

Troubleshoot Interface Down or Flap Issues on NCS

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Introduction

This document describes how to troubleshoot interface down, or interface flap issues.

Components Used

This document is specific to Cisco IOS[®]XR, but it is not restricted to a specific software release.

This document is specific to the NCS platform.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background

There are multiple reasons why interface down, or interface flap can happen. The links can go down due to multiple devices as shown in image 1. It shows an NCS router with one front panel port connected to the NPU (Network Processor Unit) via PHY (Physical Layer) device in between (known as PHY based ports). There are platforms where the front panel ports are directly connected to the NPU (known as PHYless

ports). A single router can have both variants.

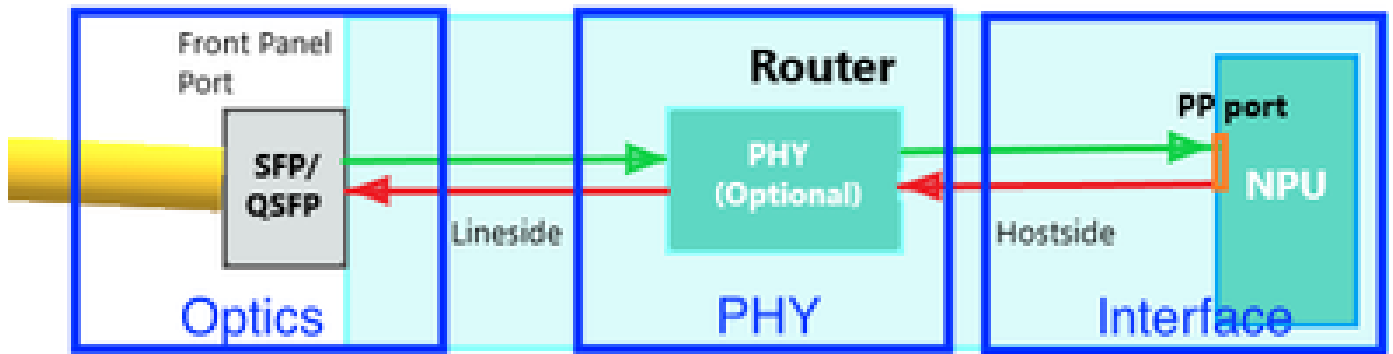


Image 1

Optics

Interface

Note that an interface is always described in this way on Cisco IOS XR.

R/S/I/P : Rack/Slot/Instance/Port/Breakout

R/S/I/P/B : Rack/Slot/Instance/Port/

Port Speed

Some platforms/line cards support multiple speeds on some ports. Examples are: 1/10GE, 25/40GE, 40/100GE, 1/10/25GE.

The speed can be configured on each individual port or per group of ports. Look at the hardware documentation for the port mapping on the NCS. Check if the port speed is set correctly. Some ports can auto-sense the speed, others need configuration.

Some ports can be configured per group (usually a quad: a group of four).

For example:

```
<#root>
```

```
(config)#
```

```
hw-module quad 0 location 0/0/CPU0 mode ?
```

```
WORD 10g or 25g
```

Some ports can be configured individually. This is usually the 100G ports. 100G is the default speed, but you can configure 40G.

For example:

```
<#root>
```

```
(config)#
controller optics 0/0/1/0

(config-Optics)#
speed 40g
```

Fault Signaling Mechanism

Note that a Link Fault Signaling mechanism can play a role when you troubleshoot the interface issue. On 10G and higher, there is Link Fault Signaling mechanism included in the PHY layer. So when a local fault is detected, the remote end is informed.

- Reside in Reconciliation Sublayer (RS)
- To monitor link status between local RS & remote RS and perform link status notification
- Sublayers within the PHY are required to detect faults that render a link unreliable

