

# 20m MMF reach objective Tx and Rx parameter tracking tables

14<sup>th</sup> March 2013

# Optical Transmitter characteristics (each lane)

| Description  | Type  | Unit | dawe_01a_0113_optx,<br>dawe_01a_0213_mmf       | 100m baseline proposal                         | 20m Strawman proposal                              |
|--|-------|------|--|--|--|
| Signal rate  |       | GBd  | 25.78125                                       | 25.78125 ±100 ppm                              | 25.78125 ±100 ppm                                  |
| Center wavelength  | range | nm   | 840 to 860                                     | 840 to 860                                     | 840 to 860   |
| RMS spectral width   | max   | nm   | 0.65   | 0.6  | tbc (0.6 to 0.8)                                   |
| Average launch power   | max   | dBm  | 2.4  | 2.4  | 2.4  |
|  | min   |      | -7.6   | -9.1 (tbc) {Tx <sub>OM Amin</sub> -2}          | TBD  |
| Optical Modulation Amplitude (OMA)   | max   | dBm  | 3  | 3  | 3  |
| OMA  | min   | dBm  | -5.6   | -7.1 (tbc)<br>{Tx <sub>OMA@TDP</sub> -TDP+0.9} | TBD  |
| OMA at max TDP   | min   | dBm  |  | -3   | TBD  |
| Launch power in OMA minus TDP  | min   | dBm  | TBD  | -8 (tbc) {Tx <sub>OMA@TDP</sub> -TDP}          | TBD  |
| Difference in launch power between any two lanes (OMA)   | Max   | dB   | 4  | tbc (4 or greater)                             | (Tx <sub>OM Amax</sub> -Tx <sub>OMA@TDPmax</sub> ) |
| Transmitter and dispersion penalty (TDP) at target BER before FEC                              | Max   | dB   | TBD  | 5 (tbc)  | TBD  |
| Extinction ratio   | Min   | dB   | 3  | 3  | 3  |
| Optical return loss tolerance  | Max   | dB   | 12   | 12   | 12   |
| Encircled Flux   |       |      |  | ≥ 86% at 19 um,<br>≤ 30% at 4.5 um             | ≥ 86% at 19 um,<br>≤ 30% at 4.5 um                 |
| Transmitter eye mask definition<br>{X1, X2, X3, Y1, Y2, Y3},<br>5×10 <sup>-5</sup> hits/sample |       |      | Around<br>0.25, 0.36, 0.45, 0.27,<br>0.35, 0.4 | TBD {ffs}                                      | TBD {ffs}  |
| Average launch power of OFF transmitter  | Max   | dBm  | -30  | -30  | -30  |

Gray text items in the strawman proposal have not been reviewed yet.

