

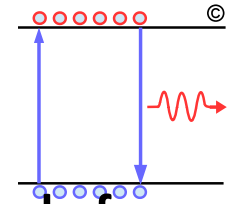
MCB/HCB Crosstalk Regard to Comments 83 and 86

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IEEE 802.3bs Task Force Meeting

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Background



- **Comment 128 was submitted on P802.3bs draft 1.4 that mated board of CL92 crosstalk is excessive in support of 50G Cu cabling**
 - Comment was rejected as P802.3bs does not define Cu cabling
 - After further investigation P802.3bs C2M simulation were all based on hypothetical channels having $< \frac{1}{4}$ the amount of CL92 MCB/HCB mated crosstalk
 - Comments 83 and 86 are submitted against D2.0 related to excessive crosstalk not considered in the baseline C2M.

Cl 120E SC 120E.4.1 P 368 L 16 # 128
Ghiasi, Ali Ghiasi Quantum LLC

Comment Type TR Comment Status R

MCB/HCB characteristics is referenced from CL92.11.1 and CL92.11.2. The crosstalk for the mated MCB-HCB is defined by 92.11.3.6 in accordance to meet 100GBASE-CR4 with following parameters:
MDNEXT \leq 1.8 mV RMS
MDFEXT \leq 4.8 mV RMS
But the cable under consideration for 50G operation have significantly lower crosstalk than early BJ cables
http://www.ieee802.org/3/cd/public/May16/ghiasi_3cd_02a_0516.pdf
http://www.ieee802.org/3/cd/public/May16/roth_3cd_01a_0516.pdf

Suggested Remedy

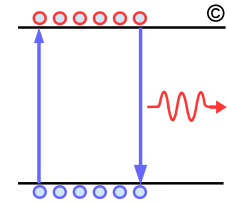
With typical newer cable having PSXT of \sim 1 mV, a mated board having 4.8 mV of FEXT and 1.8 mV NEXE will have significant burden on the Cu reach and COM margin. The fact that we have cable data with PSXT \sim 1mV indicate technology has improved and limits in the BJ are overly pessimistic.

Response Response Status C

REJECT.
[Editor's note: This comment was sent after the close of the comment period.]

Although there appears to be some justification for a reduction in MDNEXT/MDFEXT for copper cabling, the impact of this on Annex 120E is not clear: The P802.3bs draft does not specify copper cables, and the commenter has not indicated what changes (if any) are required to the Annex.

50G Mated Board References Legacy CL92 MCB/HCB Specifications



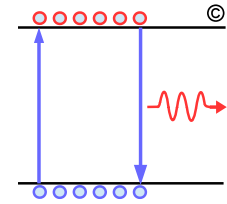
❑ Currently CL 120E.4.1 MCB/HCB specifications references

- CL 92.11.1 for HCB specifications
- CL 92.11.2 for the MCB specifications
- CL 92.11.3.6 defines mated test fixture ICN
 - MDFEXT of 4.8 mV is excessive for 50G PAM4 link!

Table 92–13—Mated test fixtures integrated crosstalk noise

Parameter	100GBASE-CR4	Units
MDNEXT integrated crosstalk noise voltage	Less than 1.8	mV
MDFEXT integrated crosstalk noise voltage	Less than 4.8	mV

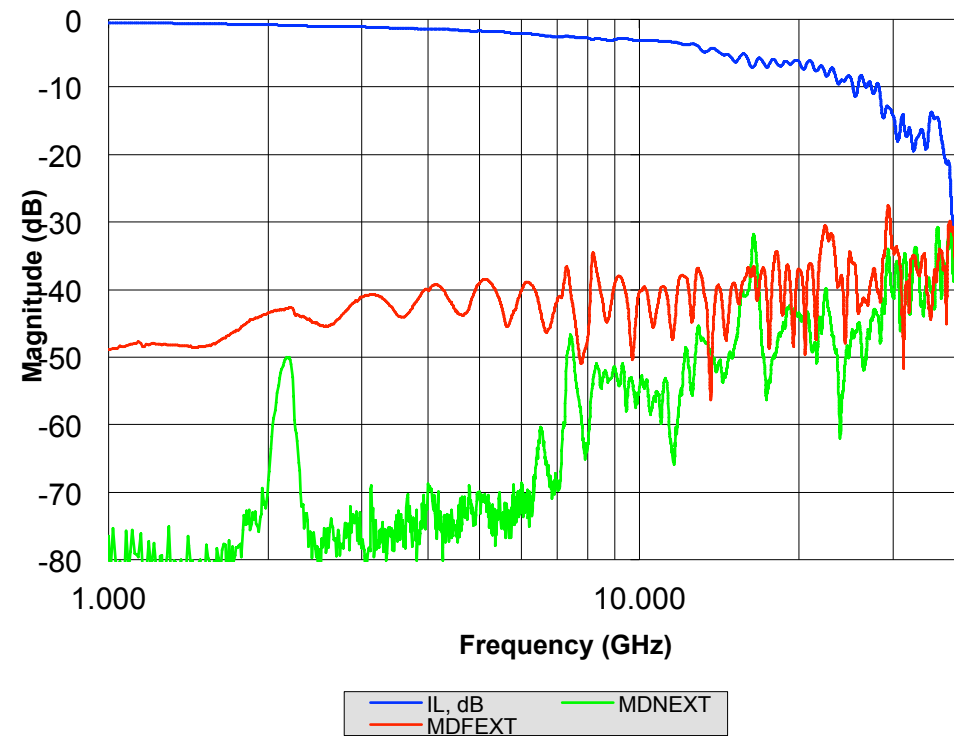
Bases for the Mated MCB/HCB MDFEXT/MDNEXT in CL92



