Cl **83D** *SC* **83D.4** *P* **157** *L* **49** # i-1

Mellitz, Richard — Intel Corporation

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

Table 83d-6 Continuous time filter entry and data in Table 83d-7 is based on an a receiver without a DFE. The CTLE parameters in Clause 93 Table 93-9 are for a CTLE which is intended to be used with a DFE.

Channel margin is expected to improve by 0.5-1 dB.
See>
http://www.ieee802.org/3/bm/public/cuadhoc/meetings/apr24_14/mellitz_01_042414_caui.pdf

SuggestedRemedy

accept recommedation in
http://www.ieee802.org/3/bm/public/cuadhoc/meetings/may15_14/latchman_01_051514_caui.pdf

slide 5

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-4

Cl **95** *SC* **95.1** *P* **103** *L* **41** # i-2

Anslow, Peter — Ciena Corporation

Comment Type **E** *Comment Status* **A** *Bucket*

There is a typographical error in Table 95-1 footnote b

SuggestedRemedy

Change:
"RS-FEC correction function may is not supported." to:
"RS-FEC correction function is not supported."

Response *Response Status* **C**

ACCEPT.
See comment i-24

Cl **83D** *SC* **83D.3.3** *P* **156** *L* **10** # i-3

Latchman, Ryan

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

Replace discrete two point jitter tolerance test with single interference tolerance test that includes continuous SJ per Table 88-13

SuggestedRemedy

In Table 83D-4, remove "Jitter Tolerance" row.
In 83D 3.3.1, add new exception "c) Sinusoidal jitter is added to the test transmitter by modulating the clock source."
In Table 83D-5, add a row "Applied pk-pk sinusoidal jitter" with min value of "Table 88-13" for both tests.
See latchman_01_053014_caui slides 3 and 4

Response *Response Status* **C**

ACCEPT.

Cl **83D** *SC* **83D.4** *P* **157** *L* **48** # i-4

Latchman, Ryan

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

Change COM CTLE for DFE based RX to align with 802.3bj

SuggestedRemedy

Update Table 83D-6 Continuous time filter parameters as per latchman_01_053014_caui slide 5.
Delete Table 83D-7 "Reference CTLE coefficients"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Also see comments i-1, i-89

Cl **83E** *SC* **83E.3.1.6** *P* **169** *L* **11** # i-5

Latchman, Ryan

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

Add text on recommended CTLE peaking being used for host output eye evaluation

SuggestedRemedy

In 83E.3.1.6 change:
"The recommended CTLE peaking value is provided ..." to:
"The recommended CTLE peaking value (which is also used for host output eye measurements) is provided ..."
See latchman_01_053014_caui slide 6

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-78

Cl **83E** *SC* **83E.3.4.2.1** *P* **179** *L* **49** # i-6

Latchman, Ryan

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

Make explicit that the module shall meet the BER requirement with +/-1dB values for Recommended_CTLE_value. Make explicit the optional use of Recommended_CTLE_value. Add pics

SuggestedRemedy

In 83E.3.4.2.1 change:
"The module under test is evaluated with three ..." to:
"The module under test shall meet the BER requirement as described in Table 83E-7 using three ..."
Add to the end of the same paragraph: "Modules may optionally elect not to use the Recommeded_CTLE_Value."
Add a row to PICS under 83E.5.3 Major capabilities/options
(item: ADR, Feature: Adaptive receiver, Subclause: 83E.3.4.2.1, Value: Module receiver does not use Recommended_CTLE_value, Status: O, Support: Yes [ ] No [ ]
See latchman_01_053014_caui slides 6 and 7

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-78

Cl **83D** *SC* **83D.3.1** *P* **153** *L* **43** # i-7

Latchman, Ryan

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

Table 83D-1 reference to output jitter needs to be updated based on latest 802.3bj draft

SuggestedRemedy

In Table 83D-1, change reference for the bottom row from 92.8.3.9 to 92.8.3.8

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95** *P* *L* # i-8

King, Jonathan

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

Replace TDP with TxVEC.

SuggestedRemedy

Replace TDP with TxVEC.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment i-35

Cl **83D** *SC* **83D.3.1.1** *P* **154** *L* **4** # i-9

RAN, ADEE Intel Corporation

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

The current method for setting the transmitter equalization coefficient is unidirectional. There is no standardized method for a receiver to indicate whether the current transmitter equalization coefficients are good or not, or to request a change to the coefficients in use. Configuring a multi-port system without such methods is difficult if at all possible.

Using a back channel for transmitter equalization tuning as in Clause 72 is a powerful feature. Since CAUI-4 does not use the clause 72 training, to avoid adding complexity it is suggested to add an optional back-channel through MDIO control.

Having a standardized MDIO-based method will help multi-port systems integration and tuning and promote interoperability.

SuggestedRemedy

A proposal was discussed in the CAUI-4 ad hoc. Presentation and detailed text, tables and figure will be supplied.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the changes shown in ran_01_0714_optx and anslow_01_0714_optx with the exception that the tolerance for c(1) and c(-1) are +/- 0.04 and a requirement for changes to be monotonic is added with editorial license.
Also, change the "weight" entries in the tables of anslow_01_0714_optx to "ratio".
In the added 83D.3.3.2 change "it shall be as" to "it shall operate as"

Cl **83D** *SC* **83D.3.3.1** *P* **156** *L* **33** # i-10

RAN, ADEE Intel Corporation

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

Table 83D-5 replaces Table 93-6. The latter defines two tests per symbol error ratio, one with a specified maximum insertion loss ("short channel') and one with a specified minimum insertion loss ("long channel"). Table 83D-5 has two tests, but both specify only a maximum-loss channel.

Since the Annex 93C test method for both cases, the test condition limiting parameters should be similar. The current difference may cause confusion among test implementers and different interpretation of the test requirements, as either "minimum stress" or "required operating region".

This ambiguity has a simple solution - since the CAUI-4 channel specification is normative, there is no need to re-define the required operating region; interference tolerance should be defined with a minimum stress. This aligns with the maximum COM value used in both tests.

Test 1 should be a "long channel" with minimum loss, and test 2 should be a "short channel" with maximum loss.

SuggestedRemedy

Change "Insertion loss at 12.89 GHz" value for test 1 from "max 20" to "min 20" dB.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Move the "2" values in the COM row to new "Target" columns.
Change the Insertion loss values for test 1 to be min 19.5 and max 20.5 dB and for test 2 to be min 9.5 and max 10.5 dB

Cl **83D** *SC* **83D.5.4** *P* **160** *L* **42** # i-11

RAN, ADEE Intel Corporation

Comment Type **E** *Comment Status* **A** *Bucket*

"waveform" is the established term.

SuggestedRemedy

Change "wave form" to "waveform".

Response *Response Status* **C**

ACCEPT.

Cl **83A** *SC* **83A.3.4.7** *P* **326** *L* **8** # i-12

RAN, ADEE Intel Corporation

Comment Type **ER** *Comment Status* **A**

"When aui_rx_mode = QUIET, SIGNAL_DETECT shall be set to OK within 500 ns following the application of a signal at the receiver input detects an ALERT signal driven from the XLAUI/CAUI link partner"...

This is a malformed and illegible statement. It seems to be copied from 83A, which had this phrasing since D1.3 of 802.3bj. Unfortunately it has escaped unnoticed.

A meaningful variation of this sentence appears in 84.7.4 (as modified by 802.3bj):

"When rx_mode = QUIET, SIGNAL_DETECT shall be set to OK within 500 ns following the application of a signal at the receiver input that corresponds to an ALERT transmission (see 84.7.2) from the link partner."

85.7.4 has a similar meaningful statement.

SuggestedRemedy

Change "detects" to "that corresponds to" to create a meaningful statement.

Consider applying a similar correction in 83A.3.4.7 too.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: This comment relates to page 135 line 39 (and page 157 line 9)]
In 83A.3.4.7, change:
"... a signal at the receiver input detects an ALERT signal ..." to:
"... a signal at the receiver input that corresponds to an ALERT signal ..."

Make the same change in 83D.3.4.

Cl **83E** *SC* **83E.3.3** *P* **173** *L* **20** # i-13

RAN, ADEE Intel Corporation

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

Bit error ratio is meaningless at TP4a as defined in Figure 83E-5 - it is a physical point outside of any receiver capable of detecting bits.

SuggestedRemedy

Delete this row from the table. Define BER as a CAUI-4 normative requirement (e.g. add "shall" in 83E.3.3.1 and 83E.3.4.1).

