TROUBLESHOOTING 101: THE LINK IS NOT COMING UP

This article describes steps to perform to troubleshoot an Optical Transceiver or fibre link that is not coming up.

Check whether you're using the right form factor of transceiver and slot

- The QSFP+ and QSFP28 form factors or SFP, SFP+, and SFP28 modules look exactly the same. And as they have the same size, your SFP transceiver will fit seamlessly into an SFP+ or SFP28 switch port and vice versa. However, the connection won't work as you expect it to. Or, worse, even, it won't work at all.
- If you plug a 1G SFP device into an SFP+ port, the speed will be locked at 1 Gbps. Plugging an SFP28 module into an SFP port delivers no results, as the 25G transceiver can never auto-negotiate to 1Gbps.

Ensure that the optical transceiver match

- Wavelength: your need to select the optical modules with the same wavelength for interconnection. A 1310nm transceiver, for example, will not talk to an 850 nm transceiver.
- Distance: Optical modules interconnected must have the matching transmission distance. The connector specifications of optical modules vary greatly according to the transmission distance. Long-distance optical modules are expensive. When long-distance and short-distance optical modules are interconnected, optical attenuators must be used. To prevent an optical module from being burnt, the distance supported by the optical module should be longer than the length of the optical fibre connected to it.
- Rate: The nominal rate of an optical module must be the same as the actual link rate. Low-rate optical modules are prohibited from transmitting high-rate signals. The nominal rate of an optical module must be greater than the interface rate.

Confirm that the correct type of fibre-optic cable is being used.

- Check whether optical modules and optical fibers match.
    - A single-mode optical module (typically with a center wavelength of 1310 nm or 1550 nm) must be used with a single-mode optical fibre cable. Single mode (often yellow) for the long reach (LR/LX) modules,

- A multimode optical module (typically with a center wavelength of 850 nm) must be used with a multimode optical fibre cable. multi-mode (often orange or aqua) for short reach (SR/SX) modules.

Ensure that a compatible transceiver is used

- In what switch/router is the transceiver supposed to work? Is the equipment "open for 3rd party transceivers" or "vendor locked"? In the 2nd case, the transceiver has to be coded to be accepted by the equipment. Therefore switch/router brand and model & firmware version must be known (e.g. Cisco Catalyst 8500, IOS 12.2 - 44SE)
- Some SFP and SFP+ modules may not work because they supply bad data in their SFF headers (the standardized header for SFPs) from the EEPROM on the module
- Run the **display interface transceiver command** to check whether any alarm information has been generated for the optical module
- Transceivers that have compatibility dilemmas may display these error messages.

"% GBIC_SECURITY_CRYPT-4-VN_DATA_CRC_ERROR: SFP in slot 123456 has bad CRC
%PM-4-ERR_DISABLE: gbic-invalid error recognized on Gi2/1/20, putting Gi2/1/20 in err-disable state."

Check if the local optical interface is shut down

- Run the display command in the interface view to check whether the two interfaces have been shut down. If an interface is shut down, run the ***no shutdown or undo shutdown*** command on the interface.

Try to set the speed setting manually on both sides.

- If a multi-rate module is used, please ensure that the other end of the link is set to the desired speed and that Auto-Negotiation is disabled if needed.
- Check whether the working modes of the two connected ports match each other or whether the working modes of the interface where the SFP module is located match the working state of the optical transceiver.
- Some MACs (MAC in this case is the logical part of the overall SFP interface) can determine the speed of a signal coming in, and switch to either 1G or 10G speed. However, if both ends are manually configured to a fixed speed and the speed of each end is different (one end 1G, other end 10G), then no communication will occur. As a result, if there is no knowledge about the speed of the peer side, then there is no guarantee that the connection will come up.

- On Cisco switches, you can execute the “show interface brief” command to check it. If they do not match, you can use the speed and duplex mode commands to configure and fix it.

Note: SFP+ can support dual rate 1G/10G, and SFP28 can support 10G/25G. Make sure dual rate is supported by your switch software as well.

Check if the transmit and receive power of the local optical module is too low or too high.