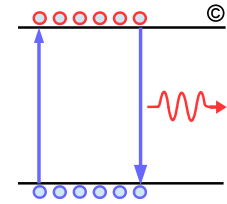
□ QSFP+ connector provided bases for the CL92 MDFEXT and MDNEXT

- QSFP28 does provide slight improvement but in 802.3cd decided to stay with these legacy limits
- http://www.ieee802.org/3/bj/public/sep12/ghiasi_3bj_01a_0912.pdf

MCB-HCB Crosstalk	10.3125 GBd ICN (mV)	25.78 GBd ICN (mV)	28.0 GBd ICN (mV)
Rise Time 20-80% (ps)	24.000	9.600	8.840
MDNEXT	0.323	1.390	1.612
MDFEXT	3.593	4.562	4.673
ICN	3.607	4.769	4.943



Hypothetical Channel Used for C2M Analysis Has Significantly Lower NEXT/FEXT



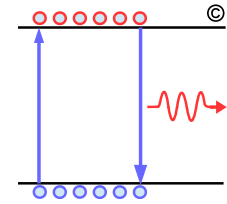
□ CDAUI-8/CCAUI-4 base channels

- http://www.ieee802.org/3/bs/public/adhoc/elect/24Aug_15/dallaire_01_082415_elect.pdf

CHANNEL	FEXT	NEXT	IL @ 13.28125 GHz (dB)	ILD (dBrms)
From IEEE 802.3bs shanbhag_3bs_14_0623:				
(1) Nelco 4000-13SI Host PCB + next gen 28Gb/s high density SMT IO	5	0	8.7	0.110
(2) EM-888 Host PCB + next gen 28Gb/s press-fit stacked IO	7	0	8.9	0.051
From IEEE 802.3bs shanbhag_3bs_01_1014:				
(3) 4in Megtron6 Host PCB + next gen 28Gb/s high density SMT IO	5	0	4.3	0.110
(4) 10in Megtron6 Host PCB + next gen 28Gb/s high density SMT IO	5	0	8.8	0.106
(5) 4in Megtron6 Host PCB + next gen 28Gb/s press-fit stacked IO	7	0	4.5	0.051
(6) 10in Megtron6 Host PCB + next gen 28Gb/s press-fit stacked IO	7	0	9.0	0.052
Cisco Channels:				
(7) Cisco 2in Stacked	0	0	8.5	0.237
(8) Cisco 5in Stacked	0	0	11.3	0.245

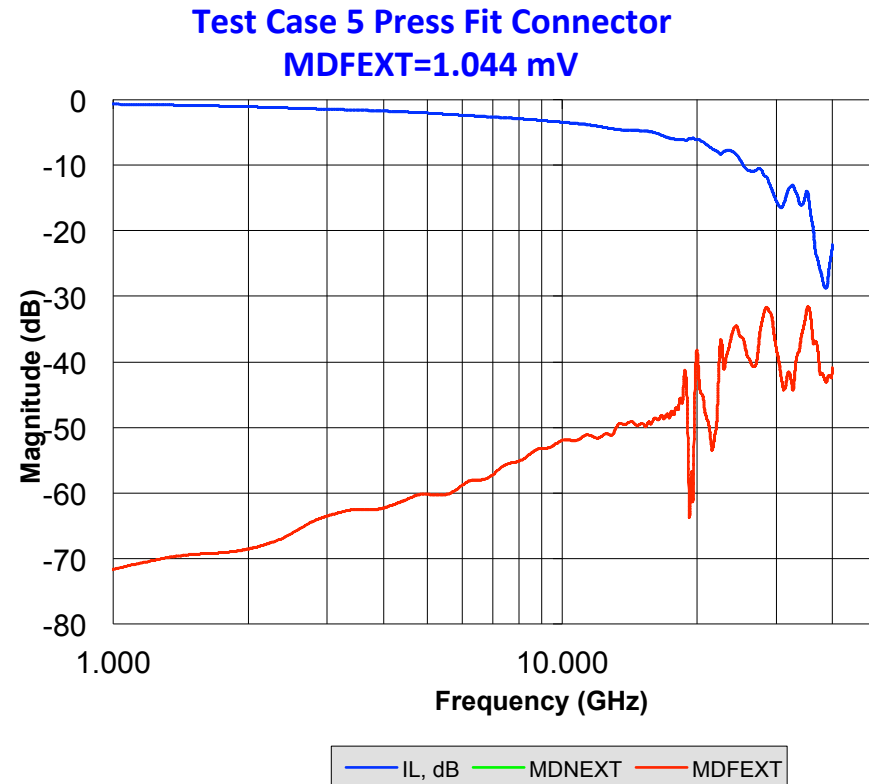
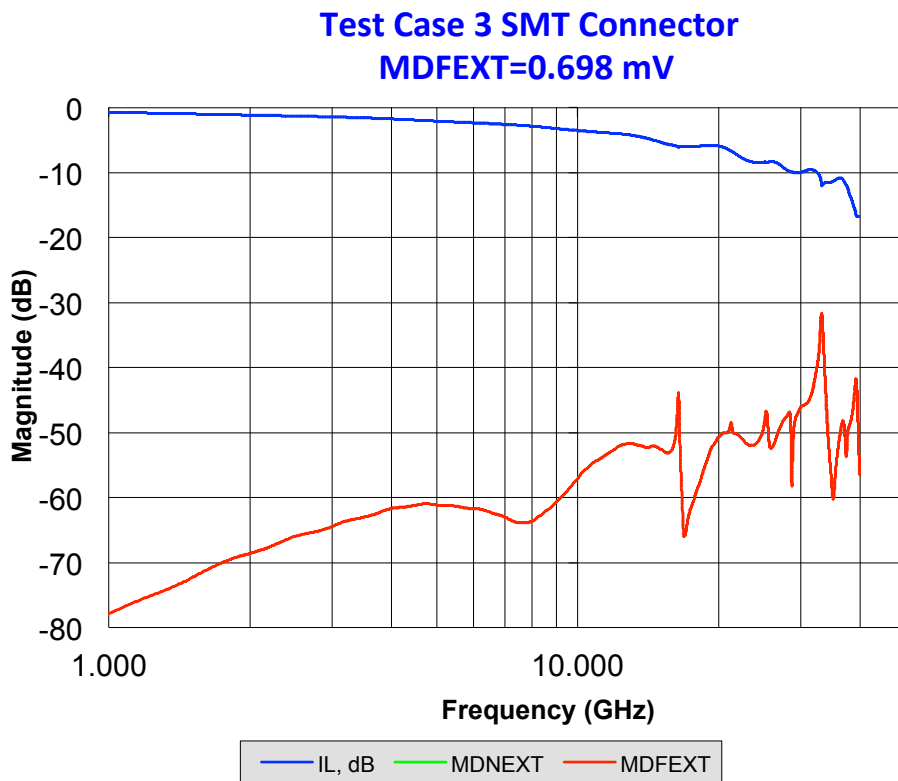
Test case 3 and 5 Used for Crosstalk Analysis

Crosstalk for C2M Test Case 3 and 5

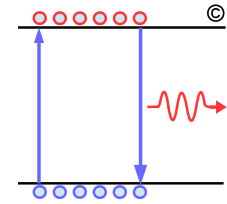


☐ Mated board had no NEXT and with excellent FEXT

- http://www.ieee802.org/3/bs/public/channel/TEC/shanbhag_3bs_01_1014.pdf
- C2M are based on channels with 5-7x lower crosstalk than mated board referenced currently!



Summary



- ❑ **Currently clause 120.E reference CL92 mated board having MDFEXT (4.8 mV) and MDNEXT (1.8 mV) which were based on QSFP+ connector**
- ❑ **802.3bs C2M simulation in support 200GAUI-4/400GAUI-8 where based on a TE hypothetical connector with 5-7x lower FEXT and NEXT**
- ❑ **With market strong preference to stay with QSFP28 compatible connector it is unlikely that the MCB/HCB crosstalk limits of CL 92 could be tighten by more than ~20%**
- ❑ **Need to revisit the baseline simulation using representative connector or add colored AWGN noise to account for the real connector crosstalk**
 - The outcome could be that the extra crosstalk does not have material impact on C2M channels with 10 dB loss at Nyquist
 - More likely outcome would be slight reduction in the TP1a and TP4/TP5 eye opening.