The host receiver interference tolerance test already has this requirement.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events, 83E.3.3.1 and 83E.3.4.1 and the BER row have been removed by comment i-32.

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **6** # i-14

RAN, ADEE Intel Corporation

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

"Random jitter and the pattern generator output amplitude is adjusted to result in the eye height and eye width given in Table 83E-5 using the reference receiver."

As currently written, the amplitude may exceed the "Differential pk-pk input voltage tolerance" parameter. This can create an excessive stress or damage the receiver under test.

SuggestedRemedy

Append to this paragraph "as long as the pattern generator's peak-to-peak voltage does not exceed the receiver's Differential pk-pk input voltage tolerance specification (see Table 83E-7)".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-103

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **6** # i-15

RAN, ADEE Intel Corporation

Comment Type **E** *Comment Status* **A**

Two parameters are adjusted.

SuggestedRemedy

change "is adjusted" to "are adjusted".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-103

Cl **83E** *SC* **83E.3.3.1** *P* **173** *L* **42** # i-16

RAN, ADEE Intel Corporation

Comment Type **E** *Comment Status* **A**

"The CAUI-4 chip-to-module host input is defined to operate at a bit error ratio..."

Bit error ratio is a characteristic of a receiver.

SuggestedRemedy

Change "chip-to-module host input" to "chip-to-module host receiver".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events, 83E.3.3.1 has been removed by comment i-32.

Cl **83E** *SC* **83E.3.4** *P* **177** *L* **29** # i-17

RAN, ADEE — Intel Corporation

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

"Differential pk-pk input voltage tolerance" is specified as (min) 900 mV. In contrast, "Single-ended voltage tolerance" and "DC common mode voltage" in this same table have both min and max specifications, and clearly the working range is between the two.

For clarity and uniformity, it is better to that specify all tolerance values as maximum allowed values.

A similar definition (and problem) exists in table 83E-4.

SuggestedRemedy

Change "Differential pk-pk input voltage tolerance (min)" to "Differential pk-pk input voltage tolerance (max)", in both tables.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In Table 83E-7, change
Single-ended voltage tolerance (min) -0.4
Single-ended voltage tolerance (max) 3.3

To:
Single-ended voltage tolerance range (min) -0.4 to 3.3

Cl **83E** *SC* **83E.5.4.3** *P* **184** *L* **48** # i-18

RAN, ADEE — Intel Corporation

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

"Differential pk-pk input voltage tolerance" "termination mismatch" and "Common move voltage" from Table 83E-4 do not have PICS items.

SuggestedRemedy

Add PICS items for these parameters, or for the whole table 83E-4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change PICS items in 83E.5.4.3 to be for the whole of Table 83E-4 instead of individual parameters and in 83E.5.4.4 to be for the whole of Table 83E-7.

Cl **95** *SC* **95** *P* *L* # i-19

Ben Ary, Jacob — Teldor Cables & Syste

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

Throughout clause 95 it is important to be accurate and consistent both with ISO/IEC and IEC terminology. Specifically as regards the use of the terms OM3 and OM4. These terms do not define "fiber types" but rather performance categories of cabled fiber. Wherever the use of fiber type is mandated or required for clarity or technical accuracy - use the IEC nomenclature A1a.2 and A1a.3. OM3 and OM4 can be used in the tables where link performance parameters are specified, but again, not as fiber types.

SuggestedRemedy

Response *Response Status* **C**

REJECT.
No specific remedy supplied.

The format for referencing OM3 and OM4 in clause 95 follows clause 86.

The first mention of OM3 or OM4 in Clause 95 is in 95.7 which says:
"A 100GBASE-SR4 compliant PMD operates on 50/125 mm multimode fibers, type A1a.2 (OM3) or type A1a.3 (OM4), according to ..." which clarifies the relationship between "OM3" & "OM4" and A1a.2 & A1a.3.

The commenter is invited to identify where the draft is not clear and provide proposals for specific changes.

Cl **00** *SC* **0** *P* **0** *L* **0** # i-20

Turner, Michelle

Comment Type **ER** *Comment Status* **A** *Bucket*

This draft meets all editorial requirements.

SuggestedRemedy

Response *Response Status* **C**

ACCEPT.
Thank you.

Cl **45** *SC* **45.2.3.46** *P* **38** *L* **18** # i-21

Healey, Adam — Avago Technologies

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

This comment is based on IEEE 802.3 revision request #1242 (http://ieee802.org/3/maint/requests/maint_1242.pdf). In Table 45-140, only 20 lanes are required for the currently defined PCS implementation, therefore the 6th bit is superfluous.

SuggestedRemedy

Subclause 45.2.3.46, change Table 45-140, column Bit(s), 3.400.15:6 to 3.400.15:5 and 3.400.5:0 to 3.400.4:0.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.4** *P* **50** *L* **23** # i-22

Healey, Adam — Avago Technologies

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

This comment is based on IEEE 802.3 revision request #1244 (http://ieee802.org/3/maint/requests/maint_1244.pdf). Clause 44.3 deals with 10 Gb/s and the calculation implicitly assumes a bit time of 100 ps. Clause 80 is an introduction to 40 Gb/s and 100 Gb/s networks, so this assumption results in the calculation being wrong.

SuggestedRemedy

The second paragraph in this clause says "See 44.3 for the calculation of bit time per meter of fiber or electrical cable." It should be changed to the following text (including a new equation):

<start replacement text>
Equation (80-1) specifies the calculation of cable delay in nanoseconds per meter of fiber or electrical cable, based upon the parameter n, which represents the ratio of the speed of electromagnetic propagation in the fiber or electrical cable to the speed of light in a vacuum, c = 3x10^8 m/s.

cable delay = 10^9/(n*c)[ns/m] (80-1)

The value of n should be available from the fiber or electrical cable manufacturer, but if no value is known then a conservative delay estimate can be calculated using a default value of n = 0.66, which yields a
default cable delay of 5 ns/m.
<end replacement text>

Response *Response Status* **C**

ACCEPT.

Cl **86** *SC* **86.10.2.1** *P* **75** *L* **19** # i-23

Healey, Adam — Avago Technologies

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

This comment is based on IEEE 802.3 revision request #1246 (http://ieee802.org/3/maint/requests/maint_1246.pdf). The value of 300 ps stated in Note "a" to table 86-13 is too low by a factor of two. This value is believed to have originated from misapplication of the skew model kolesar_02_0508 which provides a value for variation within a lane. This value must be multiplied by 2 to account for variation across lanes. See kolesar_01_0613_mmf for more details. Further, the units in Note "a" should ideally match those for the other skew parameters in Table 86-13. Also the sum of the Note "a" value and the value in Table 86-13 for Cabling Skew Variation must equal the 2.8 ns allocation described in clause 86.3.2.

SuggestedRemedy

For note "a" of Table 86-13, replace "300 ps" with "0.6 ns". Change the 2.5 ns value in Table 86-13 to 2.2 ns.

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95.1** *P* **103** *L* **41** # i-24

Petrilla, John — Avago Technologies

Comment Type **E** *Comment Status* **A** *Bucket*

In footnote b, "...function may is not supported" likely should be "function is not supported"

SuggestedRemedy

In footnote b, change "...function may is not supported" to "function is not supported"

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95.7.1** *P* **110** *L* **50** # i-25

Petrilla, John — Avago Technologies

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

In Table 95-6 the Transmitter eye mask coordinates do not sufficiently account for instrumentation noise in available test instruments. See petrilla_01_0714 for additional information and details.

SuggestedRemedy

In Table 95-6 change the Transmitter eye mask coordinates as described in petrilla_01_0714.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Keep the same mask coordinates and change the hit ratio from 5E-5 to 1.5E-3

Cl **95** *SC* **95.7.2** *P* **111** *L* **35** # i-26

Petrilla, John — Avago Technologies

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

In Table 95-7 the Conditions of stressed receiver sensitivity test do not sufficiently account for instrumentation noise in available test instruments. See petrilla_01_0714 for additional information and details.

SuggestedRemedy

In Table 95-7 change the Conditions of stressed receiver sensitivity test: VECP, J2, J4 and eye mask coordinates as described in petrilla_01_0714 for additional information and details.

Response *Response Status* **U**

REJECT.
It is advisable to warn the reader that instrumentation noise may be signfiicant.
95.8.8.4 already contains the text:

"Care should be taken when characterizing the test signal because excessive noise/jitter in the measurement system will result in an input signal that does not fully stress the receiver under test. Running the receiver tolerance test with a signal that is under-stressed may result in the deployment of non-compliant receivers. Care should be taken to minimize the noise/jitter introduced by the reference O/E, filters and BERT and/or to correct for this noise."

