Big Ticket
Consensus Discussion Slides

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October 13 & 14

Pivot Discussion: Keep TP0a or not

CI **163**   SC **163.9.2**   P **176**   L **30**   # **135**

Ghiasi, Ali   Ghiasi Quantum/Inphi

Comment Type   **TR**   Comment Status **D**   *TP0v*

Transmit parameters must be measurable and well defined physical test point, the current TP0v test point methodology is not proven yet and is not uncommon when one inverts the channel spurious response to result. We have put into the draft unproven test method when the solution was trivial!

SuggestedRemedy

Just as we have done for the MCB and HCB losses, we need to increase the loss from the TP0 to TP0a a loss of 2.2 dB to 2.6 dB with nominal 2.4 dB loss is inline with MCB loss and allow construction of DUT boards with 2.5-3" long traces. Such traces combined with 2x8 or 2x12 2.5 mm pogo pins connectors allow breakout of high large 256 lanes switches. Make TP0a normative and make TP0v the method to de-embed when DUT PCB loss deviate from nominal range.

Proposed Response   Response Status **W**

PROPOSED REJECT.

The new test fixture specifications were adopted based on sufficient support by the task force. See Comment #33 in the following:
https://www.ieee802.org/3/ck/comments/draft1p2/8023ck_D1p2_final_closedcomments.pdf
The comment does not provide sufficient evidence that the adopted approach will not work nor is the proposed remedy sufficiently complete to implement, e.g., limit values at TP0a, methodology.
Comment #73 proposes to remove TP0a as an example. Comment #136 proposes a new IL equation for the example test fixture.
This comment suggests to make TP0a normative same as previous draft and previous generations of PHYs and to use the TP0v method is to embed additional test fixture if its IL is out of range. TP0a is described an example in existing spec.
For task force review.
[Editor's note: CC: 120F, 163]

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Pivot Discussion: Keep TP0a or not

Cl 163   *SC* 163.9.2.2   *P* 178   *L* 28   # 73

Brown, Matt   Huawei

Comment Type   **T**   *Comment Status* **D**   *example TF*

The example test fixture using TP0a is no longer required. See the following ad hoc presentation;

https://www.ieee802.org/3/ck/public/adhoc/sept16_20/brown_3ck_adhoc_01a_091620.pdf

SuggestedRemedy

Remove 163.9.2.2 and reference TP0v instead of TP0a for all transmitter specifications for KR (Clause 163) and C2C (Annex 120F).

Proposed Response   *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement the suggested remedy.
For task force discussion.
[Editor's note: CC: 120F, 163]

Cl 163   *SC* 163.9.2.2   *P* 178   *L* 29   # 6

Mellitz, Richard   Samtec

Comment Type   **TR**   *Comment Status* **D**   *example TF*

TP0a is moot and replaced by TP0v

SuggestedRemedy

remove references to TP0a.

Proposed Response   *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Respolve using the response to comment #73.

Pivot Discussion: Keep TP0a or not

Straw Poll #1:

I support use of the TP0v methodology as proposed in benartsi_3ck_01_0720 (choose one):

Y: 16, N: 1, Need more information: 21

See comment #33 for details

JULY

Comment Discussion Presentation - KR Test Fixtures

Prepared by Howard Heck

See: http://www.ieee802.org/3/ck/public/20_07/heck_3ck_01a_0720.pdf

- Chair noted that the editorial team prepared the summary at her request in the 30 June 2020 meeting.
- Discussed that the method makes substantial changes to the specification and the need for analysis before incorporating into the draft.

Presentation #3:

"What to do with TP0a and TP5a ", Matt Brown

See: https://www.ieee802.org/3/ck/public/adhoc/sept16_20/brown_3ck_adhoc_01a_091620.pdf

- Updated version '01a'. No objection.
- Discussed various aspects of the figure on slide 7.
- On slide 3, the title should reference "KR/C2C" not "KR/C2M".

Straw Poll #1

At this time, I support removing the example TX test fixture in 163.9.2.2.

