Proposal of 25GBASE-BR & 50GBASE-BR PMD

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IEEE P802.3cp Bidirectional 10G, 25G, and 50G Optical access PHYs

Introduction

- Draft of 802.3cp D.1.0 was circulated and reviewed by Task Force members.
- We propose to
  - ① Change power budget values of 25GBASE-BRxx
  - ② Change average Launch/Receive Power values of 50GBASE-BRxx
  - ③ Add new table Maximum channel insertion loss versus number of discrete reflectances for25GBASE-BR40+

Table 159–10—25GBASE-BRx illustrative link power budgets

Table 159–10—25GBASE-BRx illustrative link power budgets

Parameter	25GBASE-BR10	25GBASE-BR20	25GBASE-BR40	25GBASE-BR40+	Unit
Power budget (for maximum TDP)	9.7	16.2	21.2	26.2	dB
Operating distance	10	20	40	40	km
Channel insertion loss	6.3[a]	13[a]	18	23	dB
Maximum discrete reflectance	See 159.10	-26	-26	-26	dB
Allocation for penalties[b] (for maximum TDP)	3.4	3.4	3.4	3.4	dB
Additional insertion loss allowed	0	0	0	0	dB

Power budget calculation

Parameter	25GBASE-BR10	25GBASE-BR20	25GBASE-BR40	25GBASE-BR40+	Unit
Average launch power (min)	-7	-8	-3	2	dBm
Average receive power (min)	-13.3	-21	-21	-21	dBm
Channel Insertion Loss	6.3	13	18	23	dB
Transmitter and dispersion penalty (TDP), (max)	3.4	2.7	2.7	2.7	dB
Calculated Power budget	9.7	15.7	20.7	25.7	dB
Table 159-10	9.7	16.2	21.2	26.2	

*Power budget = Channel Insertion Loss - Transmitter and dispersion penalty (TDP), (max)

- Power budget is not same with table 159-10.
- 20.7 dB power budget of 25GBASE-BR40 is same with 25GBASE-ER (40km) so that 802.3cp can use same parameter values with 802.3cc in 25GBASE-BR40 case

Proposal of Table 159-10

Parameter	25GBASE-BR10	25GBASE-BR20	25GBASE-BR40	25GBASE-BR40+
Power budget (for maximum TDP)	9.7	15.7	20.7*	25.7
Operating distance	10	20	40	40
Channel Insertion loss	6.3	13	18	23
Maximum discret reflectance		-26	-26	-26
Allocation for penalties (for maximum TDP)	3.4	2.7	2.7	2.7
Additional insertion loss allowed	0	0	0	0

Correction of Avg launch power and receive power of 50GBASE-BRxx

Parameter	Current				Proposed			
	50GBASE-BR10	50GBASE-BR20	50GBASE-BR40	50GBASE-BR40+	50GBASE-BR10	50GBASE-BR20-D, U	50GBASE-BR40-D, U	50GBASE-BR40+-D,U
Average launch power (min) (dBm)	-4.5	-4.5	0.4	5.4	-4.5	-4.5	0.5	5.5
Average receive power (min) (dBm)	-10.8	-17.6	-17.6	-17.6	-10.8	-17.5	-17.5	-17.5
Channel Insertion Loss (dB)	6.3	13.1	18	23	6.3	13	18	23
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max) (dB)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Calculated Power budget (dB)	10.1	16.9	21.8	26.8	10.1	16.8	21.8	26.8
Table 160-10	9.5	16.2	21.2	26.2				

- Current power budget of 50GBASE BR20 is 16.2 dB in the Table 160-10.
- But, the calculated power budget is 16.9 dB if parameter values in the table 160-6 and 160-8 were used.
- Channel insertion loss is 13.1 dB of 50GBASE-BR20. But it is 13 dB in the Table 160–10.
- Avg. launch power, receive power and power budget should be fixed as we proposed.

Table 159–14

Table 159–14—Maximum channel insertion loss versus number of discrete reflectances for 25GBASE-BR40and 25GBASE-BR40+

Maximum channel insertion loss (dB)		Number of discrete reflectances > –55 dB and ≤ –35 dB										
		0	1	2	3	4	5	6	7	8	9	10
Number of discrete reflectances > –35 dB and ≤ –26 dB	0	18	18	18	17.9	17.9	17.9	17.8	17.8	17.8	17.7	17.7
	1	17.9	17.9	17.9	17.8	17.8	17.7	17.7	17.6	17.6	17.5	—[a]
	2	17.8	17.8	17.7	17.7	17.6	17.6	17.5	17.4	17.4	—[a]	—[a]
	3	17.7	17.6	17.6	17.4	17.4	17.3	—[a]	—[a]	—[a]	—[a]	—[a]
	4	17.5	17.4	17.3	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]
	> 4	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]

[a]The indicated combination of reflectances is not supported.

- Current maximum channel insertion loss is 18 dB for 25GBASE-BR40. But 25GBAE-BR40+ has 23 dB of maximum channel insertion loss.
- Propose to add a new table for 25GBASE-BR40+

Proposed table for 25GBASE-ER50+

Maximum channel insertion loss (dB)		Number of discrete reflectances > –55 dB and ≤ –35 dB										
		0	1	2	3	4	5	6	7	8	9	10
Number of discrete reflectances > –35 dB and ≤ –26 dB	0	23	23	23	22.9	22.9	22.9	22.8	22.8	22.8	22.7	22.7
	1	22.9	22.9	22.9	22.8	22.8	22.7	22.7	22.6	22.6	22.5	-
	2	22.8	22.8	22.7	22.7	22.6	22.6	22.5	22.4	22.4	-	-
	3	22.7	22.6	22.6	22.4	22.4	22.3	-	-	-	-	-
	4	22.5	22.4	22.3	-	-	-	-	-	-	-	-
	>4	-	-	-	-	-	-	-	-	-	-	-


Thanks!

Calculations of Channel Insertion Loss and Power budget

- Channel Insertion loss = Average launch Power (min) – Average receiver power (min)
- Power budget = Channel Insertion Loss – Transmitter and dispersion penalty (TDP), (max)

IEEE 802.3cc power budget

Parameter	25GBASE-LR	25GBASE-ER
Average launch power (min)	-7	-3
Average receive power (min)	-13.3	-21
Channel Insertion Loss	6.3	18
Transmitter and dispersion penalty (TDP), (max)	3.4	2.7
Power budget	9.7	20.7