Additions to this text to recommend how far above the noise the signal are invited.

Cl **95** *SC* **95.8.7** *P* **115** *L* **2** # i-27

Petrilla, John — Avago Technologies

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

Although the reference receiver frequency response is defined for the transmit eye test, the reference receiver sensitivity is not. Since sensitivities of available test instruments are not expected to be as good, relative to the worst case Rx, as in the past, the test equipment can adversely impact the measurement result. This should be addressed. See petrilla_01_0714 for additional information and details.

SuggestedRemedy

Include in 95.8.7 the following: The reference receiver has an RMS input noise of 17 microwatts. Change the last sentence from "Compensation may be made for variation of the reference receiver filter response from an ideal fourth-order Bessel-Thomson response." to "Compensation may be made for variation of the reference receiver input noise and filter response from an ideal fourth-order Bessel-Thomson response."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-25

Also, change:
"Compensation may be made for variation of the reference receiver filter response from an ideal fourth-order Bessel-Thomson response." to:
"Compensation may be made for variation of the reference receiver filter response from an ideal fourth-order Bessel-Thomson response, and for any excess reference receiver noise."

Cl **95** *SC* **95.8.8.4** *P* **117** *L* **52** # i-28

Petrilla, John — Avago Technologies

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

Although the reference receiver frequency response is defined for the stressed receiver test signal calibration, the reference receiver sensitivity is not. Since sensitivities of available test instruments are not expected to be as good, relative to the worst case Rx, as in the past, the test equipment can have significant adverse effect on the measurement result. This should be addressed. See petrilla_01_0714 for additional information and details.

SuggestedRemedy

Change the first sentence from "The stressed receiver conformance test signal can be verified using an optical reference receiver with an ideal fourth-order Bessel-Thomson response with a reference frequency fr of 19.34 GHz." to "The stressed receiver conformance test signal can be verified using an optical reference receiver with an RMS input noise of 17 microwatts and ideal fourth-order Bessel-Thomson response with a reference frequency fr of 19.34 GHz."

Response *Response Status* **C**

REJECT.
See response to i-26

Cl **95** *SC* **95.8.8.1** *P* **115** *L* **26** # i-29

Petrilla, John — Avago Technologies

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

The purpose of the sinusoidal amplitude interferer 1 is delared to be as an emulator of instantaneous bit shrinkage that can occur with DDJ. Unfortunately, there is no further mention of DDJ, instantaneous bit shrinkage nor further guidance on instantaneous bit shrinkage or amount of sinusoidal amplitude interferer 1 to generate. Since instantaneous bit shrinkage can be very problematic, some guidance or means should be included so that receivers under test are not overstressed.

SuggestedRemedy

Add a instantaneous bit shrinkage maximum (recommended to be 0.1 UI) to the setup instructions. In item 3), 95.8.8.2, page 117 include in the last paragraph a max limit of 0.1 UI for instantaneous bit shrinkage.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In item 3) in 95.8.8.2 , add:
"The instantaneous bit shrinkage introduced by sinusoidal amplitude interferer 1 should be no more than 0.1 UI." after the sentence beginning:
"The sinusoidal amplitude interferers may be set at any frequency..."

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **12** # i-30

Petrilla, John — Avago Technologies

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

Extinction ratio (ER) has been shown to degrade when shifting from the test pattern used for OMA measurement to the test patterns used for receiver sensitivity. ER should also be expected to degrade when adding impairments to a relatively clean optical source that are being added to make the source look like a worst case transmitter. Since the min ER in Table 95-6 reflects the worst case Tx, setting a clean Tx to the min ER and then adding the impairments found in the worst case Tx overstresses the signal. Either a higher min ER setting should be given for a clean signal or the min ER in Table 95-6 should be applied after the 2/3 VECP and sinusoidal interferers and Gaussian jitter are applied.

SuggestedRemedy

Change item 2 from, "With the sinusoidal interferers and sinusoidal jitter turned off, set the extinction ratio of the E/O to approximately the minimum specified in Table 95-6." to "After application of the low-pass filetr and with the sinusoidal interferers and sinusoidal jitter turned on, set the extinction ratio of the E/O to approximately the minimum specified in Table 95-6." and move the edited item 2) to become part of item 3), before the paragraph, "Sinusodal jitter ..."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In 95.8.8.2, change:
"stressed eye J4 jitter " to:
"stressed eye J4 Jitter "

Also, change:
"Iterate the adjustments of sinusoidal interferers and Gaussian noise generator until the values of VECP, stressed eye J2 Jitter and stressed eye J4 Jitter meet the requirements in Table 95-7, and ..." to:
"Iterate the adjustments of sinusoidal interferers and Gaussian noise generator and extinction ratio until the values of VECP, stressed eye J2 Jitter and stressed eye J4 Jitter meet the requirements in Table 95-7, the extinction ratio is approximately the minimum specified in Table 95-6, and ..."

Cl **95** *SC* **95.9.4** *P* **119** *L* **12** # i-31

Petrilla, John Avago Technologies

Comment Type **E** *Comment Status* **A**

The use of commas is not consistent in the two paragraphs,
"It is recommended that manufacturers indicate in the literature associated with the PHY the operating environmental conditions to facilitate selection, installation, and maintenance.

It is recommended that manufacturers indicate, in the literature associated with the components of the optical link, the distance and operating environmental conditions over which the specifications of this clause will be met."

SuggestedRemedy

After the word, indicate, add or delete a comma. Repeat after the words PHY and link.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In the second paragraph of 95.9.4, add commas after "indicate" and "PHY"

Cl **83E** *SC* **83E.34.1** *P* **177** *L* **51** # i-32

Petrilla, John Avago Technologies

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

Since there is no requirement for a CAUI-4 module input to include an error detector or counter and since the output of this interface is not usually exposed, the intention and consequences of this sub-clause is unclear. The same problem exists with sub-clause 83E.3.3.1. We can look to clause 95 for an solution example.

SuggestedRemedy

Create new subclause 83E.1.1 with the following text: "The bit error ratio (BER) shall be less than 1x10-15". Delete 83E.3.3.1 and 83E.3.4.1. Delete first row (Bit error ratio) of table 83E-4 and table 83E-7. Add footnote to the "Host stressed input test" parameter in Table 83E-4 and the "Module stressed input test" parameter in Table 83E-7: "Meets BER specified in 83E.1.1"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: relates to subclause 83E.3.4.1]

Create new subclause 83E.1.1 with title:"Bit error ratio" and the following text: "The bit error ratio (BER) shall be less than 10^-15". Delete 83E.3.3.1 and 83E.3.4.1. Delete first row (Bit error ratio) of Table 83E-4 and Table 83E-7. Add footnote to the "Host stressed input test" parameter in Table 83E-4 and the "Module stressed input test" parameter in Table 83E-7: "Meets BER specified in 83E.1.1"

Change BER PICs to reference subclause 83E.1.1

Also see comments i-96, i-13, i-16, i-97

Cl **83E** *SC* **83E.3.4.2.1** *P* **179** *L* **10** # i-33

Petrilla, John Avago Technologies

Comment Type **E** *Comment Status* **A**

The sentence, "The target pattern generator 20% to 80% transition in the module stressed input test is 9.5 ps." would benefit from adding the word time as in transition time.

SuggestedRemedy

Change the sentence, "The target pattern generator 20% to 80% transition in the module stressed input test is 9.5 ps." to "The target pattern generator 20% to 80% transition time in the module stressed input test is 9.5 ps." .

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95.7.1** *P* **110** *L* **41** # i-34

Petrilla, John Avago Technologies

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

In Table 95-6 the value for TDP is too high (see petrilla_01_0114.optx) due to mistaken inclusion of attributes in the calculation of the max penalty that are not captured in the TDP test. The reference receiver bandwidth (95.8.5 exception e is also affected.

SuggestedRemedy

In Table 95-6 change the value for max TDP from 5 to 4.1 and in 95.8.5 exception e, change 12.6 GHz to 16.1 GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events. TDP has been replaced by TxVEC. See comment i-35.

Cl **00** *SC* **0** *P* **110** *L* # i-35

Petrilla, John — Avago Technologies

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

The ability of TDP to adequately predict link margin for MMF links is questionable and, consequently, basing the min OMA requirement on TDP measurements is problematic. Another metric, TxVEC (Tx Vertical Eye Closure), provides a better correlation with link margin and has the advantages of not requiring a reference Tx and being easier and lower cost to implement while capturing all the Tx impairments that TDP captures. For more detail see petrilla_01a_0314 and petrilla_02_0714.