Y: 10, N: 11, A: 15

Ad Hoc

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Pivot Discussion: Keep TP0a or not

- I support keeping TP0v methodology as the normative specification
  - Y:
  - N:
  - No opinion

- Assuming we keep TP0v methodology, I support removing the example test fixture in 163.9.2.2
  - Y:
  - N:
  - No opinion

Pivot Discussion: TP0 to TP0a IL

| CI 163 | SC 163.9.2.2. | P 178 | L 33 | # 136 |

Ghiasi, Ali   Ghiasi Quantum/Inphi

| Comment Type | TR | Comment Status | D | example TF |

Inccrease the loss from 1.2 dB and 1.6 dB

SuggestedRemedy

to 2.2 and 2.6 dB and update equation 163-1 to
=0.0062 + 0.1753*sqrt(f)+0.0561*f the equation nominal loss is 2.4 dB

| Proposed Response | | Response Status | W |

PROPOSED ACCEPT IN PRINCIPLE.

The following TP0a IL are proposed:
Comment #136: 2.2 - 2.6 dB
Comment #162: 2.4 - 3.2 dB
Comment #204: 2.0 - 2.8 dB
Comment #229: 3.5 or 4 dB
Comment #26 : 4 dB
#73 proposes to remove TP0a example. Comment #135 and #6 propose to change TP0a
to normative.
For task force review.

Pivot Discussion: TP0 to TP0a IL

- I support the test fixture TP0 to TP0a insertion loss being
  - a single value
  - a range

- For the example test fixture, I support TP0 to TP0a insertion loss of (Chicago rules)
  - 0 dB
  - Between 0 and 2 dB
  - 2 dB
  - 2.5 dB
  - 3 dB
  - 3.5 dB
  - 4 dB
  - Greater than 4dB

Pivot Discussion: Match TX & RX

| CI 163 | SC 163.9.3.1 | P 180 | L 34 | # 40 |

Healey, Adam   Broadcom Inc.

Comment Type **T**   *Comment Status* **D**   *RX test fixture*

Now that the transmitter has relaxed test fixture requirements and taken a "test fixture embedding" approach, it seems appropriate for the receiver to follow suit.

SuggestedRemedy

Update 163.9.3.2 by changing references to "TP5a" to "TP5v" and add a pointer to 163.9.2.1 for test fixture requirements. Replace the specification of "ERL (min)" in Table 163-9 with a specification of "dERL" as is done for the transmitter and update 163.9.3.1 accordingly. Implement similar changes in Annex 120F. Update Annex 163A to include calculation of the reference ERL at TP5v (which should largely be a "mirror image" of the material currently describing the calculation of the reference ERL at TP0v). For interference tolerance and jitter tolerance test channel calibration, exceptions to 93A.2 and Annex 93C would need to be made to substitute TP0 to TP0v (and TP5v to TP5) replicas for their TP0 to TP0a (And TP5a to TP5) counterparts.

Proposed Response   *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Align the RX test fixture specifications with the TX TF specifications based on slide 12 of: https://www.ieee802.org/3/ck/public/adhoc/sept16_20/brown_3ck_adhoc_01a_091620.pdf
For CL 163.9.3.2:
Change references to "TP5a" to "TP5v" and add a pointer to 163.9.2.1 for test fixture requirements. Replace the specification of "ERL (min)" in Table 163-9 with a specification of "dERL" as is done for the transmitter and update 163.9.3.1 accordingly.
For CL 163.9.3.3 RITT, add a bullet at the beginning of the considerations, "In this clause TP0v (TP5v) replaces TP0a (TP5a) in Annex 93A and Annex 93C'.
For CL 163.9.3.4 JTOL, add a sentence after "The test setup shown in Figure 93–12, or its equivalent, is used.": "In this clause TP0v (TP5v) replaces TP0a (TP5a) in Annex 93A, Annex 93C, and Annex 120D"
Implement similar changes in Annex 120F.
For Annex 163A:
Change to include calculation of the reference ERL at TP5v (which should largely be a "mirror image" of the material currently describing the calculation of the reference ERL at TP0v).
Implement with editorial license.
[Editor's note: CC: 163, 120F,163A]

Pivot Discussion: Match TX & RX

- I support aligning RX to TP0v test fixture characteristics and methodology
  - Y:
  - N:

Pivot Discussion: EOJ Susceptibility & Limit

CI **120F**   *SC* **120F.3.1.3**   *P* **210**   *L* **43**   # 190

Calvin, John   Keysight Technologies

Comment Type   **T**   *Comment Status* **D**   *EO jitter*

Based on Sleigh/Calvin/LeCheminant presentation
https://grouper.ieee.org/groups/802/3/ck/public/adhoc/sept16_20/calvin_3ck_adhoc_01_091
620.pdf it has been shown that the EOJ measurement is susceptible to a systematic error
based on the test pattern length and baud rate. This is easily resolved by allowing the
CDR loop BW to be reduced below 4 MHz

SuggestedRemedy

Update the text of page 210 line 43 to read Even-odd jitter is calculated using the
measurement method specified in 120D.3.1.8.2. with the exception that EOJ may be
measured with a clock recovery unit (CRU) with a corner frequency of <= 4 MHz and a
slope of 20 dB/decade

Proposed Response   *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Comment #127 proposes using PRBS9Q rather than PRBS13Q.
Comment #190 proposes reducing the scope CRU bandwidth.
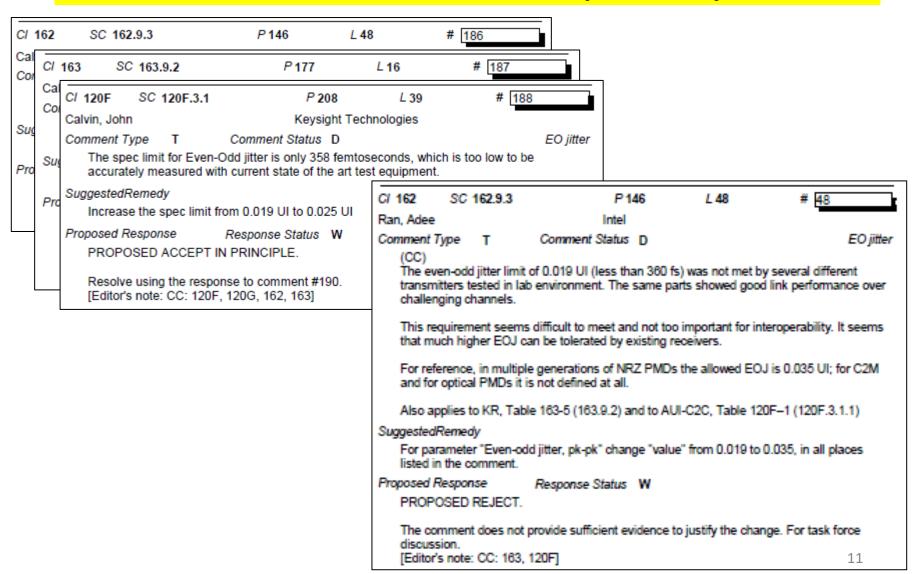Comment #188 proposes to increase the value from 0.019 UI to 0.025 UI.
Discussion is required to determine and appropriate solution.
Applies also to comments against 162 and 163.
For task force discussion.
[Editor's note: CC: 120F, 120G, 162, 163]

Pivot Discussion: EOJ Susceptibility & Limit

CI 162   SC 162.9.3   P 146   L 48   # 186

CI 163   SC 163.9.2   P 177   L 16   # 187

CI 120F   SC 120F.3.1   P 208   L 39   # 188

Calvin, John   Keysight Technologies

Comment Type   T   Comment Status   D   EO jitter

The spec limit for Even-Odd jitter is only 358 femtoseconds, which is too low to be accurately measured with current state of the art test equipment.

SuggestedRemedy
Increase the spec limit from 0.019 UI to 0.025 UI

Proposed Response   Response Status   W
PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #190.
[Editor's note: CC: 120F, 120G, 162, 163]

CI 162   SC 162.9.3   P 146   L 48   # 48

Ran, Adee   Intel

Comment Type   T   Comment Status   D   EO jitter

(CC)
The even-odd jitter limit of 0.019 UI (less than 360 fs) was not met by several different transmitters tested in lab environment. The same parts showed good link performance over challenging channels.

This requirement seems difficult to meet and not too important for interoperability. It seems that much higher EOJ can be tolerated by existing receivers.