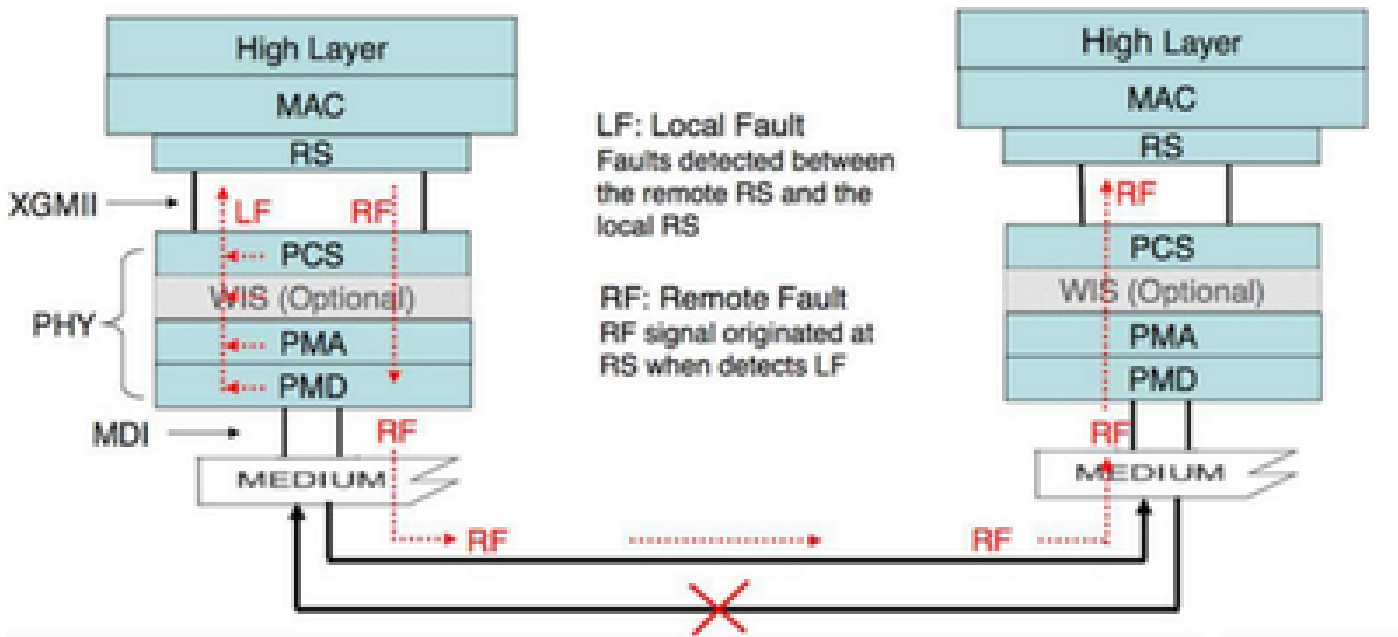


Image 2

On GigE interface, there is no such onboard mechanism. Check if “ethernet oam” is configured as an alternative.

For example:

```
interface GigabitEthernet0/6/0/2
ethernet oam
uni-directional link-fault detection
action
uni-directional link-fault efd
```

DWDM Tunable Optic

On DWDM optic that supports frequency tuning, use this config to set the frequency that can be used (based on DWDM circuit setup by the circuit provider):

This is the command:

```
controller optics 0/6/0/2
  dwdm-carrier {100MHz-grid | 50GHz-grid} frequency {frequency}
```

Verify the settings:

```
<#root>
```

```
RP/0/RP0/CPU0:NCS-5508#
```

```
show controllers optics 0/6/0/2 dwdm-carrier-map
```

```
DWDM Carrier Band:: OPTICS_C_BAND
```

```
MSA ITU channel range supported: 1~96
```

```
DWDM Carrier Map table
```

ITU Ch Num	G.694.1 Ch Num	Frequency (THz)	Wavelength (nm)
1	-35	191.35	1566.723
2	-34	191.40	1566.314
3	-33	191.45	1565.905
4	-32	191.50	1565.496
...			
95	59	196.05	1529.163
96	60	196.10	1528.773

On DWDM optics, all DWDM specific tuning is done under controller dwdm config :

```
<#root>
```

```
RP/0/RP0/CPU0:NCS-5508(config)#
```

```
controller dwdm 0/6/0/2 ?
```

admin-state	Configure the transport admin state of the controller: in-service, out-of-service o
g709	Configure G709 parameters
laser	To be deprecated and removed in 7.5.1 release
log	Proactive log

loopback	Configure loopback mode
network	Configure DWDM network information
pm	Configure pm parameters
proactive	Enable Proactive Protection Feature
rx-los-threshold	Configure transponder receive power LOS threshold
transmit-power	Configure transponder transmit power
vtxp-monitor	Enable VTXP monitoring function
wavelength	Configure ITU Channel, Wavelength and Frequency
<cr>	

RP/0/RP0/CPU0:NCS-5508(config-dwdm)#

g709 fec ?

15sdfec	15%-SD Forward Error Correction
15sdfecde	15%-SD Forward Error Correction with Diff
ci-bch	Continuously Interleaved BCH FEC
disable	Disable FEC
enhanced	Enhanced FEC mode
high-gain	To be deprecated and removed in 7.5.1 release
high-gain-hd-fec	7% HD FEC (Staircase FEC)
high-gain-multivendor-hd-fec	7% HD FEC (Staircase FEC) Multivendor Interoperable
high-gain-sd-fec	7% CISCO SD FEC (Soft-Decision FEC)
long-haul	To be deprecated and removed in 7.5.1 release
long-haul-hd-fec	20% HD FEC (Staircase FEC)
long-haul-sd-fec	20% CISCO SD FEC (Soft-Decision FEC)
standard	Standard FEC mode

IPoDWDM - Coherent DSP

Coherent DSP supports high rate speed (100/200/400G) over long distances. The DWDM processing is handled by Coherent DSP (Digital Signal Processor).

Examples of such NCS modules: NC55-6X200-DWDM-S or NC55-MPA-2TH-S (with CFP2-WDM-D-1HL)

<#root>

RP/0/RP0/CPU0:NCS-5508(config)#

controller coherentDSP 0/6/0/0

RP/0/RP0/CPU0:NCS-5508(config-CoDSP)#

fec ?