SuggestedRemedy

In Table 95-6, Table 95-8 and Table 95-10 replace 'Transmitter and dispersion penalty' and 'TDP', edit 95.8.1.1 and 95.12.4.4, and replace the subclause 95.8.5 Transmitter and dispersion penalty (TDP) with a new subclause as per the MMF ad hoc recommendation in king_02_0714. If any of the associated values are updated, the updates will be found in petrilla_02_0714.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Implement changes to replace TDP in Clause 95 as described in king_03_0714
See also comment i-8

A straw poll of the Task Force was taken:
Do you support:
a) making no change to the draft due to this comment
b) making the changes shown in king_02_0714_optx (J. Petrilla's proposal)
c) making the changes shown in king_03_0714_optx (P. Dawe)

a) 0
b) 4
c) 7

Cl **95** *SC* **95.8.8.1** *P* **115** *L* **26** # i-36

Petrilla, John — Avago Technologies

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

The second paragraph of 95.8.8.1 describes setup of the stressed receiver input waveform in conjunction with the block diagram in 95-3 ending with the instruction, "The Gaussian noise generator, the amplitude of the sinusoidal interferers, and the low-pass filter are adjusted so that the VECP, stressed eye J2 Jitter, and stressed eye J4 Jitter specifications given in Table 95-7 are met simultaneously while also passing the stressed receiver eye mask in Table 95-7 according to the methods specified in 95.8.7". Unfortunately, results have not been presented that simultaneously satisfying all conditions is possible. Also, additional consideration should be given to de-embedding reference receiver noise from J2 and J4 jitter versus adjusting J2 and J4 jitter values for the ref. Rx. Consequently, this paragraph should remain open for comments until more experience is accrued and the method can be confirmed.

SuggestedRemedy

Indicate that 95.8.8.1 remains open for comment in draft 3.1.

Response *Response Status* **U**

REJECT.
A contribution which shows that simultaneously satisfying all conditions is not possible together with a proposal for how the paragraph should be modified is requested.

Cl **83D** *SC* **83D.3.3** *P* **156** *L* **8** # i-37

RAN, ADEE — Intel Corporation

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

Interference tolerance is not something measured at TP5a - measuring it requires BER results internal to the component, so it is out of place here. There is already a normative statement about interference tolerance in 83D.3.3.1, so this line can be safely deleted.

A similar argument can be made about jitter tolerance, but this is the only place it is currently defined.

SuggestedRemedy

Delete the "Interference tolerance" line from the table.

Move the "Jitter tolerance" reference and comment to a separate subclause describing the test method agreed upon (I am aware of a proposed modification to the current method), and make it normative.

Response *Response Status* **C**

REJECT.
Same style as Table 93-5. It is useful to point to 83D.3.3.1 Receiver interference tolerance

Cl **83D** *SC* **83D.3.3.1** *P* **156** *L* **22** # i-38

RAN, ADEE — Intel Corporation

Comment Type **E** *Comment Status* **A**

"The transmitter taps are set via management to the optimal transmitter equalizer settings described in 83D.3.1.1."

But 83D.3.1.1 does not describe the optimal settings.

SuggestedRemedy

Change this sentence to

"The transmitter taps are set via management to the optimal valid transmitter equalizer settings (see 83D.3.1.1)."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change to:
"The transmitter taps are set via management (see 83D.3.1.1) to the settings that provide the lowest BER."

Also see comment i-93

Cl **83D** *SC* **83D.4** *P* **158** *L* **22** # i-39

Healey, Adam — Avago Technologies

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

The one-sided noise spectral density (eta_0) is too high.

SuggestedRemedy

Change from 5.2E-4 to 5.2E-8. This is consistent with the parameters value specified in Clause 93.

Response *Response Status* **C**

ACCEPT.

Cl **99** *SC* **99** *P* **2** *L* **10** # i-40

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

This says physical medium dependent (PMD) sublayer; but 1.4.316 says Physical Medium Dependent (PMD) sublayer

SuggestedRemedy

Change to Physical Medium Dependent (PMD) sublayer

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1.4** *P* **40** *L* **42** # i-41

Dawe, Piers J G — Mellanox Technologie

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

"XLAUI/CAUI-n shutdown is only supported when" something. As opposed to what? Instigated when something?

SuggestedRemedy

Do you mean "XLAUI/CAUI-n shutdown is supported only when" something?
There should be a better word than supported.
Maybe a less cryptic sentence would help: something like "EEE does not affect XLAUI/CAUI-10 or CAUI-4 when deep sleep is not enabled for the associated PHY."?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Page 44]
Change Table 78-1 footnote a from:
"XLAUI/CAUI-n shutdown is only supported when deep sleep is enabled." to:
"XLAUI/CAUI-n shutdown is supported only when deep sleep is enabled for the associated PHY."
Also, show both footnotes in underline font.

Cl **78** *SC* **78.1.4** *P* **40** *L* **42** # i-42

Dawe, Piers J G — Mellanox Technologie

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

Table 78-1 is now very long and narrow.

SuggestedRemedy

Use four columns in pairs: PHY or interface type, Clause; PHY or interface type, Clause

Response *Response Status* **C**

REJECT.
[Editor's note: Page 44]
Making this change is likely to cause confusion.

Cl **78** *SC* **78.5** *P* **45** *L* **8** # i-43

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **R**

This Case-1, Case-2 notation is now badly overloaded (4 different meanings) and does not seem to be used anywhere but 78.5.

SuggestedRemedy

Replace with "Master mode", "Slave mode", "without FEC", "with FEC" and so on.
If that's too difficult, label the cases 1 2 3 4 5 6 7 8.

Response *Response Status* **C**

REJECT.
The P802.3bm amendment has made no change to the "Case-1, Case-2" notation used in 78.5.

Cl **78** *SC* **78.5** *P* **45** *L* **22** # i-44

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Table layout?

SuggestedRemedy

Resize column widths to contents, or move "fast wake" into "Case" column twice.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resize the column widths in Table 78-4

Cl **91** *SC* **91.7.4.2** *P* **95** *L* **11** # i-45

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **R**

PICS RF4b prohibits something. According to 21.6.2, abbreviations and special symbols, X is used for "prohibited field/function"

SuggestedRemedy

Change SR4:M to SR4:X

Response *Response Status* **C**

REJECT.
The meaning of the current PICS entry "SR4:M" is that it is mandatory for 100GBASE-SR4 PHYs that "Error correction is not bypassed".

Changing this to "SR4:X" would change the meaning to be that it is prohibited for 100GBASE-SR4 PHYs that "Error correction is not bypassed". This would introduce a double negative meaning that error correction must be bypassed.

For an example of the usage of the "X" notation see 24.8.2.3 item *FEF.

Cl **95** *SC* **95.7.1** *P* **110** *L* **41** # i-46

Dawe, Piers J G — Mellanox Technologie

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

This TDP limit of 5 dB appears to be a "worst bit plus noise" estimate from the spreadsheet; the real TDP will be considerably lower. TDP of 5 is near to a "cliff" (see dawe_01_0513_optx.pdf and dawe_02a_0114_optx.pdf slide 12), is far higher than other TDP limits in 802.3, and is not feasible.

SuggestedRemedy

Using the improved definition of TDP (see other comments) that includes all penalties:
Change TDP limit from 5 dB to 4.3 dB.
Consequent changes: change OMA-TDP (min) from -8 dB to -7.3 dB;
Change OMA (min) from -7.1 dB to -6.4 dB;
Change Average launch power, each lane (min) from -9.1 dB to -8.4 dB;
In receive specs, change Average receive power, each lane (min) from -11 dB to -10.3 dB;
In receive specs, if we are testing with maximum of all penalties, change Stressed receiver sensitivity (OMA), each lane (max) from -5.6 to -3-1.9 = -4.9 dBm;
In Table 95-8, 100GBASE-SR4 illustrative link power budget, change Power budget (for max TDP) from 8.2 dB to 4.3+1.9 = 6.2 dB (?);
In Table 95-8, change Allocation for penalties (for max TDP) from 6.3 dB to 4.3 dB (?).

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to i-34
The implications of the change to TxVEC on the budget and penalties should be explored in the MMF Ad Hoc.

Cl **95** *SC* **95.7.1** *P* **110** *L* **41** # i-47

Dawe, Piers J G — Mellanox Technologie

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

With the present methodology, we need to allow 0.2 dB more in the budget for modal noise than we chose before we reduced the minimum extinction ratio (see mmfadhoc/meetings/nov6_13/ModalNoiseIn100GBASE-SR4v3a_mmf.pdf).

