Cl **120F** *SC* **120F.3.1** *P* **205** *L* **10** # 36

Ben Artsi, Liav — Marvell Technology

Comment Type **T** *Comment Status* **A** *bucket2*

TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.

SuggestedRemedy

Follow the same remedy as for 163.9.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **20** # 59

Mellitz, Richard — Samtec

Comment Type **TR** *Comment Status* **A** *bucket2*

Vf(min) should align with Av in COM table 120F-6 since Nv=200

SuggestedRemedy

Replace TBD for Vf(min) with V(fmin)=0.413

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **21** # 12

Wu, Mau-Lin — Mediatek

Comment Type **T** *Comment Status* **A** *bucket2*

Linear fit pulse peak (min) is 'TBD x v_f'

SuggestedRemedy

Change Linear fit pulse peak (min) from 'TBD x v_f' to '0.55 x v_f'

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.2.3** *P* **208** *L* **53** # 170

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *bucket2*

Addressing TBD in test setup requirements.

"The return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the
requirements of Equation (TBD)."

The test fixture can be considered as a channel that the transmitter is connected to. As such, it should meet the ERL requirements of the channel. There are no return loss requirements for a channel.

SuggestedRemedy

Change the quoted sentence to

"The effective return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the
requirements of 120F.4.3."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #11078.

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **17** # 173

Ran, Adee Intel

Comment Type **T** *Comment Status* **D** *bucket2*

Addressing EMSW which is TBD.

EMSW is not a meaningful measure for a receiver with DFE, since the eye's shape depends on the delay and the transfer function of DFE's feedback path. A DFE mathematical model can have arbitrary delay and transfer function so the value of EMSW (or any eye width parameter) is not well defined.

Furthermore, the DFE typically optimizes the eye height, but not necessarily the eye width (whihc requires equalizing the transitions). Trying to optimize for both EW and EH with a single DFE has been done in early versions of PCI express, it can be a futile exercise, and it is not what a real receiver will do anyway.

As the experience with COM has shown, for lossy channels and DFE receivers the equalized EH is a good enough figure of merit. Real receivers do not care about asymmetry caused by the DFE.

It is suggested to remove EMSW, at least until evidence of the need for it and a robust measurement method is presented.

SuggestedRemedy

Remove the EMSW specification in this subclause, and also in 120G.3.2 and Table 120G–5 and Table 120G–8.

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **23** # 207

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R**

Unless one end of the link has common mode termination the 17.5 mV allowed common mode does not get absorbed

SuggestedRemedy

Add common mode return loss with following equation = 12 - 9*f/1e9 dB up to 1 GHz
3 dB from 1GHz to 50 GHz
See ghiasi_03_0620

Response *Response Status* **C**

REJECT.

[Editor's note: changed subclause from 120G.3.]

The following presentation was reviewed at an ad hoc meeting:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_03_0720.pdf

There is no consensus to make the proposed changes at this time.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **29** # 175

Ran, Adee Intel

Comment Type **T** *Comment Status* **A**

Unlike a host transmitter, which has a fixed known channel and can be tuned to optimize the signal at the receiver input, the module has no knowledge of the channel. A fixed signal setting (swing and equalization) can be optimized for a high loss channel but will be inappropriate for a low loss channel, and vice versa.

To enable host management to choose the appropriate signal swing and equalization for the host channel in use, the module output should have more than one setting, and a control method to choose between them.

Discussions at this point indicate that it is desired to have no more than two settings. The suggested remedy is based on that. Future proposal may refine this idea.

SuggestedRemedy

Define two separate tests for the module output, near-end and far-end.

In the near-end test, only the near-end specifications are measured, with an MCB only. In the far-end test, only the far-end specifications are measured, with an MCB and a frequency dependent attenuator (specified strcitly to create the effect of a maximum-loss host channel).

The module shall have a 2-valued control variable (mapped to an MDIO register, although actual interface may be different) to select between two settings of its ouput. One setting will be tested in the near-end test and another will be tested in the far-end test.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt a near end and a far end setting with an MDIO register bit to select between the setting as discussed in slide 9 of ran_3ck_01b_0720. Implement with editorial license.

Strawpoll #8 (decision)
I support closing comment 175 with: Adopt a near end and a far end setting with an MDIO register bit to select between the setting as discussed in slide 9 of ran_3ck_01b_0720. Implement with editorial license.
Yes: 37
No: 10

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **42** # 176

Ran, Adee Intel

Comment Type **T** *Comment Status* **R**

the Differential peak-to-peak output voltage is way too large, and if it is implemented it can overwhelm the host receiver.

