SMF TBDs

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Introduction

The P802.3bs draft 1.1 contains a number of TBDs and magenta text that must be removed before the draft can proceed to Working Group ballot.

This contribution contains proposals for dealing with some of them.

Reflection budgets

During the discussion of the comments against D1.1 on reflections, a straw man proposal was generated for each single-mode PHY in anslow_3bs_03_0116. This proposal is shown on the next three pages.

A straw poll was also taken:

Do you prefer the straw man reflection budget for 400GBASE-DR4 with:

- -35 dB maximum discrete reflectance and 0.6 dB penalty   28

- -45 dB maximum discrete reflectance and 0.2 dB penalty   4

Reflection budget straw man 400GBASE-DR4

Parameter	D1.1	Straw man	Unit
Table 122-6			
Average launch power, each lane (min)	-1.9		dBm
Outer Optical Modulation Amplitude (OMAouter), each lane (min)	0.2		dBm
Launch power in OMAouter minus TDP, each lane (min)	-0.8		dBm
Optical return loss tolerance (max)	TBD	15.5	dB
Transmitter reflectance (max)	-20	-26	dB
Table 122-7			
Average receive power, each lane (min)	-4.9		dBm
Receiver reflectance (max)	-26	-26	dB
Receiver sensitivity (OMAinner), each lane (max)	-9.1		dBm
Table 122-8			
Power budget (for max TDP)	6	6.1	dB
Maximum discrete reflectance	-35	-35	dB
Allocation for penalties (for maximum TDP)	3	3.1	dB
Table 122-11			
Optical return loss	TBD	15.5	dB
Table 122-12			
[Channel] Optical return loss (min)	TBD	27	dB
122.11.2.2			
maximum discrete reflectance	-35	-35	dB

DR4 6 x -35 dB (slide added during presentation)

-26	-35	-55	-55	-35	-35	-35	-35	-55	-55	-35	-26
0	0	0	0	0	0	0	0	0	0	0	3
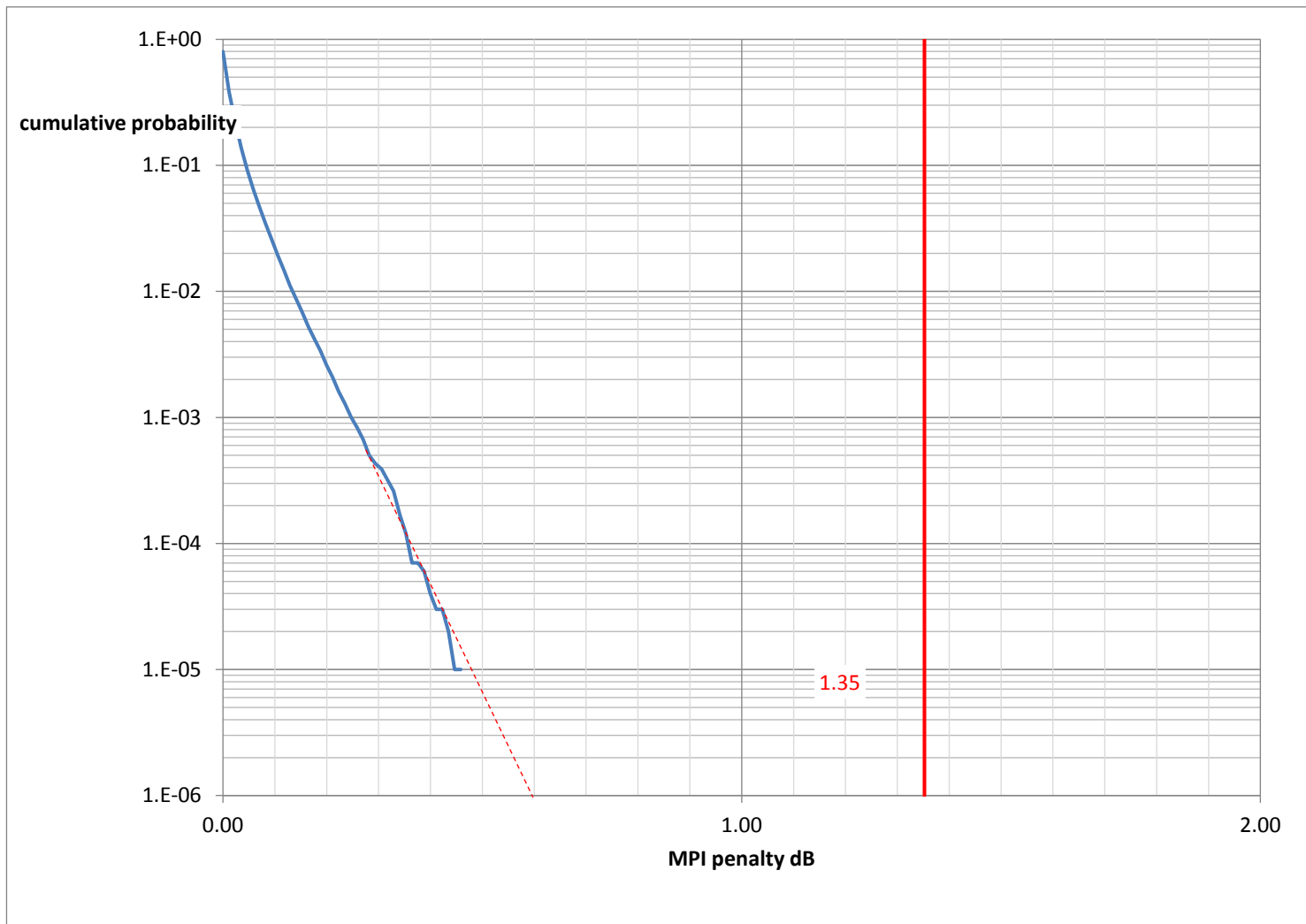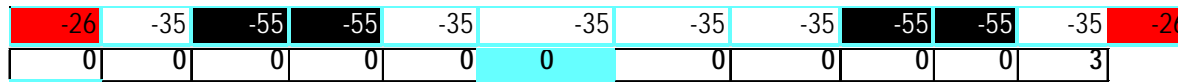
Reflection budget straw man 400GBASE-FR8