CFEC	Forward Error Correction C_FEC
EnhancedHG20	Forward Error Correction Enhanced_HG20
EnhancedHG7	Forward Error Correction Enhanced_HG7
EnhancedI4	Forward Error Correction Enhanced_I_4
EnhancedI7	Forward Error Correction Enhanced_I_7
EnhancedSD15	Forward Error Correction Soft-Decision 15
EnhancedSD15DE	Forward Error Correction Soft-Decision 15 with DE
EnhancedSD20	Forward Error Correction Soft-Decision 20
EnhancedSD27	Forward Error Correction Soft-Decision 27
EnhancedSD7	Forward Error Correction Soft-Decision 7
EnhancedStaircaseDE	Forward Error Correction Enhanced Staircase FEC with DE

EnhancedSwizzle	Forward Error Correction Enhanced_Swizzle
OFEC	Forward Error Correction O_FEC
Standard	Forward Error Correction Standard
none	No Forward Error Correction

Detailed Troubleshooting

This section covers the basic debugging/techniques from optics perspective.

First Things to Check

Check if the optics show up in the inventory. If the optics are not shown, check if the optics are inserted properly in the R/S/I/P and cables with no issues are used.

```
+++++++ show inventory details [18:06:56.572 UTC Thu Apr 06 2023] ++++++
```

```
NAME: "0/RP0", DESCR: "NC55A1 24Q6H SS Route Processor Card"  
PID: NCS-55A1-24Q6H-SS , VID: V01, SN: FOC2528002Q  
MFG_NAME: Cisco Systems, Inc., SNMP_IDX: 1 , Type: Module  
PN: 73-20057-02
```

```
NAME: "TenGigE0/0/0/0", DESCR: "Cisco SFP+ 10G ZR Pluggable Optics Module"  
PID: SFP-10G-ZR , VID: V02, SN: BD211218N1T  
MFG_NAME: CISCO-PRE , SNMP_IDX: 2129921 , Type: Module  
PN: TSFP10G-1558.17
```

```
NAME: "TenGigE0/0/0/1", DESCR: "Cisco SFP+ 10G ZR Pluggable Optics Module"  
PID: SFP-10G-ZR , VID: V02, SN: BD211218N3K  
MFG_NAME: CISCO-PRE , SNMP_IDX: 2134017 , Type: Module  
PN: TSFP10G-1557.36
```

```
<#root>
```

```
RP/0/RP0/CPU0:NCS-5501#
```

```
show controllers te0/0/0/14 internal
```

```
Internal data for interface: TenGigE0/0/0/14
```

```
Subport Number      : 255  
Port Number         : 14 *  
Bay Number          : 0 *  
Board Type          : 0x60020201 *
```

```
Port Type           : 10GE *
```

```
Bandwidth(Kbps)     : 10000000 *  
Transport mode       : LAN *  
BIA MAC addr        : 008a:9617:4838  
Oper. MAC addr       : 008a:9617:4838  
Egress MAC addr     : 008a:9617:4838
```

```
Port Available      : true *
```

```
Status polling is      : disabled *
Status events are     : disabled
I/F Handle            : 0x00000158 *
Cfg Link Enabled      : enabled

H/W Tx Enable         : yes

MTU                   : 1514 *
H/W Speed             : 10 Gbps *
H/W Duplex            : Full *
H/W Loopback Type     : None *
FEC                   : Not Configured *
H/W FlowCtrl Type     : Disabled *
H/W AutoNeg Enable    : Off *
H/W Link Defects      : No Fault *

Link Up               : yes *

Link Led Status       : Green ON *

Pluggable Present     : Yes *

Pluggable Type        : SFP+ 10G CU3M

Pluggable PID         : SFP-H10GB-CU3M *

Pluggable Compl.      : Failed - Bad Vendor CRC
```

If the transceiver is not recognized, check if the transceiver type is supported here:
<https://tmgmatrix.cisco.com/>.

The vendor CRC must be correct.

Check the signal strength.

Digital Optical Monitoring (DOM) support is required on the transceiver.

```
<#root>
```

```
RP/0/RP0/CPU0:BRU-SPCORE-P2#
```

```
show controllers hundredGigE0/0/0/10 phy
```

```
QSFP8636 EEPROM port: 10
```

```
Xcvr Type: QSFP28
```

Ext Type: 3.5W, CLEI, TX CDR, RX CDR,

Connector Type: MPO
 Ethernet Compliance Codes: 100G BASE-SR4,
 BR, nominal: 25500 Mbps
 Length SMF: 0KM, OM3: 70M, OM2: 0M, OM1: 0M, Cable: 50M
 Deice Tech: 850nm VCSEL,
 Vendor Name: CISCO-FINISAR
 Vendor OUI: 00.90.65
 Vendor Part Number: FTLC9555REPM-C1 (rev.: A)
 Wavelength: 850.000 nm
 Wavelength Tolerance: 10.000 nm
 Vendor Serial Number: FIW2638016W
 Date Code (yy/mm/dd): 22/09/13 lot code:
 Diagnostic Monitoring Type: RX Avg, TX,
 Enhanced Options: Init Complete Flag Impl,
 Extended Module Codes:
 Options:
 L-Tx/Rx LOS:
 L-Tx Fault:
 L-Tx/Rx LOL:
 Module DDM: Volt, Temp, TX Power, TX Bias, RX Power,