With a long host channel, pre-equalization will be required and will attenuate low frequencies, while the channel attenuates high frequencies, creating a lower PtP signal at the host Rx.

With a short host channel, there will be lower attenuation by the channel, and equalization may not be required. in that case the full swing will create a large signal at the host Rx input.

A hosts receiver that can function with a smaller swing over a lossy channel doesn't need this large signal (which may be bad for it). Reduced swing in the module output may be necessary in some channels.

SuggestedRemedy

Change the differential peak-to-peak output maximum specification to 400 mV PtP, both for the near-end test and the far-end test. Clarify that different module output settings may be used in the tests.

Change the input tolerance reuqiremement in Table 120G–4 accordingly.

Response *Response Status* **C**

REJECT.

Straw poll #6, indicated most support for adopting the values for far-end and near-end differential peak to peak voltage (max.) as proposed on slide 9 of ran_3ck_01b_0720.

The closed response to comment #175 adopted two equalization settings for module transmitter.

Based on strawpoll #9, there is no consensus to close to the comment with the proposed values.

Strawpoll #9 (decision)
I would support closing comment 176 setting far-end and near-end differential peak to peak voltage (max) to 600 mV as proposed on slide 9 of ran_3ck_01b_0720.
Yes: 19
No: 20

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **45** # 177

Ran, Adee Intel

Comment Type **T** *Comment Status* **A**

Addressing Near-end eye height, differential (min) and Far-end eye height, differential (min) which are TBDs.

The host output is now specified in terms of VEC. There is no reason that the module output should not use this specification method.

The proposed limit values are based on host output specification, and are the same for near-end and for far-end, at this time. The limit values may be adjusted in future drafts. The module can use different settings to meet the near-end and far-end requirements.

SuggestedRemedy

Change the minimum NEEH and FEEH values in Table 120G–3 to 15 mV. Add rows for Near-end VEC and Far-end VEC, both with maximum value of 9 dB. Clarify that different module output settings may be used in the tests.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

For NE EH…
#177 proposes 15 mV
#135 proposes 50 mV
#191 proposes 40 mV

For FE EH…
#177 proposes 15 mV
#192 proposes 20 mV
#107 proposes 24 mV

For NE VEC…
#177 proposes 9 dB
#108 proposes 7.5 dB

For FE VEC…
#177 proposes 9 dB
#109 proposes 7 dB

The following presentations were reviewed:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_02_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/hidaka_3ck_01_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/ran_3ck_01b_0720.pdf

Straw polls #4 and #5, indicated strong support for adopting the values for far-end and near-end VEC and EH as proposed on slide 9 of ran_3ck_01b_0720.

The closed response to comment #175 adopted two equalization settings for module transmitter.

Set far-end VEC (max) to 7.5 dB
Set near-end VEC (max) to 7.5 dB
Set far-end EH (min) to 24 mV
Set near-end EH (min) to 24 mV

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **52** # 208

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R**

Unless one end of the link has common mode termination the 17.5 mV allowed common mode does not get absorbed

SuggestedRemedy

Add common mode return loss with following equation = 12 - 9*f/1e9 dB up to 1 GHz
3 dB from 1GHz to 50 GHz
See ghiasi_03_0620

Response *Response Status* **C**

REJECT.

[Editor's note: changed line from 23.]

The following presentation was reviewed at an ad hoc meeting:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_03_0720.pdf

There is no consensus to make the proposed changes at this time.

Cl **163** *SC* **163.9.1** *P* **177** *L* **38** # 28

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **R** *common mode noise*

The 'AC common-mode RMS voltage (max.)' is 30 mV, which is the same as that in 802.3cd. By combining this spec with P/N skew mismatch of backplane channel, it will induce crosstalk to differential signal at receiver. From 50G to 100G, it's difficult to improve the P/N skew mismatch to half. Based on that, we shall modify AC common-mode RMS voltage. We shall align this spec to that in C2M (120G).

SuggestedRemedy

Change 30 mV to 17.5 mV.

Response *Response Status* **C**

REJECT.

Note that comment #205 and #54 request the same change.

The suggested remedy does not provide sufficient evidence that the proposed threshold is feasible and necessary. Further evidence and consensus building is encouraged.

This applies to both KR and C2C.

Cl **163** *SC* **163.9.1** *P* **177** *L* **42** # 58

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *bucket2*

Vf(min) should align with Av in COM table 163-10 since Nv=200

SuggestedRemedy

Replace 0.4 with 0.413

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: Change page from 148.]

Resolve using the response to comment #33.