SuggestedRemedy

Use the proposed scope based TDP including all penalties (see another comment) and then the extra penalty from modal noise will be a transmitter implementer's choice not a receiver implementer's problem.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-35

Cl **95** *SC* **95.7.2** *P* **111** *L* **28** # i-48

Dawe, Piers J G — Mellanox Technologie

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

VECP is not a true penalty. It would be possible to use it for the unique case of an SRS signal, but not desirable.

SuggestedRemedy

Replace VECP spec with Signal Penalty (or Transmitter penalty) spec. Here, change "Vertical eye closure penalty (VECP) lane under test 4.2 dB" to "Signal Penalty, lane under test 4.3 dB" (same number as TDP in Table 95-6), modifying footnote d). And see comment against 95.8.8.2.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to i-59

Cl **95** *SC* **95.7.1** *P* **110** *L* **50** # i-49

Dawe, Piers J G — Mellanox Technologie

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

Are the mask coordinates correct? TR comment because this action should follow others to be taken at July meeting.

SuggestedRemedy

Review them and revise if necessary, following and consistent with changes to TDP and VECP.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See response to i-25

Cl **95** *SC* **95.7.2** *P* **111** *L* **29** # i-50

Dawe, Piers J G — Mellanox Technologie

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

Are the J2 and J4 values correct? TR comment because this action should follow others to be taken at July meeting.

SuggestedRemedy

Review them and revise as necessary, consistent with changes to TDP and VECP. Also the SRS eye mask.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to i-26

Cl **95** *SC* **95.8.1** *P* **113** *L* **1** # i-51

Dawe, Piers J G — Mellanox Technologie

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

Table 95-10, "Test-pattern definitions and related subclauses", doesn't define any patterns - that's in Table 95-9. It specifies which patterns to use, which is different.

SuggestedRemedy

Change title of Table 95-10 from:
Test-pattern definitions and related subclauses
to:
Parameter definitions and test patterns

Response *Response Status* **C**

REJECT.
The title of Table 95-10 is consistent with clauses 52, 86, 87, 88.

Cl **95** *SC* **95.8.2** *P* **113** *L* **42** # i-52

Dawe, Piers J G — Mellanox Technologie

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

This "shall" duplicates the one in 95.7.1, which is bad practice. It puts a (repeated) PMD requirement in the definitions section where it doesn't belong. the point about "if measured" applies to any spec; we should not be saying it in most or every subclause as if it were an exception to the rule.

SuggestedRemedy

Change the first sentence of 95.7.1 from:
...shall meet the specifications in Table 95-6 per the definitions in 95.8.
to
...shall meet the specifications in Table 95-6 if measured according to the definitions in 95.8.
and similarly for 95.7.2 100GBASE-SR4 receive optical specifications.
Change "The center wavelength and RMS spectral width of each optical lane shall be within the range given in Table 95-6 if measured per TIA/EIA-455-127-A or IEC 61280-1-3."
to "Center wavelength and RMS spectral width shall be as defined by TIA/EIA-455-127-A or IEC 61280-1-3."
Similarly in 95.8.3 Average optical power, 95.8.4 Optical Modulation Amplitude (OMA), 95.8.6 Extinction ratio, 95.8.7 Transmitter optical waveform (transmit eye), and 95.8.8 Stressed receiver sensitivity.

Response *Response Status* **U**

REJECT.
The format of clause 95 is consistent with other clauses including 52, 86, 87, 88.

Cl **95** *SC* **95.8.2** *P* **113** *L* **49** # i-53

Dawe, Piers J G — Mellanox Technologie

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

For average optical power, Table 95-10 gives a choice of test patterns for average optical power.
Table 95-10 doesn't define test patterns, it merely selects (specifies or identifies) the appropriate ones.

SuggestedRemedy

Change
using the test pattern defined in Table 95-10.
to
using one of the test patterns specified in Table 95-10.

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95.8.5** *P* **114** *L* **10** # i-54

Dawe, Piers J G — Mellanox Technologie

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

As discussed in the MMF ad hoc, for this PMD the TDP method can be improved for better accuracy, lower test cost and much simplified calibration.
Doing so avoids the need to fix the incorrect use of VECP in this subclause.

SuggestedRemedy

Replace 95.8.5 with the material in
http://ieee802.org/3/bm/public/mmfadhoc/meetings/jun12_14/802%203-95-TxVECimproved.pdf or its successor.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See response to i-35

Cl **95** *SC* **95.8.5** *P* **114** *L* **41** # i-55

Dawe, Piers J G — Mellanox Technologie

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

Define Signal Penalty as a simplified scope-based TDP, and use this for SRS calibration to get consistency between Tx and Rx specs.
The alternative would be to fix the VECP: find a new "all but" parameter and a new VECP spec for SRS.

SuggestedRemedy

In either a new 95.8.6 or 95.8.5.1,
Define Signal Penalty (or Transmitter Penalty), as TDP with the following differences:
Observation bandwidth of 19.34 GHz not 12.6 GHz;
Noise term M set to zero.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to i-59

Cl **95** *SC* **95.8.7** *P* **115** *L* **1** # i-56

Dawe, Piers J G — Mellanox Technologie

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

A mask hit ratio limit of 5e-5 was found suitable for PMDs with spec BER of 1e-12. For this PMD with a BER a more than a million times higher, a higher hit ratio limit would be appropriate. Improving the mask hit ratio limit is expected to improve the correlation between the mask test and performance in the field, improve eye measurement accuracy and/or reduce test time.
Also for the expected 400GBASE-SR16 based 100GBASE-SR4, test time will be important with 16 lanes.
A hit ratio limit of 1e-4 would be suitable.

SuggestedRemedy

Change "with the exception that the clock recovery unit's high-frequency corner bandwidth is 10 MHz." to:
"with these exceptions:
a) the clock recovery unit's high-frequency corner bandwidth is 10 MHz, and
b) the transmitter shall achieve a hit ratio lower than the limit of hits per sample specified in Table 95-6."
In Table 95-6, under "Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}", insert "Hit ratio 10^-4 hits per sample".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-25

Cl **95** *SC* **95.8.8.1** *P* **115** *L* **23** # i-57

Dawe, Piers J G — Mellanox Technologie

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

Having improved TDP so it doesn't need VECP, we can use a similar methodology in SRS so that we don't need VECP at all (see other comments). Then we can remove it from the draft.

SuggestedRemedy

In 95.8.8.1, change "The low-pass filter is used to create ISI-induced vertical eye closure penalty (VECP)." to "The low-pass filter is used to create intersymbol interference.".
Change "so that the VECP, stressed eye J2 Jitter, and stressed eye J4 Jitter specifications given" to "so that the Signal Penalty, stressed eye J2 Jitter, and stressed eye J4 Jitter specifications given".
In 95.8.8.2, change "levels and frequencies of the VECP and jitter components" to "levels and frequencies of the Signal Penalty and jitter components".
Change "The required values of VECP, J2 Jitter and J4 Jitter" to "The required values of Signal Penalty, J2 Jitter and J4 Jitter".
Change "greater than two thirds of the dB value of the VECP should be created by the selection of the appropriate bandwidth for the low-pass filter. Any remaining VECP must be created with sinusoidal interferer 2 or sinusoidal jitter." to "greater than two thirds of the dB value of the Signal Penalty should be created by the selection of the appropriate bandwidth for the low-pass filter. Any remaining Signal Penalty must be created with sinusoidal interferer 2 or sinusoidal jitter.".

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to i-59

Cl **95** *SC* **95.8.8.1** *P* **116** *L* **38** # i-58

Dawe, Piers J G — Mellanox Technologie

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

Calibrating the SRS setup with a clean clock will mean that the signal as seen with any real CRU (including the one in the product) will have a little more jitter than intended, and on the other hand an unknown part of the calibrated jitter could be at very low frequencies, making the test signal as seen by a product receiver have less jitter than intended. At least some BERTs have a low bandwidth CRU option that addresses this, but even with the standard CRU, J2 and J4 can be calibrated with the SJ frequency set to the high end of the range in Table 95-11.

SuggestedRemedy

Change "clean clock" to "Low bandwidth CRU" or simply "Clock recovery unit", with its input from the test signal.
In 95.8.8.5, consider adding a NOTE--It may not be practical to calibrate the sinusoidal jitter at the lowest frequencies with the setup in Figure 95-3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The clean clock allows calibration of both the stressed eye jitter (with LF sinusoidal jitter turned off), and the LF sinusoidal jitter applied for jitter tolerance testing. For example, by using PRBS31 and square wave patterns.

