Two SMF Spec Limit Types for 802.3 PMDs Proposal

P802.3cu 100 Gb/s and 400 Gb/s over SMF
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Introduction

- The discussion about appropriate SMF spec limits for 802.3 PMD standards has been ongoing for a decade.
- The trade-off is between appropriate coverage of SMF plant vs. incurring unnecessary cost for majority of applications
- The ITU specifies four SMF types in G.652: A, B, C, D
- Different limits have been used for SMF loss, for example engineered 40km vs. worst-case 30km ER4
- Different dispersion limits have been considered, for example 1300nm to 1324nm vs. 1304nm to 1320nm zero dispersion range
- PMD penalties have always required trade-off because there is no worst-case penalty reference
- The principle of deriving appropriate SMF spec limits is established, it is now timely to consider new set of values

Introduction, cont.

- New SMF (ex. D) is widely deployed in Web2.0 datacenters
- Characteristics of SMF installed in Web2.0s datacenters are known
- Link specifications based on conservative worst-case SMF spec limits incur unnecessary cost because there is no worst-case SMF in Web2.0 datacenters
- It is proposed that 802.3 link specifications be based on two G.652 derived SMF spec limit types:
  - enable lowest cost for high-volume cost sensitive Web2.0 applications
  - provide appropriate SMF plant coverage for telecom applications

Two SMF Spec Limit Types Example

- 100GBASE-ER4 1km G.652 A&B SMF worst-case spec limits for 30km links:
- Limits for L0 λ: 1295nm (1294.53 to 1296.59nm range)
  - Loss = 0.433 dB
- Channel Insertion Loss: 15 dB
- 100GBASE-ER4 1km G.652 A&B SMF typical spec limits for 40km links:
- Limits for L0 λ: 1295nm (1294.53 to 1296.59nm range)
  - Loss = 0.4 dB
- Channel Insertion Loss: 18 dB

Type 1 SMF Spec Limits

CWDM λs 1km Type 1 (“worst-case”) SMF, G.652 A&C based, spec limits:

- Limits for L0 λ: 1271nm (1264.5 to 1277.5nm range)

  λ_{min} = 1264.5nm and $\lambda_{zero\_dispersion\_max}$ = 1324nm:
  - Dispersion = -6 ps/nm
  - PMD_Q = 0.5 ps/sqrt(km)
  - Loss = 0.47 dB
- L3 λ: 1331nm (1324.5 to 1337.5nm range)

  λ_{max} = 1337.5nm and $\lambda_{zero\_dispersion\_min}$ = 1300nm:
  - Dispersion = 3.3 ps/nm
  - PMD_Q = 0.5 ps/sqrt(km)
  - Loss = 0.43 dB

Type 2 SMF Spec Limits Proposal

CWDM λs 1km Type 2 (“typical”) SMF, G.652 B&D based, spec limits proposal:

- L0 λ: 1271nm (1264.5 to 1277.5nm range)

  λ_{min} = 1264.5nm and $\lambda_{zero\_dispersion\_max}$ = 1315 nm:
  - Dispersion = -5 ps/nm
  - PMD_Q = 0.2 ps/sqrt(km)
  - Loss = 0.433 dB
- L3 λ: 1331nm (1324.5 to 1337.5nm range)

  λ_{max} = 1337.5nm and $\lambda_{zero\_dispersion\_min}$ = 1309 nm:
  - Dispersion = 2.6 ps/nm
  - PMD_Q = 0.2 ps/sqrt(km)
  - Loss = 0.43 dB

Two SMF Spec Limit Types Proposal

Thank You