

Removal of unamplified parameters from 802.3cw

Supporting information for comments #3 & 4 on P802.3cw
D1.1

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Supporters

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Submitted Comments

Comment #3

Technical	73	156.7.2	21	Receiver Sensitivity for an unamplified link should not be part of the same PMD as receiver sensitivity for an amplified link. This is a distinct application, and a receiver should not be burdened with a requirement to support both applications. Although the sensitivity spec in Table 156-7 is informative, other aspects of this application are normative. If this is a required application it should be defined as a separate PMD.	Remove sensitivity spec from Table 156-7, or modify to define a separate PMD supporting this.	Yes
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Comment #4

Technical	74	156.8	27	Optical path power penalty for OSNR at TP3 ≥ 34 dB is a separate application, and should be removed or applied to a separate PMD.	Remove power penalty from Table 156-8, or modify to indicate that this is applied to a separate PMD.	
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100GBASE-ZR Background

- In 100GBASE-ZR (802.3ct) a single PMD was defined to support both amplified and unamplified applications
- Broad Market Potential in 802.3ct CSD targeted Cable/MSO distribution networks with reaches > 40km
 - Cable/MSO distribution networks included a mix of amplified and unamplified applications
- The 80 km objective was met with amplified DWDM systems
- Although the 80km reach objective could not be met for DWDM unamplified systems, a substantial portion of the links for the Cable/MSO space were addressed by 100GBASE-ZR

400GBASE-ZR

- 400GBASE-ZR Broad Market Potential targets Data Center interconnects
- Data Center Applications at 400G are DWDM
 - https://www.ieee802.org/3/B10K/public/18_05/baca_b10k_01a_0518.pdf
- Originally 400GBASE-ZR was defining a specification based on a 100GHz grid, but changed to a 75GHz spacing based on presentations from individuals affiliated with data center operators indicating that 40 optical channels per fiber did not meet the capacity requirements

100GBASE-ZR: Unamplified applications

- Discussion took place in 802.3ct on the merits of including unamplified and amplified specifications in the same PMD
- It was shown that with reasonable parameters substantial DWDM applications could be supported, although with reduced reach and channel count

Tx Power	-8	dBm
Rx Sensitivity	-30	dBm
Mux Loss	3.5	dB
Demux Loss	3.5	dB
Fiber Loss	0.275	dB/km
Connector Loss	1	dB
Penalties	3	dB
Reach	40	km

400GBASE-ZR: Unamplified DWDM applications

- Rx sensitivity has not been defined
 - As a starting value the value from the OIF 400ZR IA Application 2 is used
- Mux and Demux loss of 3.5 dB reduces channel count
 - For the same parameters as used previously, and reduced penalty allocation, 0 km reach is calculated

Tx Power	-10	dBm
Rx Sensitivity	-20	dBm
Mux Loss	3.5	dB
Demux Loss	3.5	dB
Fiber Loss	0.275	dB/km
Connector Loss	1	dB
Penalties	2	dB
Reach	0	km

Single 400GBASE-ZR channel

- With No Mux/Demux reach of 25km is calculated
- 400GBASE-ER8 has 30-40km reach for this application
- This is a different link/application than defined in 802.3cw
 - This is NOT a DWDM application

Tx Power	-10	dBm
Rx Sensitivity	-20	dBm
Mux Loss	0	dB
Demux Loss	0	dB
Fiber Loss	0.275	dB/km
Connector Loss	1	dB
Penalties	2	dB
Reach	25	km

Summary

- The parameters being defined in 802.3cw are for 64 channel DWDM operation over a black link up to 80km
 - This reach requires optical amplification
 - Amplified applications do not require a sensitivity spec for the high-OSNR (unamplified) application
 - Designing the receiver to support the required sensitivity for unamplified applications will increase the relative cost, by requiring higher gain electrical amplification
- An unamplified application would have reduced channel counts and reach, and likely require different transmit optical specifications
 - Using current Tx parameters in P802.3cw D1.1 ~0 reach is calculated for DWDM applications
- The unamplified application would not be defined by the same black link

Recommendations

- 802.3cw should remove parameters associated with unamplified applications for 400GBASE-ZR
- If an unamplified application is determined to be required in 802.3cw, it should be treated as a separate PMD with separate link definitions

Thanks!