MSA Data (Lower Memory)

0x0000: 11 07 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
 0x0010: 00 00 00 00 00 00 1d 75 : 00 00 81 2f 00 00 00 00
 0x0020: 00 00 20 b6 2e 9a 2d ba : 27 44 0d ed 0e 0c 0e 0c
 0x0030: 0e 0c 28 46 2a dc 29 1f : 2a 72 00 00 00 00 00 00
 0x0040: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
 0x0050: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 01 00 00
 0x0060: 00 00 ff 00 00 00 00 00 : 00 01 1f 00 00 00 00 00
 0x0070: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00

MSA Data (Upper Memory Page 00)

0x0080: 11 dc 0c 80 00 00 00 00 : 00 00 00 05 ff 00 00 23
 0x0090: 00 00 32 00 43 49 53 43 : 4f 2d 46 49 4e 49 53 41
 0x00a0: 52 20 20 20 00 00 90 65 : 46 54 4c 43 39 35 35 35
 0x00b0: 52 45 50 4d 2d 43 31 20 : 41 20 42 68 07 d0 46 ef
 0x00c0: 02 07 ff f6 46 49 57 32 : 36 33 38 30 31 36 57 20
 0x00d0: 20 20 20 20 32 32 30 39 : 31 33 20 20 0c 10 68 3a
 0x00e0: 00 00 02 3c c0 ff c6 b6 : 3b 05 e6 30 86 bb 80 05
 0x00f0: df 65 71 00 00 00 00 00 : 00 00 00 00 79 eb c1 06

CLEI Code: CMUIATKCAA

Part Number: FTLC9555REPM-C1 (ver.: V03)

Product Id: QSFP-100G-SR4-S

MSA Data (Upper Memory Page 02)

0x0180: 43 4d 55 49 41 54 4b 43 : 41 41 31 30 2d 33 31 34
 0x0190: 32 2d 30 33 56 30 33 20 : 01 00 00 31 20 20 20 20
 0x01a0: 20 66 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
 0x01b0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 aa aa
 0x01c0: 51 53 46 50 2d 31 30 30 : 47 2d 53 52 34 2d 53 20
 0x01d0: 20 20 20 20 00 00 00 00 : 00 00 00 00 00 00 00 65
 0x01e0: 31 33 33 39 39 37 31 36 : 31 d8 00 00 00 00 00 00
 0x01f0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00

Module

Thresholds:	Alarm High	Warning High	Warning Low	AT
Temperature:	+75.000 C	+70.000 C	+0.000 C	
Voltage:	3.630 Volt	3.465 Volt	3.135 Volt	

Temperature: +29.457 C

Voltage: 3.315 Volt

Lanes

```

Thresholds:
    Bias:          Alarm High      Warning High      Warning Low      AL
    Transmit Power: 3.46740 mW (5.40004 dBm) 1.73780 mW (2.40000 dBm) 0.14450 mW (-8.40132
    Receive Power:  3.46740 mW (5.40004 dBm) 1.73780 mW (2.40000 dBm) 0.09330 mW (-10.30118
  
```

TxRxIOMagId:

RxOpAmpSupprt:

Lane	Temp	Bias	Tx Power	Rx Power
0	N/A	7.130 mAmps	1.03100 mW (0.13259 dBm)	1.18990 mW (0.75510 dBm)
1	N/A	7.192 mAmps	1.09760 mW (0.40444 dBm)	1.19300 mW (0.76640 dBm)
2	N/A	7.192 mAmps	1.05440 mW (0.23005 dBm)	1.17110 mW (0.68594 dBm)
3	N/A	7.192 mAmps	1.08020 mW (0.33504 dBm)	1.00480 mW (0.02080 dBm)

MSA Data (Upper Memory Page 03)

```

0x0200: 4b 00 fb 00 46 00 00 00 : 00 00 00 00 00 00 00 00
0x0210: 8d cc 74 04 87 5a 7a 76 : 00 00 00 00 00 00 00 00
0x0220: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0230: 87 72 01 74 43 e2 03 a5 : 1d 4c 03 e8 1b 58 05 dc
0x0240: 87 72 02 3f 43 e2 05 a5 : 00 00 00 00 00 00 00 00
0x0250: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0260: a6 0f 00 00 00 00 00 00 : 00 00 66 66 00 00 33 33
0x0270: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
  
```

Use this command to verify for any issues.

<#root>

RP/0/RP0/CPU0:BRU-SPCORE-P2#

show controllers optics 0/0/0/10 summary

Port	Controller State	Admin State	LED State	Lane	Laser Bias
-----	-----	-----	-----	-----	-----
Optics 0/0/0/10					
Up	In Service				

Green	0	7.1mA	0.12	0.75	850.00	QSFP28-100G
					1	7.2mA
					2	7.2mA
					3	7.2mA

Alarms

Check the alarms for topic entries.

```
<#root>
```

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

```
show alarms brief
```

```
-----
Active Alarms for 0/0
-----
```

Location	Severity	Group	Set Time	Description
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Minor	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Minor	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Minor	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Minor	Software	04/26/2023 15:50:19 CEST	Optics0/0/0/35 - hw_optics:
0/0/CPU0	Major	Software	05/02/2023 11:18:17 CEST	Optics0/0/0/26 - hw_optics:
0/0/CPU0	Major	Software	05/02/2023 11:18:17 CEST	Optics0/0/0/26 - hw_optics:
0/0/CPU0	Major	Software	05/02/2023 11:18:23 CEST	Optics0/0/0/26 - hw_optics:
0/0/CPU0	Major	Software	05/02/2023 11:18:23 CEST	Optics0/0/0/26 - hw_optics:
...				

Show Controller Optics

Check if the SFP/QSFP is detected with the command “show controller optics <r/s/i/p>”.

- Check if the inserted optics is displayed properly (check the PID and VID).
- Check if the laser is enabled.
- Check if power levels are good.
- Check if any alarms/faults are raised.

This is a sample output if the optics are detected and in service.

Check if the “Controller State” is Up or Down.

Check if the Laser State is On or Off. The state Off is seen when the interface is shut. If this is not the case, collect this:

- show tech-support optics
- show tech-support ofa

<#root>

RP/0/RP0/CPU0:ios#

```
show controllers optics 0/0/0/12
```

```
Controller State: Up
Transport Admin State: In Service
Laser State: Off
```

Check the LED state. The state Off is seen when the interface is shut down. When the interface is not shut down, the state can be Down-Yellow or Up-Green.

If there is port breakout: If even one subport is up, all subports show Green. If at least one subport is admin up (no shut), all subports show Yellow. If all subports are admin down (shut), then the Led state is Off.

Check the FEC state. It is possible that some platform types have the FEC disabled. Then the FEC part is not displayed. If FEC is enabled on PHY, it must show PHY FEC status, not NPU. If the FEC status is not correct, check the FEC Status in **show controller <speed> <r/s/i/p>** .

Read this article to learn more on FEC: [Understanding FEC and Its Implementation in Cisco Optics](#)

Download this table for more details on FEC types for each Cisco optic: <https://www.cisco.com/c/dam/en/us/products/se/2022/4/Collateral/fec-summary-table.pdf>

Check if any alarms are raised next to “Detected Alarms”. In case of Link Issues, check if any RX-LOS/RX-LOL/TX-LOS/TX-LOL alarms are displayed here or in “show alarms brief/history” for the interface and timestamp when the link flapped.

In case of RX alarms, check if the peer has TX alarms. If the peer has TX alarms, go to the next step. If there are no peer TX alarms, try to reconnect the cable and or the pluggable item. Try to replace them with another if needed.

Check the TX Power. If the port is expected to be Up, but it has -40 Tx power, go to next step. Check the RX Power.

If the port is expected to be Up, but it has -40dBm Rx power, check if the peer has TX alarms.

If the peer has no TX alarms, try to reconnect the cable and or the pluggable item. Try to replace them with another if needed.

<#root>

RP/0/RP0/CPU0:ios#

```
show controllers optics 0/0/0/13
```

Controller State: Down
Transport Admin State: In Service
Laser State: Off

Optics not present

Optics Type: Unavailable

DWDM Carrier Info: Unavailable, MSA ITU Channel= Unavailable, Frequency= Unavailable , Wavelength= Unavailable
TX Power = Unavailable
RX Power = Unavailable

LED State: Off

FEC State: FEC ENABLED

Optics Status

Optics Type: SFP28 25G SR-S
Wavelength = 850.00 nm

Alarm Status:

Detected Alarms: None

LOS/LOL/Fault Status:
Laser Bias Current = 0.0 mA Actual

TX Power = -40.00 dBm

RX Power = -0.93

Performance Monitoring: Disable
THRESHOLD VALUES

Parameter	High Alarm	Low Alarm	High Warning	Low Warning
Rx Power Threshold(dBm)	5.4	-14.2	2.3	-10.3
Tx Power Threshold(dBm)	5.4	-12.4	2.3	-8.4
LBC Threshold(mA)	10.00	2.00	8.00	3.00
Temp. Threshold(celsius)	75.00	-5.00	70.00	0.00
Voltage Threshold(volt)	3.63	2.97	3.46	3.13

Polarization parameters not supported by optics

Temperature = 28.00 Celsius Voltage = 3.28 V

Transceiver Vendor Details

Form Factor : SFP28
Optics type : SFP28 25G SR-S
Name : CISCO-AVAGO

OUI Number : 00.17.6a
Part Number : SFBR-725SMZ-CS1
Rev Number : 01
Serial Number : AVD2227E1FU
PID : SFP-25G-SR-S
VID : V01
Date Code(yy/mm/dd) : 18/07/07

This is a sample output if the optics are not detected or not in service.

<#root>

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

show controllers optics 0/0/0/13

UTC Controller State: Down
Transport Admin State: In Service
Laser State: Off

Optics not present

Optics Type: Unavailable

DWDM Carrier Info: Unavailable, MSA ITU Channel= Unavailable, Frequency= Unavailable , Wavelength= Unavailable
TX Power = Unavailable RX Power = Unavailable

CoherentDSP

If the link is down for QDD-400G-ZR-S / QDD-400G-ZRP-S, along with a verification of the alarms and data from **show controller optics**, check for alarms in **show controller coherentDSP <R/S/I/P>** .

