

400G-10km Feasibility With 4λ x 100G-PAM4 On CWDM Grid

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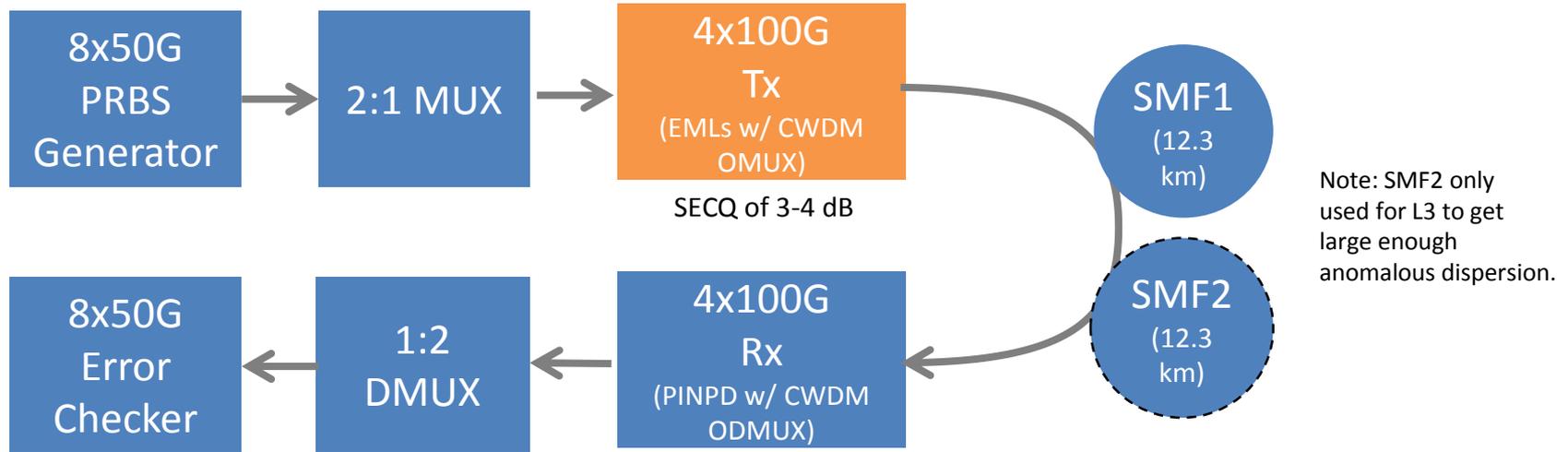
Background

- This presentation reports measurements that demonstrate the feasibility of 4x100G-PAM4 transmission using the “CWDM” wavelength grid.
- “CWDM” grid defined as (see 40GBASE-LR4, 200GBASE-FR4):

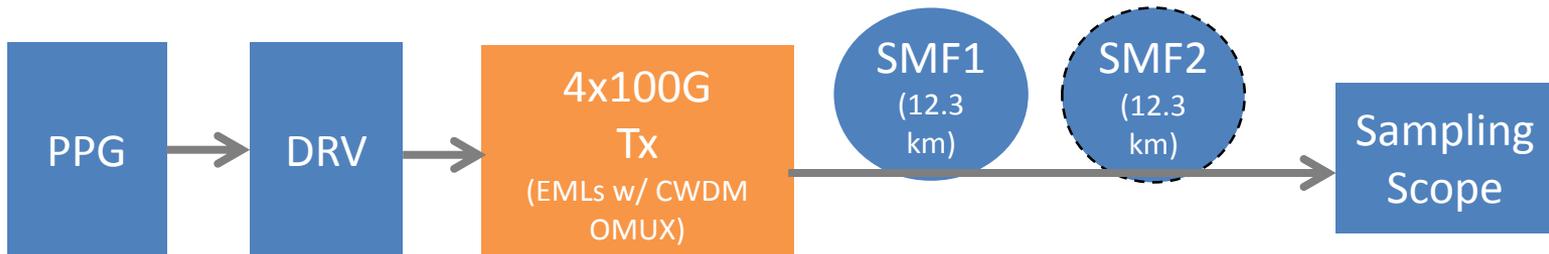
Lane	Center wavelength	Wavelength range
L ₀	1271 nm	1264.5 to 1277.5 nm
L ₁	1291 nm	1284.5 to 1297.5 nm
L ₂	1311 nm	1304.5 to 1317.5 nm
L ₃	1331 nm	1324.5 to 1337.5 nm

Experimental Configuration

For BER Test (EML Tx, PIN-PD Rx, CWDM Grid)



For TDECQ (EML Tx, CWDM Wavelengths)



BER Measurement Results

Lane	Measured Fiber Dispersion For BER Test	10 km Fiber Dispersion Per IEEE Fiber Model	Measured B-B Rx Sensitivity At 2.4E-4 BER	Measured Penalty After Fiber Propagation
	ps/nm	MIN/MAX ps/nm	dBm	dB
L0	-54.2 (SMF1)	-59.4 / -21.5	-8.82	0.27
L1	-30.3 (SMF1)	-38.5 / -2.3	-8.03	-0.01
L2	-7.5 (SMF1)	-18.5 / +16.0	-8.43	0.04
L3	+29.4 (SMF1+SMF2)	+0.5 / +33.4	-8.25	0.57

- **Red Text** – Highest normal (negative) dispersion tested and highest normal dispersion spec.
- **Green Text** – Highest anomalous (positive) dispersion tested and highest anomalous dispersion spec.
- BER measured with all lanes enabled with PRBS31.

Highest penalty was 0.57 dB, measured in L3.

SECQ vs TDECQ For 4x100G-PAM4 EML Tx On CWDM Grid

Lane	Measured Dispersion (ps/nm)	SECQ At Fiber Input (dB)	TDECQ At Fiber Output (dB)	TDECQ – SECQ (dB)
L0	- 54.2	1.79	1.83	0.04
L3	+ 29.4	1.75	2.60	0.85

Highest TDECQ-SECQ was 0.85 dB measured in L3.

Summary

- Measurements of BER and TDECQ were made near worst-case dispersion values in SMF for EML Tx and PIN-PD Rx on CWDM grid and $4\lambda \times 100\text{G-PAM4}$ transmission scheme.
- Worst-case BER penalty was 0.57 dB (for L3).
- Worst-case TDECQ-SECQ after/before dispersion was 0.85 dB (also for L3).
- Results demonstrate feasibility of $4\lambda \times 100\text{G-PAM4}$ transmission over 10 km using EML Tx on CWDM grid.