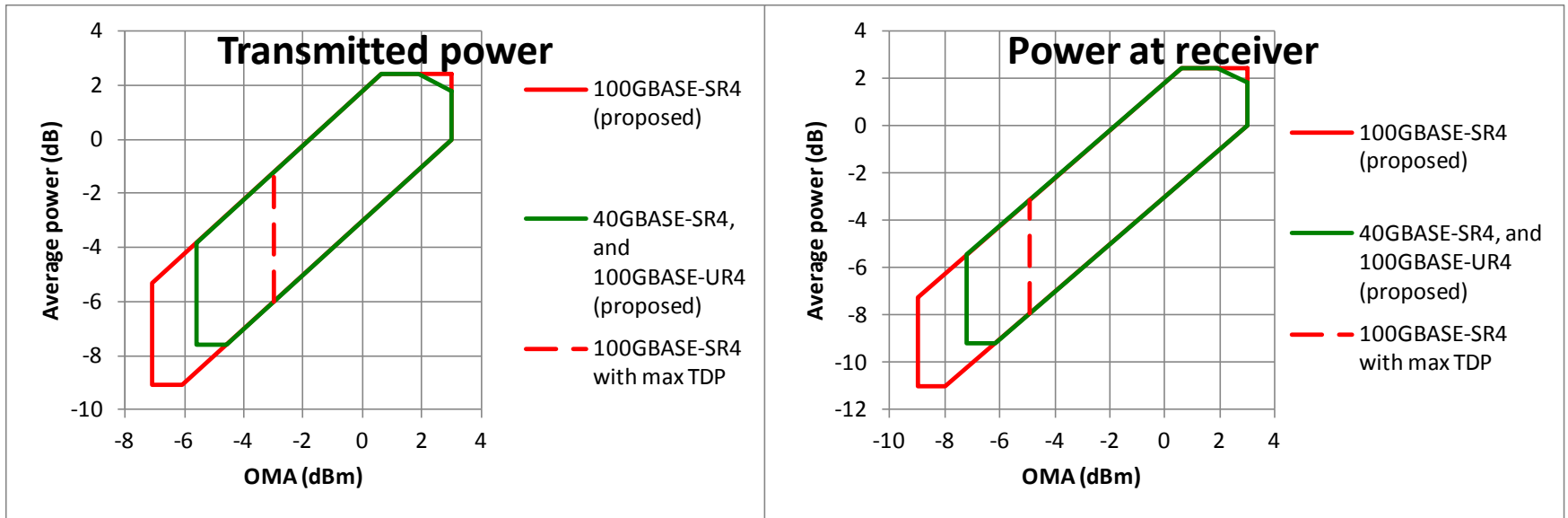
# Optical Receiver characteristics (each lane)

| Description                         | Type  | Unit | dawe_01a_0113_optx,<br>dawe_01a_0213_mmf | 100m baseline                      | 20m Strawman<br>proposal |
|-------------------------------------|-------|------|--|------------------------------------|--------------------------|
| Signal rate                         |       | GBd  | 25.78125                                 | 25.78125 $\pm$ 100 ppm             | 25.78125 $\pm$ 100 ppm   |
| Center wavelength                   | range | nm   | 840 to 860                               | 840 to 860                         | 840 to 860               |
| Damage threshold                    | min   | dBm  | 3.4                                      | 3.4                                | 3.4                      |
| Average power at receiver           | max   | dBm  | 2.4                                      | 2.4                                | 2.4                      |
|                                     | min   |      | -9.2                                     | -11 (tbc) $\{T_{x_{av\_min}}-IL\}$ | TBD                      |
| Optical Modulation Amplitude (OMA)  | max   | dBm  | 3  | 3                                  | 3                        |
| Stressed receiver sensitivity (OMA) | max   | dBm  | TBD                                      | ffs                                | ffs                      |
| SRS test conditions                 |       |      | See<br>dawe_01a_0113_optx                | ffs                                | ffs                      |
| Receiver reflectance                | max   | dB   | -12                                      | -12                                | -12                      |

Values/expressions in {} are from 100 m baseline

Gray text items in the strawman proposal have not been reviewed yet.

# OMA – average power maps



- Visual representation of dawe\_01a\_0113 (from Piers Dawe)

# Link and Cable Characteristics

| Parameter                 | Type | Unit   | 100m baseline                            | 20m Strawman proposal                    |
|---------------------------|------|--------|--|--|
| Supported fiber types     |      |        | 50μm OM4, OM3                            | 50μm OM4, OM3                            |
| Effective Modal Bandwidth | min  | MHz*km | 4700 <sup>1</sup> , (2000 <sup>1</sup> ) | 4700 <sup>1</sup> , (2000 <sup>1</sup> ) |
| Power budget              | min  | dB     | 8.2                                      | TBD                                      |
| Operating range           | min  | m      | 0.5 to 106 <sup>2</sup>                  | 0.5 to TBD (20) <sup>2</sup>             |
| Channel insertion loss    | max  | dB     | 1.9                                      | TBD (1.6)                                |

*Note 1: With launch as specified in clause 86*

*Note 2: Reach on OM4; equivalent reach on OM3 is for further study in the task force*

Gray text items in the strawman proposal have not been reviewed yet.

