

Signal Detect Level for 400GBASE-ZR - supporting comment #247 on 802.3cw D2.1

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IEEE P802.3cw

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Comment addressed by this contribution

CI 156 SC 156.5.4 P 88 L 40 # 247

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Comment Type T Comment Status X

For 400GBASE-ZR, an appropriate signal detect level can be defined. At a 29dB OSNR, for our highest allowable Rx Power, the accumulated noise would be -20dBm assuming a 100GHz Demux BW, for a 26dB OSNR the value accumulated noise would be -17 dBm.

SuggestedRemedy
Add a SIGNAL_DETECT level to indicate OK and FAILED, with a value of ≤ -17 dBm indicating FAIL.

Proposed Response Response Status ○

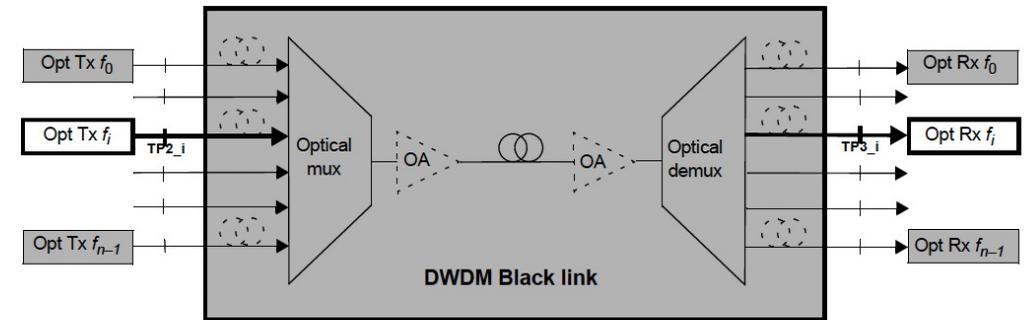


Figure 156-5—Black link example configuration for specifying n DWDM channels

156.5.4 PMD global signal detect function

The PMD global signal detect function shall set the state of the SIGNAL_DETECT parameter to a fixed OK value. The presence of a valid signal is determined only by the 400GBASE-ZR PCS (see 155.2.1).

NOTE—Average input power is not a reliable indication of signal failure in an optically amplified system.

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Overview

- In 100GBASE-ZR, average power was not a reliable indicator of signal failure:
 - 100GBASE-ZR included both amplified and unamplified applications, resulting in an increased range of potential input powers
 - 100GBASE-ZR used a DP-DQPSK symbol encoding
- 400GBASE-ZR being defined in 802.3cw
 - Supports only an amplified application
 - Uses a DP-16QAM symbol encoding, requiring a higher OSNR than 100GBASE-ZR

Optical Specs

- Table 156-7 specifies:
 - Average Receive Power (min) = -12 dBm
 - Average Receive Power (max) = 0 dBm
 - Receiver OSNR tolerance = 26 dB/12.5GHz
 - Receiver OSNR (min) = 29dB/12.5GHz ← This value includes impairments, and should be delivered by the DWDM black link
- 802.3cw does not specify optical filtering parameters individually
 - Table 156-1 defines parameters used to calculate link transfer functions
 - Maximum Demux width = 76 GHz
- SNR at TP3 [x GHz Bandwidth] = OSNR [dB] - $10 \cdot \log_{10}[x/12.5]$;
 - For a filter width of 100GHz, SNR = [17, 20] dB for OSNR of [26, 29] dB/12.5GHz
- Noise Power = Signal Power - SNR
 - TP3 Noise Power = [-29, -17] dBm for an OSNR of 26dB, for Signal Power of [-12, 0dBm]
 - TP3 Signal Power = [-32, -20] dBm for an OSNR of 29dB, for Signal Power of [-12, 0dBm]
- Noise Power is at least 5dB lower than minimum signal power for all cases

Signal Detect Level

- Based on this calculation, it is recommended to modify 802.3cw to include both OK and FAILED states for SIGNAL_DETECT
- A threshold level of $\leq -17\text{dBm}$ is recommended to indicate the FAILED state of SIGNAL_DETECT

Thanks!