<#root>

RP/0/RP0/CPU0:ios#

show controllers coherentDSP 0/0/1/0

Port : CoherentDSP 0/0/1/0
Controller State : Up
Inherited Secondary State : Normal
Configured Secondary State : Normal
Derived State : In Service
Loopback mode : None
BER Thresholds : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring : Enable
Bandwidth : 400.0Gb/s

Alarm Information:LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0IAE = 0 B
IAE = 0 SF_BER = 0
SD_BER = 0 BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0 FLEXO_GIDM = 0

FLEXO-MM = 0 FLEXO-LOM = 0 FLEXO-RDI = 0
FLEXO-LOF = 0
Detected Alarms : None

If LOS/LOF/BER is seen, check the fiber connection, the remote end TX values, and the mode of operation of the local and the peer end ZR/ZRP.

ZR/ZRP supports multiple modes of operation. Check this link [configuration guide](#).

The configuration mode, FEC, DAC, and the modulation must match with the interface configuration and with the peer configuration.

Use this command: **show optics-driver debug optics port <fp_port> instance <bayinst> location <LC>**.

<#root>

RP/0/RP0/CPU0:ios#

show optics-driver debug optics port 0 instance 0 location 0/0/CPU0

flexcoh_hdlr : [0x0]
R_S_I_P : [0.0.1.0]
module_type : [400G-ZRPLUS:Cisco-Qualified-Module]
Traffic-Setup : [Requested/Programmed]
client_rate : [100_GAUI_2_KP4_FEC/100_GAUI_2_KP4_FEC]

<- needs to match the configured interface speed

trunk_rate : [400G Muxponder/400G Muxponder] line_fec_mode : [oFEC/oFEC]

<- needs to match the peer end for link up

dac_rate : [1x1.25 => pulse_shaping On/1x1.25 => pulse_shaping On]

<- needs to match the peer end for link up

modulation : [16QAM/16QAM]

<- needs to match the peer end for link up

framing_format : [400G_ZR/400G_ZR]
framing_mode : [Enhanced/Enhanced]
hw_cfg_in_progress : [False]
hw transactions : [3]
polling enabled : [True]
pm_notify enabled : [True]
alarms_notify enabled : [True]
sdk laser oper state : [Enabled]
sdk hw laser oper state : [Enabled]
hw laser oper state : [Enabled]
sdk channel-frequency : [1931000]
hw channel-frequency : [1931000]
sdk tx-power : [-100 0.1dBm]
hw tx-power : [-113 0.1dBm]
hw tx-power-range : [-2289, -65135 0.01dBm]
sdk cd-min : [-13000]hw cd-min : [-13000]
sdk cd-max : [13000]hw cd-max : [13000]
sdk baud-rate : [60.138546]
hw baud-rate : [60.138546]
sdk hw thresholds : [Valid]
config-thresh-flags : [0x0]

```
trf-cfg-lsr-pm-flags : [0x0]
polling_mask : [0xf]
is_fw_dl_in_progress : [False]
is_fw_commit_in_progress: [False]
sdk dsp-internal-loopback: [Disabled]
hw dsp-internal-loopback: [Disabled]
sdk dsp-line-loopback : [Disabled]
hw dsp-line-loopback : [Disabled]
Flexcoh SDK API execution status
```

```
-----
traffic | tx-power | cd-min | cd-max | frequency | laser-set | pm-set | alarm-set | poll_set |
=====
Success | Success  | Success| Success| Success  | Success  | Success| Success  | Success  |
```

<- No failure to be seen in any of the status

Show Controllers PHY

Collect this information for the correct interface. This command dumps the EEPROM information.

<#root>

RP/0/RP0/CPU0:ios#

show controllers tenGigE 0/0/1/0 phy

```
SFP EEPROM port: 32
Xcvr Type: SFP
Xcvr Code: SFP+ 10G SR
Encoding: 64B66B
Bit Rate: 10300 Mbps
Link Reach 50u fiber: 80 meter
Link Reach 62.5u fiber: 20 meter
Vendor Name: CISCO-SUMITOMO
Vendor OUI: 00.00.5f
Vendor Part Number: SPP5100SR-C5 (rev.: A )
Laser wavelength: 850 nm (fraction: 0.00 nm)
Optional SFP Signal: Tx_Disable, Tx_Fault, LOS
Vendor Serial Number: SPC17050AZ0
Date Code (yy/mm/dd): 13/01/31 lot code: MA
Diagnostic Monitoring: DOM, Int. Cal.,
Enhanced Options: SW RX LOS Mon., SW TX Fault Mon, SW TX Disable, Alarm/Warning Flags
```