The draft may be improved by adding a sentence to describe LF calibration.
After :
"Sinusoidal jitter is added as specified in Table 95-11. When calibrating the conformance signal, the sinusoidal jitter frequency should be well within the 10 MHz to 10 times LB as defined in Table 95-11."
Add:
"Sinusoidal jitter amplitude below 10 MHz may be calibrated by measuring the jitter on the oscilloscope, while transmitting the square wave pattern."

Cl **95** *SC* **95.8.8.2** *P* **116** *L* **48** # i-59

Dawe, Piers J G — Mellanox Technologie

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

The definition of VECP in 87.8.11.2 is for a non-FEC PMD and causes inaccuracy for this PMD. After improving the TDP method so it doesn't rely on VECP and includes all penalties, we can then use a variant of the improved TDP method to calibrate the stressed eye and make the Tx and Rx specs consistent.

SuggestedRemedy

As the improved TDP includes all penalties, replace all references to VECP with references to Signal Penalty (based on TDP as defined in 95.8.8 and its subclauses - see another comment).
Change:
The primary parameters of the conformance test signal are vertical eye closure penalty (VECP), stressed eye J2 Jitter and stressed eye J4 Jitter. VECP is measured at the time center of the eye, half way between the normalized times of 0 and 1 on the unit interval (UI) scale as determined by the eye crossing means. VECP is given by Equation (87-1), and illustrated in Figure 87-4 (see 87.8.11.2).
to:
The primary parameters of the conformance test signal are Signal Penalty, stressed eye J2 Jitter and stressed eye J4 Jitter. Signal Penalty is defined in 95.8.new (or 95.8.5.1).
See other comments for associated changes.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
The proposed remedy would leave an incomplete description of the SRS test source set up process. However, it would improve the draft to specify that the SRS test source should be calibrated with the same metric used to determine the transmitter quaility (for example TxVEC).

Now that TDP has been replaced with TxVEC (comment i-35):
Add "TxVEC of stressed eye conformance signal" to Table 95-7 with 'value' cell to be the same as the TxVEC value in Table 95-6.

In 95.8.8.2, item 3), after the fifth indented paragraph, add a sixth indented paragraph:

"The TxVEC of the stressed eye conformance signal should not exceed the value given in Table 95-7, and is measured according to 95.8.5, except that the combination of the O/E and the oscilloscope used to measure the optical waveform has a fourth-order Bessel-Thomson filter response with a bandwidth of 19.34 GHz."

See also comments i-55 i-57 and i-48

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **5** # i-60

Dawe, Piers J G — Mellanox Technologie

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

This stressed eye generator contains a Gaussian noise generator. Even though it's before a limiter, this means that the outer slopes of the final amplitude histograms will not be "as steep as possible".

SuggestedRemedy

Delete the paragraph "Residual low probability noise and jitter should be minimized so that the outer slopes of the final amplitude histograms are as steep as possible."

Response *Response Status* **C**

ACCEPT.
See response to i-83

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **16** # i-61

Dawe, Piers J G — Mellanox Technologie

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

This says "With the sinusoidal interferers and sinusoidal jitter turned off, greater than two thirds of the dB value of the VECP should be created by the selection of the appropriate bandwidth for the low-pass filter.
Any remaining VECP must be created with sinusoidal interferer 2 or sinusoidal jitter." It doesn't mention the Gaussian noise generator shown in Figure 95-3. Is it on or off when achieving the two thirds?

SuggestedRemedy

Clarify.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change:
"With the sinusoidal interferers and sinusoidal jitter turned off"
to:
"With the sinusoidal interferers, sinusoidal jitter, and Gaussian noise generator turned off"

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **18** # i-62

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Invisible character after "2 or sinusoidal jitter."

SuggestedRemedy

Remove

Response *Response Status* **C**

ACCEPT.

Cl **83D** *SC* **83D.3.4** *P* **157** *L* **11** # i-63

Dawe, Piers J G — Mellanox Technologie

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

Requiring that "SIGNAL_DETECT changes from FAIL to OK only after the valid ALERT signal is applied to the channel." is far too onerous, it would need a pattern checker to identify when a signal wasn't a valid ALERT signal. A simple energy detector should be good enough to do what's needed.

SuggestedRemedy

Delete "only". Also in 83A.3.4.7.

Response *Response Status* **C**

REJECT.
ALERT signal is specifically used to transition from FAIL to OK
83.5.11 "Energy Efficient Ethernet" contains:
When the optional Energy Efficient Ethernet (EEE) deep sleep capability is supported and the PMA service interface is physically instantiated as XLAUI or CAUI-n, the additional functions listed in this subclause are required.
83.5.11.2 "Detection of PMA quiet and alert signals" then describes the logic and detection threshold for the PMA ALERT signal.
Removing the word "only" from 83D.3.4 and 83A.3.4.7 would not remove this requirement which was introduced by IEEE Std 802.3bj-2014 to provide a robust EEE signalling mechanism.

Cl **83D** *SC* **83D.3.4** *P* **157** *L* **11** # i-64

Dawe, Piers J G — Mellanox Technologie

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

"the valid ALERT signal is applied to the channel": channel?

SuggestedRemedy

Change to "... applied to the lane" (if that's what you mean). Or if it isn't, "is received"?
Also in 83A.3.4.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "...is received"
Also in 83A.3.4.7.

Cl **83E** *SC* **83E.1** *P* **163** *L* **30** # i-65

Dawe, Piers J G — Mellanox Technologie

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

100GBASE-SR4 always uses FEC. In a new QSFP-based design, the FEC coding and checking will be in the host (100GBASE-CR4 always has FEC in the host too). 400GBASE-SR16 (and probably all 400GE) will use FEC, and CDAUI-16 should be compatible with CAUI-4. We can use that FEC benefit in chip-to-module CAUI-4, for modules that use FEC and hosts that always use FEC.
I believe the with-FEC and without-FEC C2M CAUI-4 variants will exist in the market whatever, but it will reduce confusion if IEEE acknowledges that and provides clearer naming and the stability of a good standard for with-FEC CAUI-4. It is worth proposing this again, now that 400GE has progressed, to establish how best to move forward.
See dawe_01_0913_optx.pdf and dawe_01a_0114_optx.pdf
For consistency with Fibre Channel, a BER limit of 1e-6 rather than 2.5e-6 might be convenient.

SuggestedRemedy

Adopt the changes shown in dawe_01a_0114_optx.pdf

Response *Response Status* **C**

REJECT.
This issue has been discussed during Task Force review and also in Working Group ballot, with no consensus to make a change.
The response to comment #154 from D2.0 was:

There was no consensus to make this change.
Also see latchman_02_0513_optx
Comment #219 against D1.0 proposed defining two options: one for non-RS-FEC use and the other for with-RS-FEC use. This was not supported by a straw poll of the Task Force.
[Editor's note: tilde character changed to [Tilde] in Comment text]
A straw poll of the Task Force was taken:
Do you support the creation of two classes of C2M CAUI-4, one for non-FEC operation and another for with-FEC operation?
Yes 10
No 18

Cl **83E** *SC* **83E.3.1** *P* **166** *L* **15** # i-66

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A**

Use the same terminology as 802.3bj and almost all 802.3ba.

SuggestedRemedy

Change "Common-mode AC output voltage" to "AC common-mode output voltage". In PICS TH5, change "AC common-mode output" to "AC common-mode output voltage". Also Table 83D-1 and Table 83E-3.

Response *Response Status* **C**

ACCEPT.

Cl **83E** *SC* **83E.3.1** *P* **166** *L* **22** # i-67

Dawe, Piers J G — Mellanox Technologie

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

According to 83E.3.1.6, the host provides a recommended CTLE peaking value.
According to 83E.4.2, the host's eye must pass the spec at this value or 1 dB higher or lower if within the range 1 to 9. However, simulation shows that if the host gives a compliant but unhelpful recommendation, EH15 can be up to 8 dB smaller than the limit in Table 83E-1 within 1 dB of the recommendation (this is allowing 1 dB for the module).
We could impose some accuracy spec on the recommendation, but it is more useful and easier for the host to simply require that the eye is open at and around the setting the host recommends, by adding a subsidiary eye height spec. This 80 mV spec is chosen so that a host which gives a reasonable recommendation is not inconvenienced, and the host can trade off accuracy and eye opening - but the module is protected from a very unhelpful recommendation.

