

Considerations for 100Gb/s BiDi 10 & 20km Reach Objectives

K.P. Jackson (Sumitomo Electric)

Supporters

- Uwe Schmiade (Nokia)
- Stefan Dahlfort (Ericsson)
- Reza Khan (Semtech)
- Ernest Muhigana (Lumentum)

Background and Motivation

- Prioritize developing 100G specifications over 200G
- Technology re-use
 - Leverage lower data-rate technologies (e.g. IM-DD, PAM4 modulation)
- Fewest lanes
 - Single lane ideally
- Common technology among different reach objectives
 - Screening/binning for different performance objectives can achieve high manufacturing efficiency
 - Legacy rate compatibility is nice but not a requirement
- Electrical-Optical lane match historically achieves optimum performance
 - Eliminate gear-box for lowest power (100Gb/s electrical lanes expected)
- SFP112 form-factor preferred – choose technologies that are consistent with this form-factor
 - 2.5W envelope strongly desired (but may not be achievable for all reach objectives)
- Outdoor operating environment => wide operating temp range (e.g. -40C to +85C)
 - Results in wide wavelength operating ranges or cooled solutions required
 - CD penalty may be challenging with wider operating wavelength

Preferences (10km & 20km, 100Gb/s Objectives)

- Single-lane, 100Gb/s, PAM4 modulation
- Wavelength range
 - ITU-T Proposal (*suggested in 3dk_Johnson_2301_1.pdf*)
 - $1304.6 \pm 1\text{nm}$ (US)
 - $1309.1 \pm 1\text{nm}$ (DS)
 - Alternative (provides a filter stop band of 7nm):
 - $1300.1 \pm 1\text{nm}$ (US)
 - $1309.1 \pm 1\text{nm}$ (DS)
- IL Budget:
 - 10km = 7dB (*as opposed to 6.3dB*) for maintenance margin
 - 20km = 15dB (*seems ok*)

Discussion

- This technology (single-lane) selection may not address 100Gb/s, 40km reach objective
 - High CD penalty (?)
 - Statistical CD analysis to address probability of worst-case conditions? (cf. https://grouper.ieee.org/groups/802/3/df/public/22_11/parsons_3df_01a_22_11.pdf)
 - *If 1x100G or 2x50G not doable, then 100G-ER1 using coherent (100GBASE-ZR as a starting point)(?)*
- This technology (single-lane) selection will likely not work for all 200Gb/s reach objectives
 - Could work for 10km, 1x200Gb/s (?) (fronthaul applications, when needed)

Thanks!