MSA Data

```
0x0000: 03 04 07 10 00 00 00 00 : 00 00 00 06 67 00 00 00
0x0010: 08 02 00 1e 43 49 53 43 : 4f 2d 53 55 4d 49 54 4f
0x0020: 4d 4f 20 20 00 00 00 5f : 53 50 50 35 31 30 30 53
0x0030: 52 2d 43 35 20 20 20 20 : 41 20 20 20 03 52 00 e6
0x0040: 00 1a 00 00 53 50 43 31 : 37 30 35 30 41 5a 30 20
0x0050: 20 20 20 20 31 33 30 31 : 33 31 4d 41 68 f0 03 7a
0x0060: 00 00 0b ea 11 8a 3a 43 : 9d 9c 2b 0d 84 89 fd c5
0x0070: a4 0e 5b 00 00 00 00 00 : 00 00 00 00 8b 64 8d fc
```

```
Thresholds: Alarm High Warning High Warning Low Alarm Low
Temperature: +75.000 C +70.000 C +0.000 C -5.000 C
Voltage: 3.630 Volt 3.465 Volt 3.135 Volt 2.970 Volt
Bias: 10.500 mAmps 9.000 mAmps 2.500 mAmps 2.000 mAmps
```

Transmit Power: 1.47910 mW (1.69998 dBm) 0.74130 mW (-1.30006 dBm) 0.18620 mW (-7.30020 dBm) 0.07410 mW
Receive Power: 1.58490 mW (2.00002 dBm) 0.79430 mW (-1.00015 dBm) 0.10230 mW (-9.90124 dBm) 0.04070 mW
Temperature: 24.012
Voltage: 3.304 Volt
Tx Bias: 0.000 mAmps
Tx Power: 0.000 mW (<-40.00 dBm)
Rx Power: 0.000 mW (<-40.00 dBm)
Oper. Status/Control: Tx Disabled, Rx Rate Select, LOS,
EEPROM Memory (A2 lower)
0x0100: 4b 00 fb 00 46 00 00 00 : 8d cc 74 04 87 5a 7a 75
0x0110: 14 82 03 e8 11 94 04 e2 : 39 c7 02 e5 1c f5 07 46
0x0120: 3d e9 01 97 1f 07 03 ff : 00 00 00 00 00 00 00 00
0x0130: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0140: 00 00 00 00 3f 80 00 00 : 00 00 00 00 01 00 00 00
0x0150: 01 00 00 00 01 00 00 00 : 01 00 00 00 00 00 00 27
0x0160: 18 03 81 13 00 00 00 00 : 00 00 00 00 00 00 b2 00
0x0170: 00 40 00 00 00 40 00 00 : 00 00 00 00 00 00 00 00

CLEI Code: COUIA8NCAA
Part Number: 10-2415-03 (ver.: V03)
Temp/Alarm/Power Flags: COM, commercial 0C to 70C
Minimum Temperature: 0
Maximum Temperature: 70
Calibration Constants: LBC Scale, Temperature, Laser bias current, Output power,
Product Id: SFP-10G-SR
EEPROM Memory (A2 upper)
0x0180: 43 4f 55 49 41 38 4e 43 : 41 41 31 30 2d 32 34 31
0x0190: 35 2d 30 33 56 30 33 20 : 01 00 46 00 00 00 00 c6
0x01a0: 00 00 00 00 00 00 00 00 : 00 00 85 99 8f 00 a8 3b
0x01b0: d4 4b 00 00 1e 00 0a ff : 16 93 0f 8e 00 00 aa aa
0x01c0: 53 46 50 2d 31 30 47 2d : 53 52 20 20 20 20 20 20
0x01d0: 20 20 20 20 32 33 00 00 : 00 00 00 00 00 00 00 35
0x01e0: 14 1b 20 20 20 26 20 26 : 00 00 00 00 00 00 00 00
0x01f0: 00 00 00 00 00 fb 00 00 : ff ff ff ff 00 00 00 aa

MSA Data LOWER PAGE (QSA)
0x0000: 0d 00 02 01 00 00 01 00 : 00 00 00 00 00 00 00 00
0x0010: 00 00 00 00 00 01 00 00 : 00 00 00 00 00 00 00 00
0x0020: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0030: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0040: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0050: 00 00 44 32 50 30 0f 00 : 00 00 00 00 00 00 00 00
0x0060: 00 00 00 00 01 01 00 00 : 00 00 00 00 00 00 00 00
0x0070: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00

MSA Data UPPER PAGE (QSA)
0x0080: 0d 9b 80 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0090: 00 00 00 00 43 49 53 43 : 4f 2d 44 4e 49 20 20 20
0x00a0: 20 20 20 20 00 30 30 30 : 43 41 5a 41 44 45 52 4f
0x00b0: 2d 30 32 20 20 20 20 20 : 30 33 00 00 00 00 46 32
0x00c0: 00 00 00 00 44 54 59 32 : 32 32 31 30 36 47 38 20
0x00d0: 20 20 20 20 32 30 31 38 : 30 35 33 30 00 00 f2 c2
0x00e0: f2 00 07 d0 45 c2 18 57 : 2b 29 67 3f 51 03 49 be
0x00f0: 37 c4 da 00 00 00 00 00 : 00 00 00 00 81 96 b0 b1

NPU

This section covers specific when the interface is directly connected to the NPU. So, there is no PHY. These

ports are PHYless ports.

