Supporting explanations for P802.3dj draft D1.0 comments

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Comments against P802.3dj draft D1.0

1. Addition of TX Channel requirements sub-clauses 180.8.5.1 and 182.8.5.1, including Transmitter compliance channel specifications tables with correct ORL requirements, rather than referencing 121.8.5.2 (D1.0 comments #001, 003)

2. Proposed values for Total average launch power (max) TBD’s in Tables 181-5 and 183-6 (800GBASE-FR4-500 and -FR4) (D1.0 comments #006, 007)

3. Proposed values for Difference in launch power between any two lanes (OMAouter) (max) TBD’s in Tables 181-5 and 183-6 (800GBASE-FR4-500 and -FR4) (D1.0 comments #008, 009)

4. Proposed values for Difference in receive power between any two lanes (OMAouter) (max) TBD in Tables 181-6 and 183-7 (800GBASE-FR4-500 and -FR4) (D1.0 comments #010, 011)

5. Use of max(TECQ, TDECQ) in place in Table 183-6 (800GBASE-FR4/LR4) and elsewhere in clause 183. (D1.0 comment #012)

6. Population of TBD clauses 183.7.1 and 183.7.2 with text from clauses 182.7.1 and 182.7.2. (D1.0 comments #125, 126)

7. Addition of informative MPI and DGD penalty allocation to Link power budgets in Tables 180-9 (500m DRn) and 181-7 (800GBASE-FR4-500). (D1.0 comments #127, 128)
1. TX Channel requirements

(D1.0 comments #001, 003)

• 180.8.5 points to 121.8.5.2 for TX channel requirements
• Table 121-11 in 121.8.5.2 lists ORL = 21.4 dB for 200GBASE-DR4
  • This ORL matches 400G/800G/1.6TBASE-DRn, but not 200GBASE-DR1, which is 15.5 dB
  • A similar issue occurs in 182.8.5 with the ORL for 200GBASE-FR1, which is 17.1 dB, not 21.4 dB.
• Proposed change:
  • Add a new exception to the list: “The optical return loss is as given in Table 180-6” (or Table 182-7, as appropriate)
2. Total average launch power (max)

(D1.0 comments #006, 007)

- Total average launch power (max) is TBD in Table 181-5 (800GBASE-FR4-500) and Table 183-6 (800GBASE-FR4)
- In 50G/L and 100G/L FR4 and LR4 PMDs, this is simply the Average launch power, each lane (max) + 6 dB.
- There is no obvious reason not to follow the same methodology for 800GBASE-FR4-500 and 800GBASE-FR4 for D1.1.
- Propose to replace the TBD’s with 10.9 dBm in both tables.
3. Difference in launch power between any two lanes (OMAouter) (max)

(D1.0 comments #008, 009)

- Difference in launch power between any two lanes (OMAouter)(max) is TBD in Table 181-5 (800GBASE-FR4-500) and Table 183-6 (800GBASE-FR4)

- In 50G/L and 100G/L FR4 and LR4 PMDs, this is given as OMAouter(max) – OMAouter(min) or 4 dB, whichever is smaller.

- There is no obvious reason not to follow the same methodology for 800GBASE-FR4-500 and 800GBASE-FR4 for D1.1.

- Propose to replace the TBD’s with 4 dB in both tables.

<table>
<thead>
<tr>
<th>PMD</th>
<th>Outer Optical Modulation Amplitude (OMAouter), each lane (max)</th>
<th>Outer Optical Modulation Amplitude (OMAouter), each lane (min)</th>
<th>OMAouter(max) minus OMAouter(min)</th>
<th>Difference in launch power between any two lanes (OMAouter) (max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200GBASE-FR4</td>
<td>2.8</td>
<td>-3</td>
<td>5.8</td>
<td>4</td>
</tr>
<tr>
<td>200GBASE-LR4</td>
<td>4.5</td>
<td>-1.2</td>
<td>5.7</td>
<td>4</td>
</tr>
<tr>
<td>400GBASE-FR4</td>
<td>3.7</td>
<td>-0.2</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>400GBASE-LR4-6</td>
<td>4.4</td>
<td>0.3</td>
<td>4.1</td>
<td>4</td>
</tr>
<tr>
<td>800GBASE-FR4-500</td>
<td>4.8</td>
<td>0.8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>800GBASE-FR4</td>
<td>4.8</td>
<td>0.8</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Values in dB, dBm
4. Difference in receive power between any two lanes (OMAouter) (max)

(D1.0 comments #010, 011)

- Difference in receive power between any two lanes (OMAouter)(max) is TBD in Table 181-6 (800GBASE-FR4-500) and Table 183-7 (800GBASE-FR4)

- In 50G/L and 100G/L FR4 PMDs, this is given as OMAouter(max) – OMAouter(min) + 0.1 or 0.2 dB.
  - The 0.1-0.2 dB presumably accounts for the difference in attenuation between the two extreme wavelengths.

