Troubleshoot Transceivers In Cisco IOS XE Enterprise Routers

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Introduction

This document describes how to troubleshoot transceivers in Cisco IOS® XE Enterprise Routers.

Requirements

Basic knowledge in transceivers and Cisco IOS® XE CLI.

Components Used

This document is based on Cisco Enterprise Routers like Catalyst8000 and Cisco 8000 Secure Routers series.

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 Information

This document is focused in data gathering and troubleshoot regarding interfaces with transceiver fault errors. As an example , here it is illustrated the type of errors to be troubleshooted:

```
%IOSXE_SPA-6-UPDOWN: Interface TenGigabitEthernet0/0/0, link down due to local fault
%LINK-3-UPDOWN: Interface TenGigabitEthernet0/0/0, changed state to down
```

The Compatibility Matrix

It is important to first check the Cisco Optics-to-Device Compatibility Matrix .

This matrix provide the key data verification points when using a transceiver and the platform that support it. The data can be filtered by the transceiver model used or the platform, it provides information such as:

- Platform
- Product ID
- Data Rates
- Form Factor
- Max. Reach
- Cable Type
- Media
- Connector Type
- Digital Optical Monitoring (DOM) capabilities
- Minimum version required to support the transceiver
- Link to the transceiver datasheet

Troubleshooting Flow Suggested

Step 1. Verify which Type of Transceiver is Used

Use these commands to identify what type of transceiver is being used. Gathering this data helps to identify the product id and the vendor.

- show interfaces

```
TenGigabitEthernet0/0/1 is administratively down, line protocol is down
<snip>
  MTU 1500 bytes, BW 10000000 Kbit/sec, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 10000Mbps, media type is 10GBase-SR                <----
```

- show inventory

```
Router#show inventory
NAME: "Chassis", DESCR: "Cisco C8200L-1N-4T Chassis"
PID: C8200L-1N-4T      , VID: V01  , SN: XXXXXXXXXXXX

NAME: "Power Supply Module 0", DESCR: "100W AC Internal Power Supply for Cisco C8200"
PID: PWR-CC1-100WAC    , VID:      , SN:

NAME: "POE Module 0", DESCR: "POE Module for Cisco C8200"
PID: PWR-CC1-150WAC    , VID:      , SN:

NAME: "Fan Tray", DESCR: "Cisco C8200 1RU Fan Assembly"
PID: C8200-FAN-1R      , VID:      , SN:

NAME: "module 0", DESCR: "Cisco C8200L-1N-4T Built-In NIM controller"
PID: C8200L-1N-4T      , VID:      , SN:

NAME: "NIM subslot 0/0", DESCR: "Front Panel 4 ports Gigabitethernet Module"
PID: 2x1G-2xSFP        , VID: V01  , SN:

NAME: "subslot 0/0 transceiver 1", DESCR: "SFP+ 10GBASE-SR"           <----
PID: SFP-10G-SR          , VID: V03  , SN: XXXXXXXXXXX                <----
```

- show interfaces transceiver detail

```
Router#show interfaces transceiver detail
IDPROM for transceiver TenGigabitEthernet0/0/1:
  Description                          = SFP+ optics (type 130)
  Transceiver Type:                    = SFP+ 10GBASE-SR (273)    <--- Type
  Product Identifier (PID)             = SFP-10G-SR          <--- Product ID
  Vendor Revision                      = 1.0
  Serial Number (SN)                   = XXXXXXXXXXX     <--- Serial Number
  Vendor Name                          = CISCO                   <--- Vendor
```

- show hw-module subslot <module/submodule> transceiver <port> idprom brief

```
Router#show hw-module subslot 0/0 transceiver 1 idprom brief
IDPROM for transceiver TenGigabitEthernet0/0/1:
  Description                          = SFP+ optics (type 130)
  Transceiver Type:                    = SFP+ 10GBASE-SR (273)    <--- Type
  Product Identifier (PID)             = SFP-10G-SR         <--- Product ID
  Vendor Revision                      = 1.0
  Serial Number (SN)                   = XXXXXXXXXXX     <--- Serial Number
  Vendor Name                          = CISCO                  <--- Vendor
  Vendor OUI (IEEE company ID)         = 00.1C.AD (7341)
<snip>
  Connector type                       = LC            <--- Connector type
  Encoding                             = 64B66B
  Nominal bitrate                      = 10GE (10300 Mbits/s)
```

Step 2. Verify the Compatibility Matrix Data

Refer to the Compatibility Matrix section from this article.