Parameter	D1.1	Straw man	Unit
Table 123-7			
Average launch power, each lane (min)	-3		dBm
Outer Optical Modulation Amplitude (OMAouter), each lane (min)	0		dBm
Launch power in OMAouter minus TDP, each lane (min)	-1		dBm
Optical return loss tolerance (max)	TBD	15.5	dB
Transmitter reflectance (max)	TBD	-26	dB
Table 123-8			
Average receive power, each lane (min)	-7		dBm
Receiver reflectance (max)	TBD	-26	dB
Receiver sensitivity (OMAinner), each lane (max)	-9.8		dBm
Table 123-9			
Power budget (for maximum TDP)	6.2	6.8	dB
Maximum discrete reflectance	TBD	-35	dB
Allocation for penalties (for maximum TDP)	2.2	2.8	dB
Table 123-12			
100GBASE-FR8 Optical return loss	20	15.5	dB
Table 123-13			
[Channel] Optical return loss (min)	21	27	dB
123.11.2.2			
maximum discrete reflectance	26	-35	dB

Reflection budget straw man 400GBASE-LR8

Parameter	D1.1	Straw man	Unit
Table 123-7			
Average launch power, each lane (min)	-2.5		dBm
Outer Optical Modulation Amplitude (OMAouter), each lane (min)	0.5		dBm
Launch power in OMAouter minus TDP, each lane (min)	-0.5		dBm
Optical return loss tolerance (max)	TBD	15.5	dB
Transmitter reflectance (max)	TBD	-26	dB
Table 123-8			
Average receive power, each lane (min)	-8.8		dBm
Receiver reflectance (max)	TBD	-26	dB
Receiver sensitivity (OMAinner), each lane (max)	-11.6		dBm
Table 123-9			
Power budget (for maximum TDP)	8.7	9.2	dB
Maximum discrete reflectance	TBD	-35	dB
Allocation for penalties (for maximum TDP)	2.4	2.9	dB
Table 123-12			
100GBASE-LR8 Optical return loss	20	15.5	dB
Table 123-13			
[Channel] Optical return loss (min)	21	27	dB
123.11.2.2			
maximum discrete reflectance	-26	-35	dB

Delay

All three PMD's have:

Delay constraints: 8192 bit times (16 pause_quanta or 20.48 ns)

As the maximum delay time includes the delay through 2 m of fiber after the MDI (which is ~10 ns), this allows PMD implementations that are not module based to have an internal spool of fiber of up to about 2 m before the MDI.

The Chief editor intends to enter comments against D1.2 to turn these values black

Skew and Skew Variation

All three PMD's have:

Skew constraints: SP2 43 ns, SP3 54 ns, SP4 134 ns, SP5 145 ns

Skew Variation: SP2 0.4 ns, SP3 0.6 ns, SP4 3.4 ns, SP5 3.6 ns

This translates to:

Max Skew increase across PMD Tx or Rx: 11 ns

Max Skew increase across optical channel: 80 ns

Max Skew Variation increase across PMD Tx or Rx: 200 ps

Max Skew Variation increase across optical channel: 2.8 ns

Presentation on Skew for the P802.3ba project:

http://www.ieee802.org/3/ba/public/jul08/giannakopoulos_01_0708.pdf

An updated version of the spreadsheet used in P802.3bs:

anslow_02_0216_smf.xls

OMA and ER definitions

The extinction ratio measurement method for NRZ optical signals is defined in IEC 61280-2-2. This is defined as the average of the "one" level for the central 20% of the eye divided by the average of the "zero" level for the central 20% of the eye.