For reference, in multiple generations of NRZ PMDs the allowed EOJ is 0.035 UI; for C2M and for optical PMDs it is not defined at all.

Also applies to KR, Table 163-5 (163.9.2) and to AUI-C2C, Table 120F–1 (120F.3.1.1)

SuggestedRemedy
For parameter "Even-odd jitter, pk-pk" change "value" from 0.019 to 0.035, in all places listed in the comment.

Proposed Response   Response Status   W
PROPOSED REJECT.

The comment does not provide sufficient evidence to justify the change. For task force discussion.
[Editor's note: CC: 163, 120F]

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Pivot Discussion: EOJ Susceptibility & Limit

- To address EOJ measurement error susceptibility, I would support: (Chicago rules)
  - A: Changing the measurement method to use PRBS9Q instead of PRBS13Q
  - B: Allowing a shorter odd-length pattern with all transitions (not a specific one)
  - C: Specifying or allowing a lower CRU bandwidth
  - D: Use the average of the 12 transition measurements rather than the worst case
  - E: None of the above
  - F: Don't care
  - G: Need more information

- For the EOJ limit, I would support (Chicago Rules & Choose one)
  - A: Changing the limit to 0.035 UI
  - B: Changing the limit to 0.025 UI
  - C: No change to the limit (0.019 UI)
  - D: Don't care
  - E: Need more information

Pivot Discussion: EW/ESMW

| CI 120G | SC 120G.3.1 | P 226 | L 17 | # 41 |

Healey, Adam   Broadcom Inc.

Comment Type   T   Comment Status   D   ew/esmw

ESMW (eye symmetry mask width) is "TBD". Similarly, eye width specifications for stressed input parameters are also "TBD". These parameters will be difficult to define for a reference receiver that includes decision feedback equalization unless the behavior of the feedback signal in the vicinity of the threshold crossings is clearly defined. However, there are other, simpler means to enforce that the reference receiver output has a useable eye width. The most straight-forward implementation for this draft is to expand on a feature of the eye height and vertical eye closure measurement procedure referred to in 120G.5.2 item h). This items points to 120E.4.2 and 120E.4.3 for the method to measure eye height, vertical eye closure, and other parameters. Step 4) in 120E.4.3 states that the distribution of the signal voltage (from which eye height and vertical eye closure are derived) is to be measured over a window "within 0.025 UI of time TCmid". This essentially averages the distribution over the time window or, thought of a different way, is similar to having a uniform jitter distribution around TCmid. Use of such a window reduces the measured eye height and vertical eye closure for signals with narrower eye widths. The width of the window can be increased to provide higher degrees of protection.

SuggestedRemedy

Remove references to ESMW and eye height from Annex 120G. Change 120G.5.2 item h) to the following: "From the eye diagram, compute eye height and vertical eye closure using the methodologies defined in 120E.4.2 and 120E.4.3 with the following exceptions. The value of TCmid is set to the sampling phase t_s determined in step d) (skipping steps 1) through 3) from 120E.4.2). The CDFs of the signal voltages computed in 120E.4.2 steps 4) through 6) are the average values over the time interval t_s-0.05 UI to t_s+0.05 UI. The feedback coefficients b(n) determined in step d) are constant over the averaging time interval."

Note that eye height and vertical eye closure limits may need to be adjusted to account for the reductions to these values via the averaging window.

Proposed Response   Response Status   W

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
It is assumed that in the suggested remedy, the intent was to refer to eye width rather than eye height.
The EW and ESMW specifications are incomplete both in values and in method as the draft is currently written.
Implement suggested remedy with editorial license, except remove "eye width" rather than "eye height".
Add an editorial note that all EH and VEC values currently specified may need to be adjusted to account for this new methodology.
For task force discussion.

Similar comments
with other remedies:
208, 211, 240, 243, 245

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Pivot Discussion: EW/ESMW

- I support the EW/ESMW direction of

  - Keep ESMW and eye width

  - Replace EH, ESMW, and eye width with an eye mask as proposed in dawe_3ck_01_1020

  - Remove ESMW and eye width and redefine EH and VEC as proposed in healey_3ck_01a_1020

  - Remove ESMW and eye width and leave EH and VEC as is