- There is no obvious reason not to follow the same methodology for 800GBASE-FR4-500 and 800GBASE-FR4 for D1.1.

- Propose to replace the TBD’s with 4.1 dB in both tables.

<table>
<thead>
<tr>
<th>PMD</th>
<th>Difference in launch power between any two lanes (OMAouter) (max)</th>
<th>Difference in receive power between any two lanes (OMAouter) (max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200GBASE-FR4</td>
<td>4</td>
<td>4.1</td>
</tr>
<tr>
<td>400GBASE-FR4</td>
<td>3.9</td>
<td>4.1</td>
</tr>
<tr>
<td>800GBASE-FR4-500</td>
<td>4</td>
<td>4.1</td>
</tr>
<tr>
<td>800GBASE-FR4</td>
<td>4</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Values in dB
5. Use of max(TECQ, TDECQ) in Clause 183

(D1.0 comment #012)

- A TX must be compliant over the full range of fiber length (chromatic dispersion), so the use of TDECQ alone is insufficient to determine Outer Optical Modulation Amplitude (OMAouter), each lane (min) in Table 183-6 (800GBASE-FR4/LR4).
  - It’s possible to bias an EAM such that TDECQ < TECQ when the EAM has non-zero chirp and the fiber has significant dispersion (Johnson_3df_01a_221011)
  - This TX spec methodology is already adopted in clauses 180, 181 and 182.

- Propose to replace TDECQ with max(TECQ, TDECQ) in Table 183-6.
  - Note that “-0.1 + max(TECQ, TDECQ)” is already in Equation 183-1 referenced in Table 183-6.
  - For consistency with clauses 180-182, replace "Equation 183-1" with "-0.1 + max(TECQ, TDECQ)" in Table 183-6, and delete Equation 183-1 on page 435, line 20. (not sure why it’s there)
  - Update Figures 183-3, 183-5, 183-6 and associated descriptive text with max(TECQ, TDECQ).
6. Population of clauses 183.7.1 and 183.7.2

(D1.0 comments #125, 126)

- Clause 183.7.1 Optical fiber cable is TBD.
  - The specs in this clause are simply reporting values from external fiber cabling standards.
  - There is no difference between the fiber cable specs to be used for the FR4/LR4 PMDs, and any other PMD.
  - Propose to use the same text and table as given in 182.7.1.

- Clause 183.7.2 Optical fiber connection is TBD.
  - Propose to use the same text as given in 182.7.2: "An optical fiber connection, as shown in Figure 183–7, consists of a mated pair of optical connectors."
  - Since this is a basic definition of terms, it should not be controversial.
7. Informative MPI and DGD power penalties

(D1.0 comments #127, 128)

• The link power budget does not explicitly say what the penalty allocation is for MPI and DGD.
  • It's only implied by the difference between Allocation for penalties (for max TDECQ) and TDECQ(max).
  • This makes it hard for average readers to understand the power budget.

• Propose to add to the footnotes on the link power budget tables an informative value for the MPI and DGD penalty
  • Table 180-9, footnote (b). Add: "This value includes an allocation of 0.1 dB for MPI and DGD penalties."
  • Table 181-7, footnote (d). Add: "This value includes an allocation of 0.5 dB for MPI and DGD penalties."

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power budget (for max TDECQ)</td>
<td>6.5</td>
<td>dB</td>
</tr>
<tr>
<td>Operating distance</td>
<td>500</td>
<td>m</td>
</tr>
<tr>
<td>Channel insertion loss</td>
<td>3</td>
<td>dB</td>
</tr>
<tr>
<td>Maximum discrete reflectance</td>
<td>~35</td>
<td>dB</td>
</tr>
<tr>
<td>Allocation for penalties (for max TDECQ)</td>
<td>3.5</td>
<td>dB</td>
</tr>
<tr>
<td>Additional insertion loss allowed</td>
<td>0</td>
<td>dB</td>
</tr>
</tbody>
</table>

8 The channel insertion loss is calculated using the maximum distance specified in Table 180-6 and cabled optical fiber attenuation of 0.5 dB/km at 1300 nm plus an allocation for connector and splice loss given in 180.7.2.7.1.4.
9 Link penalties are used for link budget calculations. They are not requirements and are not meant to be tested. This value includes an allocation of 0.1 dB for MPI and DGD penalties.
Thank you