The transmitter linearity test pattern has 3 x 16 UI blocks at level three and 3 x 16 UI blocks at level zero for each 160 UI repeat of the pattern. If this pattern is to be used, then the three and zero levels could be defined to be the average of the inner 10 symbols from each run of 16.
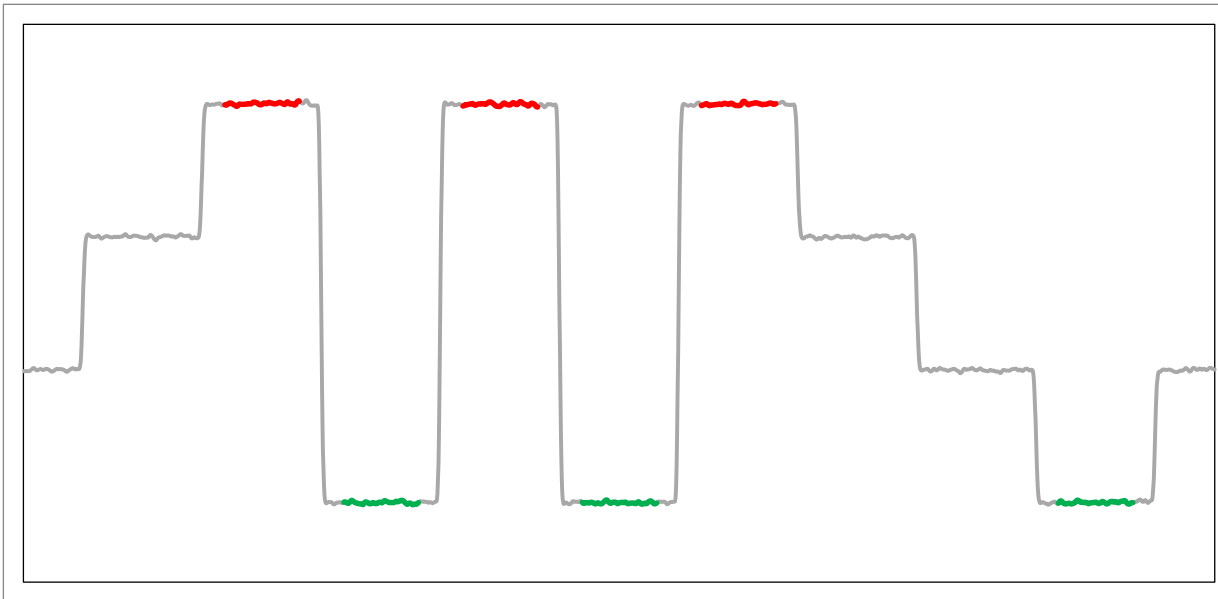
PRBS13Q has one run of 7 threes and one run of 6 zeros

TDEC and eye mask

palkert_3bs_01_0116 associated with comment #87 against D1.1 is a starting point for the definition of a PAM4 TDEC test.

More contributions on this topic are needed

Is a separate eye mask required?

Stressed receiver sensitivity

How should the stressed signal be generated?

How should the amount of stress in each sub-eye be controlled?

Contributions on this topic are needed

400GBASE-DR4

	D1.2	Straw	Units
Position of Tx and Rx lanes at MDI specified in	TBD	122.11.3	
Skew measurement CDR bandwidth	TBD	2?	MHz
Test patterns			
• Square wave location	TBD	needed?	
TDEC			
• Max mean DGD of test channel	2.24		ps
Channel			
• DGD_max	2.24		ps
MDI			
• Performance level	D/3	D/3	

Note: 2.24 ps is based on scaling 10 ps and 10 km for 10GBASE-LR in Table 52-24 to 0.5 km using a square root with distance

400GBASE-FR4

	D1.2	Straw	Units
Skew measurement CDR bandwidth	10	2?	MHz
Transmitter			
• Difference in power between lanes (OMA)	TBD		dB
Receiver			
• Difference in power between lanes (OMA)	TBD		dB
Link budget			
• Channel insertion loss calculation method	TBD		
Test patterns			
• Square wave location	TBD	needed?	

400GBASE-LR4

	D1.2	Straw	Units
Skew measurement CDR bandwidth	10	2?	MHz
Transmitter			
• Difference in power between lanes (OMA)	TBD		dB
Receiver			
• Difference in power between lanes (OMA)	TBD		dB
Link budget			
• Channel insertion loss calculation method	TBD		
Test patterns			
• Square wave location	TBD	needed?	

Thanks!