- To ensure normal communication between two interconnected interfaces that have optical modules installed, check for transmit and receive power alarms. Ensure that the transmit and receive power values of the two optical modules are in the normal ranges. Otherwise, traffic forwarding on the optical interfaces may be abnormal or the optical modules may be damaged.
- Run the display interface transceiver command to check the Digital Diagnostic information about the optical module on the local interface. Specifically, check whether the diagnostic information contains alarms about abnormal transmit or receive power.

```
          Optical            High Alarm  High Warn  Low Warn   Low Alarm
          Transmit Power     Threshold   Threshold  Threshold  Threshold
Port      (dBm)              (dBm)       (dBm)      (dBm)      (dBm)
--------- ------------------ ----------- ---------- ---------- ----------
Te1/1/4    -2.3                 1.6        -1.3       -7.3       -11.3

          Optical            High Alarm  High Warn  Low Warn   Low Alarm
          Receive Power      Threshold   Threshold  Threshold  Threshold
Port      (dBm)              (dBm)       (dBm)      (dBm)      (dBm)
--------- ------------------ ----------- ---------- ---------- ----------
Te1/1/4    -2.4                 2.0        -1.0       -9.9       -13.9
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- The display interface transceiver command displays the current transmit and receive power values of the optical module, as well as the default maximum and minimum power values.
    - If RxPower Low is displayed, the strength of signals received by the local optical module is too low. As a result, the local interface may not go Up or discard packets after it is Up. In this case, check whether the distance between the two switches exceeds the maximum transmission distance of the remote optical module. If the distance is within the transmission distance of the remote optical module, check whether the optical module and optical fiber on the interface are damaged.
    - If RxPower High is displayed, the strength of signals received by the local optical module is too high. The possible reason is that the distance between the two

switches is short but a long-distance optical module is used on the remote end. In this case, install an optical attenuator on the remote optical module to protect the local optical module.
    - If TxPower Low is displayed, the strength of signals sent from the local optical module is too low, or the optical module is faulty. This may cause low receive power on the remote optical module. Then, the remote interface may not go Up or discard packets after it is Up. In this case, contact technical support engineers.
    - If TxPower High is displayed, the strength of signals sent from the local optical module is too high. This may cause high receive power on the remote optical module. If the high receive power lasts for a long time, the remote optical module will be burnt. The local optical module may have failed and you are advised to replace it.
- An example: understanding the TX/RX light levels of 10G-SR transceiver/link
    - The Transmit power of the 10G-SR transceiver is typically good when it is in the 6 dB range between -1 and -7 dBm.
    - The Receive power is normally expected between - 1 and -9.9 dBm.
    - If either Tx or Rx is in the -30 dBm or lower range that's usually indicative of there being no actual signal received and the transceiver is reporting the "noise floor" of the receiver stage. (https://en.wikipedia.org/wiki/Noise_floor)
    - If you see an Rx power around -14 dBm or lower there is typically some sort of fault in the cable plant (bad splice, dirty connector, poorly seated jumper etc.) that's causing excessive signal loss.

Verify if the link comes up if the cables are connected back-to-back on the same switch

- For example: connecting a cable from port12 to port11 on the same switch

Replace the optical module or the fibre cable

- If no transmit and receive power alarms are displayed on the two ends but the interface is still Down, collect detailed information and logs about the optical modules, and then replace the optical modules or optical fibers. If the interface can go Up, the original optical modules or optical fibers are faulty. If the interface is still Down, contact our technical support.

Contact us

- Gather details like when and from where the module was purchased, take a picture of the SFP module, and the length of the cable and feel free to contact support with all the above information for further assistance.
- Submit your ticket through the helpdesk website: helpdesk.ecin.ca
- Or send an email to helpdesk@ecin.ca and please include the following information:
    - PART NUMBER:
    - SERIAL NUMBER:
    - PO number :
    - QUANTITY:
    - DESCRIPTION OF THE ISSUE:
    - CLI/GUI ERROR MESSAGE:
    - STEPS TO DUPLICATE A SPECIFIC ISSUE: