Revisiting MCB/HCB Crosstalk for C2M
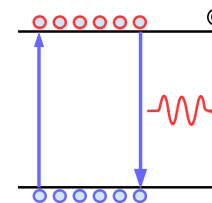
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IEEE 802.3bs Electrical Adhoc Meeting

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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 channels having < ¼ the amount of crosstalk in CL92

 – Mated board crosstalk of CL92 need to reduced for 50G PAM4 C2M and Cu cabling applications

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 inaccordance to meet 100GBASE-CR4 with following parameters:
MDNEXT <= 1.8 mV RMS
MDFEXT <= 4.8 mV RMS
But the cable under considearionfor 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

SuggestedRemedy

With typical newer cable hainvg PSXT of ~ 1 mV, a matted board having 4.8 mV of FEXT and 1.8 mV NEXT will have significant burden on the Cu reach and COM margin. The fact that we have cable data with PSXT ~ 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
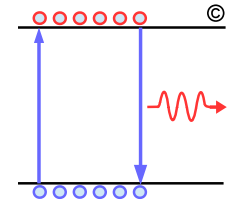
❑ **Currently CL 120E.4.1 MCB/HCB specifications references**

– CL 92.11.1 for HCB specifications

– CL 92.11.2 for the MCB specifications

– CL 92.11.3.6 defines mated text 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
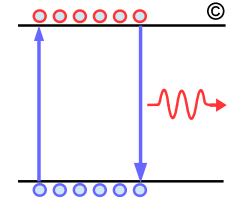
❑ **QSFP+ connector provided bases for the CL92 MDFEXT and MDNEXT**

– 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
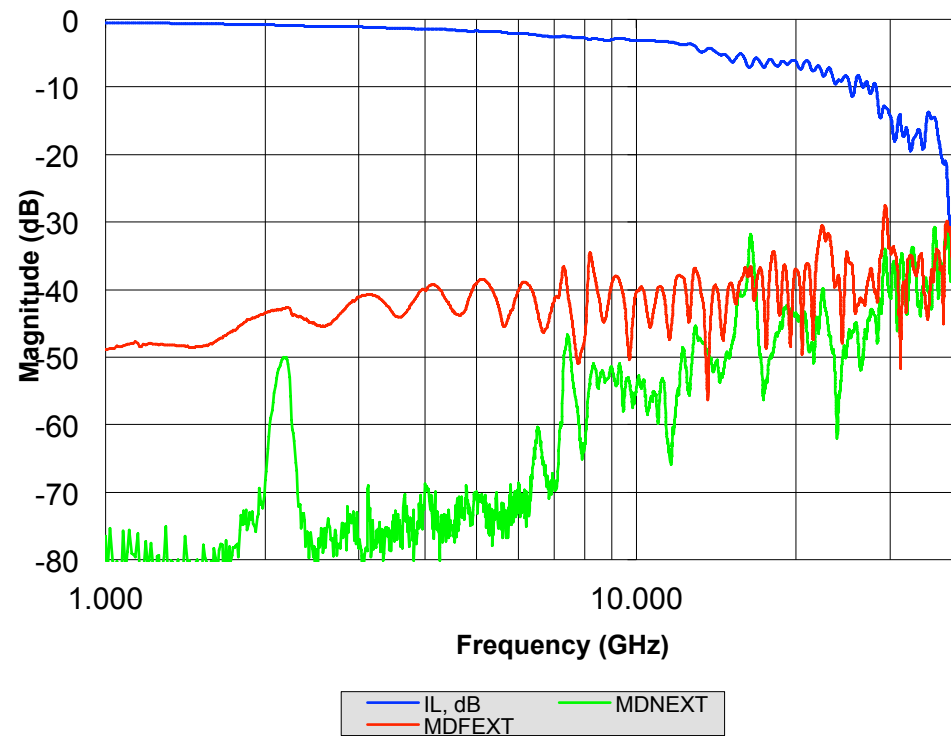
Hypothetical Channel Used for C2M Analysis Has Significantly Lower NEXT/FEXT
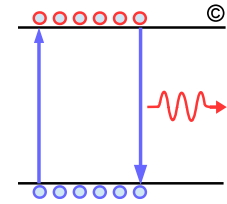
❏ **CDAUI-8/CCAUI-4 base channels**

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

Test case 3 and 5 Used for Crosstalk Analysis

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

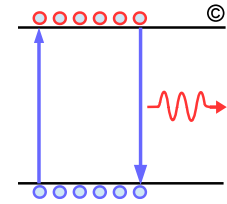A. Ghiasi

Crosstalk for C2M Test Case 3 and 5
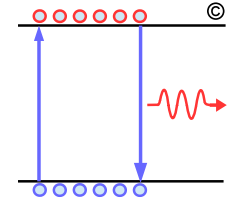
❑ **Mated board had no NEXT and with excellent FEXT**

– 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!