Cl **163** *SC* **163.9.1** *P* **177** *L* **45** # 30

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket2*

The "Linear fit pulse peak (min.)" in Table 163-5 is still 'TBD x v_f'.

SuggestedRemedy

Propose to change 'TBD x v_f' to '0.65 x v_f'.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **163** *SC* **163.9.1.2** *P* **178** *L* **47** # 34

Ben Artsi, Liav Marvell Technology

Comment Type **T** *Comment Status* **A** *TP0v*

A reference TP0 - TP0a test fixture is specified while its loss values are not practical.

SuggestedRemedy

Specify a more feasible reference TP0 to TP0a specification alongside informative parameters for reference in TP0a. Specify an additional test fixture range of TP0 - TP0v Loss at ~26.56GHz ≤ 5dB ; ILD ≤ 0.2dB ; ERL. A presentation is to be provided with the actual suggestion

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

For the TP0 to TP0v test fixture for 163 and 120F specify the following:
IL @ 26.56 GHz <= 5 dB
ILD <= 0.2 dB

Cl **163** *SC* **163.9.1.2** *P* **178** *L* **52** # 153

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *bucket2*

(Cross-clause)
The test feature normative insertion loss requirements are not realistic for real devices, especially with multiple lanes.

Also, as presented in http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf, the variations allowed within the recommendations create significant variations in results of compliance parameters. This is obvisouly not a viable methodology anymore.

It is suggested to replace the test fixture requirements with an explicit equation describing s-parameters of a transmission line with 4 dB IL (using equation 93A–14 with appropriate parameters) such that TP0a is well-defined, and create informative specifications at this TP0a. Alternatively, informative specifications can be given at TP0.

Normaitve requirements should use a new methodology based on measued or extracted test fixture s-parameters.

Also applies to Annex 120F.

SuggestedRemedy

A presentation with more details will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This comment applies to both 163 and 120F.

The commenter is referring to the following presentation:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

The new test point TP0v and related test fixture are adopted per the response to comment #33.

Retain the TP0a test point and test fixture specifications, but change to an informative specification.

Implement with editorial license.

Cl **163** *SC* **163.9.2.3** *P* **181** *L* **53** # 38

Ben Artsi, Liav Marvell Technology

Comment Type **T** *Comment Status* **D**

Stating that the transmitter device package model S(tp) is omitted from Equation (93A–3) in the calculation of COM practically penalizes cases which use "golden device" as the transmitter for interference tolerance testing

SuggestedRemedy

Change the sentence to:
"It is the test implementor's responsibility to adjust Tx package parameters to best match the actual driver package used for testing alongside parameters which will calibrate tx waveform to match the one supplied at TP0v, orelse transmitter device package model S(tp) should be omitted from Equation (93A–3) in the calculation of COM

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **163** *SC* **163.9.2.3** *P* **182** *L* **6** # 155

Ran, Adee Intel

Comment Type **T** *Comment Status* **R** *TX SNDR Parameter*

(cross-clause)
Addressing Np in SNDR calculation for receiver interference tolerance testing, which is TBD.

The corresponding test in clause 162 sets Np to 15 UI . This value may be debated, but there seems to be no reason to have a different value here.

Note that linear fit is done with Nv=200 for the vf measurement. A smaller number can create lower SNDR, by converting the tail of the pulse to noise. Using this SNDR as SNR_TX, lower SNR_TX results in lower COM, so less noise should be injected to reach the COM target. This may favor the DUT in the RITT measurement.

Also applies in 120F.3.2.3.

SuggestedRemedy

Change TBD to 15 in both places.

Response *Response Status* **C**

REJECT.

[Editor's note: Changed page from 181.]

There is no consensus to make a change at this time.

Cl **163** *SC* **163.9.3** *P* **148** *L* **30** # 57

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **D**

need spec form common mode return loss.

SuggestedRemedy

Change to integrated common mode return loss so it may be used to compute the effect of common mode noise and remove reference to 92.8.3.4

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Editor's note: changed subclause from 162.9.3.]

Cl **163** *SC* **163.10** *P* **184** *L* **1** # 11039

Ben Artsi, Liav Marvell

Comment Type **T** *Comment Status* **A** *channel RLDC*

[Comment resubmitted from Draft 1.1. 163.10, P181, L26]

Differential to common mode conversion loss is not defined for a TP0 to TP5 interconnect channel characteristics

SuggestedRemedy

Specify that the differential to common mode conversion loss of TP0 to TP5 shall be [TBD] and correlated to the capability defined in 162.11.5 when measured with an MCB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add differential to common mode conversion loss of TP0 to TP5 with the specification TBD.