A simpler option might be to require 90 mV at the recommendation, if someone else wants to do the analysis to show that it fixes the problem. This would reduce the number of host tests but is less generous to hosts that give realistic recommendations and may protect the module less well.

The text in 83E.4.2 would benefit from a little wordsmithing anyway.

SuggestedRemedy

Insert a second limit below the 95 mV, of 80 mV (1.5 dB lower than 95 mV).
In 83E.4.2, change:
For host compliance, the CTLE peaking in the reference receiver shall be set to one of three values. These are: a) the recommended CTLE peaking value provided by the host, b) the value 1 dB higher if present in Table 83E-2, c) the value 1 dB lower if present in Table 83E-2. Any of the three CTLE settings that meets both eye width and eye height defined in Table 83E-1 is acceptable.
to
For host compliance, the CTLE peaking in the reference receiver shall be set to three values. These are: a) the recommended CTLE peaking value provided by the host, b) the value 1 dB higher if present in Table 83E-2, c) the value 1 dB lower if present in Table 83E-2. A compliant host passes both the eye width and the larger eye height limit specified in Table 83E-1 at at least one of the settings, and passes the smaller eye height limit specified in Table 83E-1 at all of the two or three settings.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Make the changes proposed on slide 10 of dawe_02_0714 with a value for the smaller eye height of 80 mV with editorial license.

Cl **83E** *SC* **83E.3.1.6.1** *P* **170** *L* **1** # i-68

Dawe, Piers J G — Mellanox Technologie

Comment Type **ER** *Comment Status* **R**

The entries in Table 83E-2 are in GHz, as are Table 83D-6 and Table 83D-7. But Equation 83E-4 is in Grad/s. More generally:
This draft uses Hz 68 times and rad/s twice.
802.3bj uses Hz 195 times and does not use rad/s.
802.3-2012 uses Hz many times and does not use rad/s.
We should be consistent within 802.3. Also we should remove clutter that makes this equation and table harder to understand than they need be.

SuggestedRemedy

Remove 2pi three times from Equation 83E-4.
In Table 83E-2, delete "/2pi", three times.
Change "in Grad/s" to "in GHz", twice.

Response *Response Status* **C**

REJECT.

This issue was discussed in Task Force Review and Working Group ballot with no consensus to make the change (see comments 122, 212 against D1.0 and comment 129 against D2.0).

The current format is consistent with other industry documents (see OIF-CEI-03.1 Clause 13). Changing the format to something different would not be an improvement to the draft.

Cl **83E** *SC* **83E.3.3** *P* **173** *L* **18** # i-69

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Test Point

SuggestedRemedy

Test point

Response *Response Status* **C**

ACCEPT.

Cl **83E** *SC* **83E.3.3** *P* **173** *L* **18** # i-70

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Table layout

SuggestedRemedy

Make the table full width, resize all but first column to contents, make first column as wide as takes up the rest of the width.

Response *Response Status* **C**

ACCEPT.

Cl **83E** *SC* **83E.3.3** *P* **173** *L* **32** # i-71

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Common Mode Voltage

SuggestedRemedy

Common-mode voltage

Response *Response Status* **C**

ACCEPT.

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **12** # i-72

Dawe, Piers J G — Mellanox Technologie

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

Table 95-10, test-pattern definitions and related subclauses, says that stressed receiver sensitivity uses pattern 3 or 5 (for the victim lane, this comment is not discussing the crosstalk lanes). Yet 83E.3.3.3.1, Host stressed input test procedure, and 83E.3.4.2.1, module stressed input test procedure, say "Pattern 5 (with or without FEC encoding), Pattern 3 or a valid 100GBASE-R signal." Either allowing any valid 100GBASE-R signal is a bad idea and should not be allowed (as in previous 10G, 40G, 100G specifications including nPPI and XLAUI/CAUI) or it's a good idea and should be allowed. Which is it? This comment involves optical as well as electrical specs and is addressed to the whole committee.

SuggestedRemedy

Make the options for victim test pattern consistent for 100GBASE-SR4 and CAUI-4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Modify Clause 95 to allow a valid 100GBASE-R signal with editorial license

Cl **83E** *SC* **83E.3.4.2.1** *P* **178** *L* **11** # i-73

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Figure has Bounded Uncorrelated Jitter, text below has "bounded uncorrelated jitter"

SuggestedRemedy

Make consistent e.g. Bounded uncorrelated jitter, bounded uncorrelated jitter

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change figure text to "Bounded uncorrelated jitter" in Figure 83E-15

Cl **83E** *SC* **83E.3.4.2.1** *P* **178** *L* **17** # i-74

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Figure has Frequency Dependent Attenuator, text below has "frequency-dependent attenuator"

SuggestedRemedy

Make consistent e.g. Frequency-dependent attenuator, frequency-dependent attenuator

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change figure text to Frequency-dependent attenuator in Figure 83E-15

Cl **83E** *SC* **83E.3.4.2.1** *P* **178** *L* **27** # i-75

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A** *Bucket*

Layout of Figure 83E-15 could be further improved, which would help the layout of the following three pages.

SuggestedRemedy

Make the figure more compact:
Move Module under test to the left, dashed box with key up. If necessary, move Termination and crosstalk calibration right, and Sinusoidal jitter, Random jitter, Pattern generator and Bounded Uncorrelated Jitter left and down.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement changes with editorial license

Cl **83E** *SC* **83E.5.4.1** *P* **183** *L* **26** # i-76

Dawe, Piers J G — Mellanox Technologie

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

PICS TH4 "DC common-mode voltage" refers to 83E.3.1.2 but there is no shall in 83E.3.1.2. The normative requirement is in Table 83E-1 in 83E.3.1, and is for "DC common-mode **output** voltage". 83E.3.1.2 defines what this annex means by peak-to-peak differential voltage and common-mode voltage; it should not be half-heartedly trying to state requirements for a second time.
There may be other similar issues.

SuggestedRemedy

Change "The DC common-mode output voltage is between -0.3 V and 2.8 V with respect to signal ground. The AC common-mode output voltage is less than or equal to 17.5 mV RMS with respect to signal ground." to "DC common-mode output voltage and AC common-mode output voltage are defined with respect to signal ground.". Change PICS TH4 from
DC common-mode voltage 83E.3.1.2
to
DC common-mode output voltage 83E.3.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In 83E.3.1.2, change:
"The DC common-mode output voltage is between -0.3 V and 2.8 V with respect to signal ground. The AC common-mode output voltage is less than or equal to 17.5 mV RMS with respect to signal ground." to:
"DC common-mode output voltage and AC common-mode output voltage are defined with respect to signal ground.".
Change PICS TH4 from:
DC common-mode voltage, 83E.3.1.2
to:
DC common-mode output voltage, 83E.3.1

Cl **83E** *SC* **83E.3.3.3.1** *P* **175** *L* **46** # i-77

Dawe, Piers J G — Mellanox Technologie

Comment Type **E** *Comment Status* **A**

The first mention of PRBS9 in 83E says "Pattern 4 (PRBS9, see Table 86-11)". Table 86-11 says "Pattern defined in 83.5.10", and somewhere in the very long 83.5.10 it says "a PRBS9 pattern (as defined in Table 68-6)". Because it's so hard to follow the chain of references in this case, we should be more considerate to the reader.

SuggestedRemedy

Change "Pattern 4 (PRBS9, see Table 86-11 and Table 68-6) once (no need to do it every time this pattern is mentioned).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In 83E.3.3.1 change the first instance of:
"Pattern 4 (PRBS9, see Table 86-11)" to:
"Pattern 4 (PRBS9, see Table 86-11 and Table 68-6)".

Change the rest of the instances of :
"Pattern 4 (PRBS9, see Table 86-11)" in Annex 83E to:
"Pattern 4"
(4 instances)

Cl **83** *SC* **83** *P* **83** *L* # i-78

Goergen, Joel — Cisco Systems, Inc.

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

*** Comment submitted with the file 82487100003-Comment on IEEE P802.3bm - Joel Goergen 21June2014.docx attached ***

-Add "Adaptive CTLE" support as a line item to 83E.5.4.4 (Module Input) PICS of type "O" (optional).
-Add an ability bit for "Adaptive CTLE" into Clause 45, preferably adjacent to the recommended peaking register location at 1.179.

