is marked as *Invalid* and counters are updated as nonzero.