Wavelength Considerations for BiDi Interconnects

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Wavelength Considerations for BiDi interconnects

- General Considerations:
  - Dispersion effects degrade link performance as rate/reach increase.
    - Silicon Photonics (zero/minimal chirp) solutions behave differently than EMLs.
  - 10km and 20km solutions likely to use/enable PIN based receivers, 40km likely to require APD.
- Goals:
  - Minimizing number of (entirely) different BOM across different reaches
    - ie, keep 10km and 20km as similar as possible
  - Maximize interoperability across rates and reaches
- Five wavelength options presented
  - All pulling from the CWDM4 grid of 1270/1290/1310/1330 nm

Option 1

	10km	20km	40km
10G	1270/1330	1270/1330	1270/1330
25G	1270/1330	1290/1310	1290/1310
50G	1270/1330	1290/1310	1290/1310

- (Potential) Benefits:
  - Already 10G solutions shipping on that wavelength plan
  - Allows for interop across all 10G reaches
  - Allows for multi-rate capability at 10km
- (Potential) Drawbacks:
  - Requires unique BOM for every reach at 25G and 50G

Option 2

	10km	20km	40km
10G	1270/1330	1270/1330	1270/1330
25G	1270/1330	1270/1330	1290/1310
50G	1270/1330	1270/1330	1290/1310

- (Potential) Benefits:
  - Multi-rate and multi-reach for 10km and 20km
  - Same BOM for 10km and 20km solutions
- (Potential) Drawbacks:
  - 20km dispersion challenges at 25G and 50G
  - 40km is a unique BOM

Option 3

	10km	20km	40km
10G	1270/1330	1270/1330	1270/1330
25G	1270/1330	1270/1330	1290/1310
50G	1290/1310	1290/1310	1290/1310

- (Potential) Benefits:
  - Multi-rate and multi-reach for 10km and 20km at 10G and 25G
  - Same BOM for 10km and 20km solutions
  - Improved dispersion at 50G
- (Potential) Drawbacks:
  - 40km is a unique BOM

Option 4

	10km	20km	40km
10G	1270/1330	1270/1330	1270/1330
25G	1270/1330	1270/1330	1270/1330
50G	1290/1310	1290/1310	1290/1310

- (Potential) Benefits:
  - Multi-rate and multi-reach for 10km and 20km at 10G and 25G
  - Same BOM for 10km and 20km solutions
  - Improved dispersion at 50G
- (Potential) Drawbacks:
  - 40km will have dispersion challenges at 25G
  - No multi-rate capability between 25G and 50G solutions

Option 5

	10km	20km	40km
10G	1270/1330	1270/1330	1270/1330
25G	1290/1310	1290/1310	1290/1310
50G	1290/1310	1290/1310	1290/1310

- (Potential) Benefits:
  - Multi-rate and multi-reach for all reaches at 25G and 50G
  - Same BOM for 10km and 20km solutions
  - Improved dispersion at 25G and 50G
- (Potential) Drawbacks:
  - No multi-rate capability between 10G and 25G/50G solutions

Additional Considerations

- Scalability to 100G/L important: Dispersion even harder than at 50G
- Multi-rate capability between 50G and 10G unlikely (since 50G is PAM4). Interop between 50G and 25G possible in “PAM2” mode.
- Narrowing wavelength windows (from 20km) should be considered:
  - 17nm windows would allow for 0.09nm/K with +/- 2nm tolerance over -40 to 85C
  - Narrower windows would improve dispersion

Current Preferences

- Options 3 & 5 look favorable since they:
  - Keep 10G at currently supported wavelengths
  - Put 50G on a tighter wavelength range to improve dispersion and setup for a future 100G solution
  - Mitigates 40km dispersion challenges at 25G

- Key question is on multi-rate capability between 10G and 25G
  - Is it necessary? At what reaches?

Thank You