If transceiver is shown as compatible in terms of platform, module and software version, proceed with next step.

Step 3. Verify the show log CLI Output

Use the **show log** command to identify for relevant messages that can help to identify an error log indicator.

The scope of this article is the error code described in the Background Information section from this article.

If link down due to local or remote faults are shown in the log, proceed with the next step.

Step 4. Verify Power Levels

To verify power levels, use **show hw-module subslot <slot/sub-slot> transceiver <port> idprom brief**. Example:

```
Router#show hw-module subslot 0/0 transceiver 1 idprom brief
IDPROM for transceiver TenGigabitEthernet0/0/1:
<snip>
  Transceiver Tx power                    = -40.0 dBm        <--- Tx Power
  Transceiver Rx optical power            = -40.0 dBm        <--- Rx Power
```

You can also use command **show hw-module subslot <module/subslot> transceiver <port-number> status** to get the same data.

Alternatively you can use **show interfaces transceiver detail** command to verify current power levels and acceptable ranges:

```
                 Optical          High Alarm  High Warn  Low Warn   Low Alarm
                 Transmit Power   Threshold   Threshold  Threshold  Threshold
Port       Lane  (dBm)            (dBm)       (dBm)      (dBm)      (dBm)
---------  ----  ---------------  ----------  ---------  ---------  ---------
Te0/0/1    N/A    N/A                   2.0       -1.0       -7.3      -11.3

                 Optical          High Alarm  High Warn  Low Warn   Low Alarm
                 Receive Power    Threshold   Threshold  Threshold  Threshold
Port       Lane  (dBm)            (dBm)       (dBm)      (dBm)      (dBm)
---------  ----  ---------------  ----------  ---------  ---------  ---------
Te0/0/1    N/A    N/A                   2.0       -1.0       -9.9      -13.9
```

Note: The **show interfaces transceiver detail** is a handy command as it include current power levels of ports that support DOM and also shows the acceptable thresholds.

Step 5. Verify Acceptable Power Thresholds

Besides the command **show interfaces transceiver detail** illustrated in the previous step, you can use **show hw-module subslot <slot/subslot> transceiver <port> idprom detail** command as illustrated here:

```
Router#show hw-module subslot 0/0 transceiver 1 idprom detail
IDPROM for transceiver TenGigabitEthernet0/0/1:
<snip>
  High transmit power alarm threshold       =  2.0 dBm
  High transmit power warning threshold     = -1.0 dBm
  Low transmit power warning threshold      = -7.3 dBm
  Low transmit power alarm threshold        = -11.3 dBm
  High receive power alarm threshold        =  2.0 dBm
  High receive power warning threshold      = -1.0 dBm
  Low receive power warning threshold       = -9.9 dBm
  Low receive power alarm threshold         = -13.9 dBm
  External Calibration: bias current slope  = 1.000
  External Calibration: bias current offset = 0
```

If the thresholds are out of range, proceed with next steps.

Step 6. Verify the Data of the Neighboring Device

Gather and correlate data from the neighboring device, this includes the physical network device also such as patch panel and fiber attenuator. This is needed as the neighboring device is also a point of failure. These logs are required to be checked:

- General logs from neighbor device.
- Transceiver compatibility in the neighboring device.
- Power levels.

Step 7. Discard Layer 1 Issue

To discard physical problem issues, proceed with the these recommended steps:

- Test a well-known working SFP on both sides
- Test a well-known working port on both sides
- Test a port of another module or chassis if possible
- Connect the impacted port to a another free port within the same chassis and see if layer 1 comes up.

If it does, the issue points to the neighbor or the media.
- Test another cable
- Verify for any layer 1 issues in the carrier side.

File a TAC Case to Evaluate a Potential RMA

If the steps provided on this article do not help to narrow down the issue, file a TAC case to evaluate a potential RMA in the transceiver, module or chassis.



Note: Cisco branded transceivers are encouraged to be used as those are officially supported and tested.