**Test Case 3 SMT Connector
MDFEXT=0.698 mV**

**Test Case 5 Press Fit Connector
MDFEXT=1.044 mV**
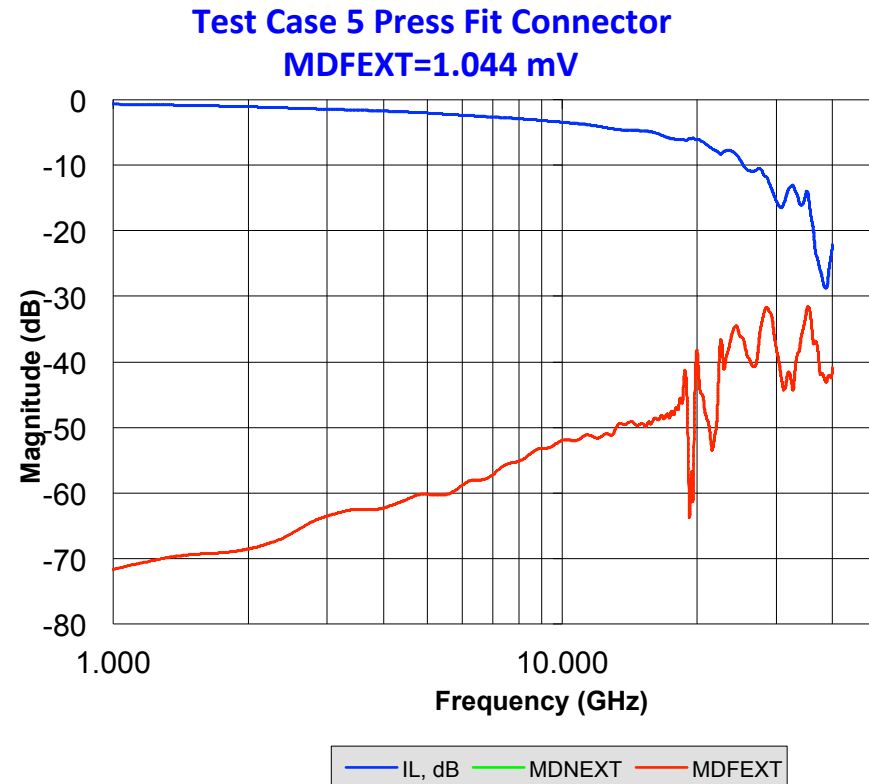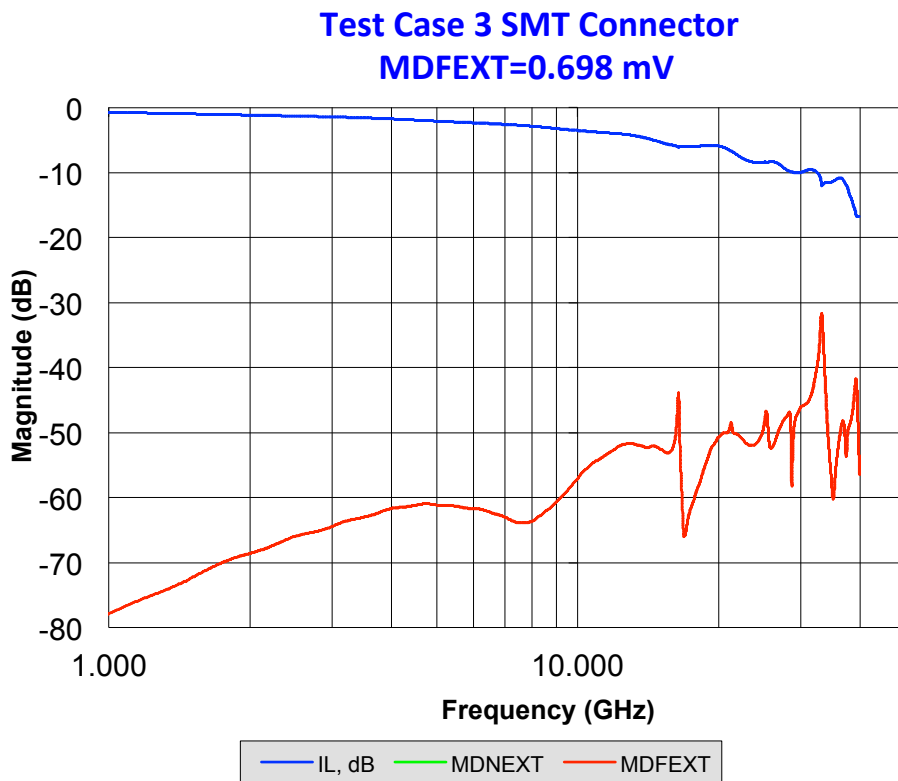
Summary

- **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 compatible with QSFP28 the MCB/HCB crosstalk limits of CL 92 could not be tighten by more than ~20%**

- **Need to revisit the baseline simulation using representative connector or add AWGN noise to account for the real connector crosstalk**

  – The outcome could be that the extra crosstalk does not have material impact as these channel have only 10 loss at Nyquist

  – The other outcome could that we may need to reduce eye opening at TP1a and TP4.