# TP1a specifications (each lane)

| Description  | Type | Unit      | XLPP1                 | dawe_01a_0113_optx,<br>dawe_01a_0213_mmf | CAUI-4 baseline                  | CPPI-4 Strawman   |
|--|------|-----------|-----------------------|--|----------------------------------|-------------------|
| Signal rate  |      | GBd       | 10.3125               | 25.78125                                 | 25.78125 ±100 ppm                | 25.78125 ±100 ppm |
| J2 Jitter  | Max  | UI        | 0.17                  | 0.19                                     |                                  | TBD               |
| J4 Jitter  | Max  | UI        |                       | 0.23                                     |                                  | TBD               |
| DDPWS  | Max  | UI        | 0.07                  | 0.1                                      | (0.035)                          | TBD (no spec?)    |
| Equalized J2*  | Max  | UI        |                       | 0.1                                      |                                  | TBD               |
| Equalized J4*  | Max  | UI        |                       | 0.14                                     | (0.52 at BER=10 <sup>-12</sup> ) | TBD               |
| Equalized DDPWS*   | Max  | UI        |                       | 0.05                                     |                                  | TBD               |
| CTLE peaking*  | Max  | dB        |                       |  |                                  | TBD               |
|  | Min  |           |                       |  |                                  | TBD               |
| Equalized eye mask definition<br>{X1, X2, Y1, Y2},<br>5×10 <sup>-5</sup> hits/sample |      | UI, mV    | 0.11, 0.31<br>95, 350 | 0.13, 0.33<br>95, 350                    |                                  | TBD               |
| Peak-to-peak voltage   | Max  | mV        |                       |  | 900                              | TBD               |
| Qsq  | Min  | V/V       | 45                    | 45                                       |                                  | TBD               |
| Single ended output voltage  |      | V         | -0.3 to 4             |  | -0.3 to 2.8                      | TBD               |
| AC common-mode output voltage  | Max  | mV<br>rms | 15                    | 20                                       | 17.5                             | TBD               |
| Transition time, 20% to 80%  | Min  | ps        | 28                    | ~10 TBD                                  | 10                               | TBD               |

*\* Similar methodology to CEI-28G-VSR; CTLE is part of the test equipment used to verify the electrical signal compliance*

# TP4 specifications (each lane)

| Description  | Type | Unit      | XLPP1                 | dawe_01a_0113_optx,<br>dawe_01a_0213_mmf | CAUI-4                           | CPPI-4 Strawman  |
|--|------|-----------|-----------------------|--|----------------------------------|------------------|
| Signal rate  |      | GBd       | 10.3125               | 25.78125                                 | 25.78125±100 ppm                 | 25.78125±100 ppm |
| J2 Jitter  | Max  | UI        | 0.42                  | 0.6                                      |                                  | TBD              |
| Equalized J2*  | Max  | UI        |                       | 0.5                                      |                                  | TBD              |
| Equalized J4*  | Max  | UI        |                       | 0.64                                     | (0.41 at BER=10 <sup>-12</sup> ) | TBD              |
| CTLE peaking*  | Max  | dB        |                       |  |                                  | TBD              |
|  | Min  |           |                       |  |                                  | TBD              |
| Equalized eye mask definition<br>{X1, X2, X3, Y1, Y2, Y3},<br>5×10 <sup>-5</sup> hits/sample |      | UI,<br>mV | 0.29, 0.5<br>150, 425 | ~ 0.45, 0.5<br>40, 250                   |                                  | TBD              |
| Differential voltage, peak-to-peak   | Max  | mV        |                       |  | 900                              |                  |
| Single ended output voltage<br>tolerance **  |      | V         | -0.3 to 4             |  |                                  | TBD              |
| AC common-mode output voltage  | Max  | mV<br>rms | 7.5                   | 18                                       | 17.5                             | TBD              |
| Transition time, 20% to 80%  | Min  | ps        | 28                    | Around 8 to 10                           | 9.5                              | TBD              |

\* *Similar methodology to CEI-28G-VSR; CTLE is part of the test equipment used to verify the electrical signal compliance*

\*\* DC common-mode voltage is set by host