<#root>

RP/0/RP0/CPU0:ios#

show controllers twentyFiveGigE 0/0/0/12 (partial output)

Operational data for interface TwentyFiveGigE0/0/0/12:

State: Administrative state: disabled

==> Check if admin state display is correct

Operational state: Down (Reason: Link is shutdown)

==> Check if link state display is correct. If interface is down with Remote fault/Link Loss (local fault)

MAC address information:

Operational address: fc58.9a01.8e10

Burnt-in address: fc58.9a01.8e10

Autonegotiation disabled.

Priority flow control information for interface TwentyFiveGigE0/0/0/12:

Forward error correction: Standard (Reed-Solomon)

==> Check if FEC status is correct.

<#root>

RP/0/RP0/CPU0:ios#

show controllers tenGigE 0/0/0/14

Operational data for interface TenGigE0/0/0/14:

State: Administrative state: enabled

Operational state: Down (Reason: Link loss or low light, no loopback)

==> This router has a Local Fault/Down.

LED state: Yellow On

<#root>

RP/0/RP0/CPU0:ios#

show controllers tenGigE 0/0/0/15

Operational data for interface TenGigE0/0/0/15:

State:

Administrative state: enabled

Operational state:

Down (Reason: Remote Fault)

==> The peer has a Fault

LED state: Yellow On

Summary

- Check if the admin state of the interface is down. If yes, then bring it to admin up state with the command **no shut** on interface.
- Check the FEC status on both the router and the peer device. If there is any mismatch, try to correct them.
- Check the auto negotiation status on both the router and the peer device. If there is any mismatch, try to correct them.
- If FEC and auto negotiation are correctly configured, check the alarms status on both the router and the peer in the **show controller optics** output.

RX-LOS, RX-LOL : Problem in the receive direction of the signal.

TX-LOS, TX-LOL : Signal received by SFP/QSFP from NPU or PHY has the issue.

If there is a Link Down/Flap with RX-LOL/RX-LOS:

- Check if peer has TX-LOS/TX-LOL.
- If there is no TX alarm, try to change the cable/pluggable (SFP/QSFP).

If there is a Link Down/Flap with TX-LOL/TX-LOS:

You can apply a loopback external to exclude the remote peer and the fiber to the remote peer. Use a fiber cable locally to physically loop the transmit (Tx) signal into the receive (Rx) port. Optionally use an attenuator, to achieve this:

```
<#root>
```

```
RP/0/RSP0/CPU0:NCS(config)#
```

```
int Hu0/3/0/31
```

```
RP/0/RSP0/CPU0:NCS(config-if)#
```

```
loopback ?
```

```
external Enable external loopback (requires loopback connector)
```

```
internal Enable internal loopback
```

```
line Enable line loopback
```

```
RP/0/RSP0/CPU0:NCS(config-if)#
```

```
loopback external ?
```

```
<cr>
```

```
RP/0/RSP0/CPU0:NCS(config-if)#
```

```
loopback external
```

```
RP/0/RSP0/CPU0:NCS(config-if)#
```

```
commit
```

You can apply a loopback internal config on both the router and the peer to verify the optics by a bypass of the fiber/optics. This means that if the interface still does not come up, it indicates that the issue is not with the optical part!

```
<#root>
RP/0/RP0/CPU0:BRU-SPCORE-P2(config)#
int hundredGigE 0/0/0/10

RP/0/RP0/CPU0:BRU-SPCORE-P2(config-if)#
loopback internal ?

<cr>
RP/0/RP0/CPU0:BRU-SPCORE-P2(config-if)#
loopback internal

RP/0/RP0/CPU0:BRU-SPCORE-P2(config-if)#
commit
```

Collect Logs

These commands on both the router and the peer can provide a cause of the issue.

- **show ip interface brief**
- **show alarms brief**
- **show controller optics <r/s/i/p> of the interface with the issue**
- **show tech-support optics**

This displays alarms, LED status, Laser status & other optics info

- **show controller <tengige/hundredgige/other> <r/s/i/p> internal of interface with the issue.**

Displays FEC, AN, Up/Down, Local fault/Remote fault, and so on.

- **show controllers npu voq-usage interface all instance all location all**

Gives front panel port to pp port, npu, and core mapping.

Full collection of logs for the interface issue:

- **show version**
- **show running-config**
- **show install active**
- **show platform**
- **show tech-support ethernet platform location 0/x/CPU0**
- **show tech-support ethernet interfaces**
- **show tech-support ethernet controllers location 0/x/CPU0**
- **show tech-support dpa location 0/x/CPU0**

- **show tech-support ofa location 0/x/CPU0**
- **show tech-support optics location 0/x/CPU0**
- **show tech-support coherent location 0/x/CPU0**
- **show tech-support pfi location all**
- **show tech-support qos platform location 0/x/CPU0**
- **show tech-support fabric**
- **show controllers npu voq-usage interface all instance 0 location all**
- **show optics trace all**
- **show ethernet infra trace location 0/x/cpu0**
- **show ethernet v-ether trace location 0/x/CPU0**
- **show vether-ea trace all location 0/x/CPU0**
- **show portmapper trace all location 0/0/CPU0**