SuggestedRemedy

-Proposed wording for the adaptive CTLE: " The adaptive module shall autonomously determine an initial CTLE gain setting immediately upon start-up . After start-up the module shall enter into a slow continuously adaptive mode, such that it is able track channel variations ".
* Update in the 802.3bm standard to capture and address any differences in compliance testing between the programmable and adaptive options, addressing our technical concerns about TP1 compliance range for programmable parts given in slide 11 -> CAUI4 complaint module should demonstrate compliance to RX CTLE coefficient +/-2dB instead of current +/-1dB.

http://www.ieee802.org/3/bm/public/cuadhoc/meetings/apr24_14/mazzini_01_042414_caui.pdf

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The contribution:
http://www.ieee802.org/3/bm/public/cuadhoc/meetings/apr24_14/mazzini_01_042414_caui.pdf was discussed at the 24 April CAUI Ad Hoc conference call and again at the 15 May CAUI Ad Hoc meeting.
This has resulted in the changes shown in latchman_01_053014_caui which:
Adds a PICS option to 83E.5.3 ADR "Adaptive receiver"
In 83E.3.1.6 changes:
"The recommended CTLE peaking value is ..." to:
"The recommended CTLE peaking value (which is also used for host output eye measurements) is ..."
In 83E.3.4.2.1 changes:
"The module under test is evaluated with three Recommended_CTLE_value values ..." to:
"The module under test shall meet the BER requirement as described in Table 83E-7 using three Recommended_CTLE_value values ..."
In 83E.3.4.2.1 adds:
"Modules may optionally elect not to use the Recommended_CTLE_value."

Apply the changes in latchman_01_053014_caui with the exception that in the PICS option to 83E.5.3 ADR "Adaptive receiver", change "Module receiver does not use ..." to "Module CAUI-4 receiver does not use ..."

There are no differences in compliance testing between the programmable and adaptive options, so no documentation of this is required.

Cl **45** *SC* **45.2.1.92b** *P* **36** *L* **31** # i-79

Dudek, Michael QLogic Corporation

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

It is not clear what transmitter equalization, receive direction means. Also it is not clear what should be entered if this does not exist.

SuggestedRemedy

Add this additional paragraph. "The transmitter, receive direction is the Transmitter in the direction from the PMD to the PCS." If this does not exist then the value should be set to zero." Add this paragraph also to 45.2.1.92c

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Use the same terminology that is used in Clause 80 to describe the transmit and receive directions.
In 45.2.1.92b and 45.2.1.92c add an extra sentence:
"The transmitter, receive direction, is the transmitter that sends data towards the PCS."

The detail of what happens when the CAUI-4 Tx or Rx is not present in the package is different for the various bits in this register if the proposal associated with comment i-9 is accepted. Consequently, this should be covered at the bit level rather than for the register as a whole.

For bits 1.180.4:2 and 1.180.1:0 add:
"If a lane 0 CAUI-4 transmitter in the receive direction is not present in the package then these bits have no effect."

If the proposal associated with comment i-9 is accepted, for bits 1.180.9:7 and 1.180.6:5 add:
"If a lane 0 CAUI-4 receiver in the receive direction is not present in the package then these bits have no effect."

If the proposal associated with comment i-9 is accepted, for bit 1.180.15 add:
If a lane 0 CAUI-4 receiver in the receive direction is not present in the package then the value returned for this bit should be zero.

See anslow_02_0714_optx.

See also comment i-80 (transmit direction).

Cl **45** *SC* **45.2.1.92d** *P* **37** *L* **27** # i-80

Dudek, Michael QLogic Corporation

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

It is not clear what transmitter equalization, transmitter direction means. Also it is not clear what should be entered if this does not exist.

SuggestedRemedy

Add this additional paragraph. "The transmitter,transmitter direction is the Transmitter in the direction from the PCS to the PMD." If this does not exist then the value should be set to zero." Also add this paragraph to 45.2.92e

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Make the equivalent changes to 45.2.1.92d (for the transmit direction - towards the PMD) as comment i-79 made to 45.2.1.92b (for the receive direction).
See anslow_02_0714_optx.

Cl **91** *SC* **91.5.3.3** *P* **94** *L* **1** # i-81

Dudek, Michael QLogic Corporation

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

The threshold value K is only used when the error correction is turned off. This is not allowed for 100GBASE-SR4 and therefore we shouldn't be defining K for this case.

SuggestedRemedy

Revert to the original text. Deleting 100GBASE-SR4. Also remove 100GBASE-SR4 from the PICS RF9.

Response *Response Status* **C**

REJECT.
The K value is required for the case where correction is enabled but error indication is disabled to ensure adequate MTTFPA

Cl **95** *SC* **95.1** *P* **103** *L* **41** # i-82

Dudek, Michael QLogic Corporation

Comment Type **TR** *Comment Status* **A** *Bucket*

In the footnote to Table 95-1 it says "The option to bypass the claues 91 RS-FDC correction function may is not supported". This is poor english and ambiguous technically.

SuggestedRemedy

Delete the "may" so that it says "function is not supported".

Response *Response Status* **C**

ACCEPT.
See comment i-24

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **4** # i-83

Dudek, Michael QLogic Corporation

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

It makes no sense that residual low probability jitter should be minimized when Gaussian noise is being added prior to the limiter and it contradicts what is said on line 36 page 115

SuggestedRemedy

Delete this paragraph.

Response *Response Status* **C**

ACCEPT.
Delete
"Residual low probability noise and jitter should be minimized so that the outer slopes of the final amplitude histograms are as steep as possible."

Cl **95** *SC* **95.8.8.4** *P* **118** *L* **5** # i-84

Dudek, Michael QLogic Corporation

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

The clean clock source cannot be used to calibrate the final stressed eye when sinusoidal jitter is present at low frequency.

SuggestedRemedy

Add "However this can only be used when the clock source is modulated with frequncies well within the band of 10MHz to 10xlb. For clock source modulation at lower frequencies the amplitude and frequency of the sinusoidal jitter should be adjusted wihtout adjusting any of the other stress components.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add to the end of the first paragraph of 95.8.8.4:

"However this can only be used when the clock source is modulated with frequencies within the band of 10 MHz to 10 times LB."

Cl **A** *SC* **A** *P* **129** *L* **14** # i-85

Dudek, Michael QLogic Corporation

Comment Type **E** *Comment Status* **A** *Bucket*

The OIF CEI-28G-VSR has already been published in OIF-CEI-03.1

SuggestedRemedy

Delete the editors note.

Response *Response Status* **C**

ACCEPT.

Cl **95** *SC* **95.8.8.1** *P* **116** *L* **2** # i-86

Dudek, Michael QLogic Corporation

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

The two sentences here should use the same terminology either symbol error ratio or BER. If the lanes are being stressed in turn then the link symbol error ratio is the sum of the symbol error ratios (not the Average)

SuggestedRemedy

Change the last sentence to "The RS-FEC input symbol error ratio is the sum of the RX-FEC input symbol error ratios measured when each lane is stressed in turn , : see 95.8.1.1"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change:
"If present, the RS-FEC sublayer can measure the interface symbol error ratio at its input."
to:
"If present, the RS-FEC sublayer can measure the lane symbol error ratio at its input. The lane BER can be assumed to be one tenth of the lane symbol error ratio."

Cl **83D** *SC* **83D.1** *P* **152** *L* **22** # i-87

Dudek, Michael QLogic Corporation

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

Equation 83D-1 is not referred to in the text, and the text says the channel loss can be higher or lower without saying "than what"

SuggestedRemedy

Insert a sentence after "as described in 83D.4". "A recommended channel insertion loss is given in equation 83D-1 and illustrated in Figure 83D-3". If "recommended" is considered too strong then mabe "typical" would be a better word.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Equation (83D-1) is referred to on Page 151 line 50:
"Figure 83D-2 depicts a typical CAUI-4 application, and Equation (83D-1) (illustrated in Figure 83D-3) summarizes the informative differential insertion loss budget associated with the chip-to-chip application."

Change:
"Actual channel loss could be higher or lower due to ..." to:
"Actual channel loss could be higher or lower than given by Equation (83D-1) due to ..."

Cl **83D** *SC* **83D.3.1** *P* **153** *L* **49** # i-88

Dudek, Michael QLogic Corporation

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

The reference is incorrect. Also extrapolating to 1e-15 from 1e-4 seems to be unnecessarily remote extrapolation. . It is more important that the standard provides an accurate measurement than reducing the test time.

SuggestedRemedy

Change the reference from 92.8.3.9.2.c to 92.8.3.8.2.c. Change to the range used for 1e-15 in OIF CEI 3.1. Change "1e-4 to 2.5e-3" to "1e-6 to 1e-4".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Make the suggested changes to match 83E.4.2.
In Table 83D-1 footnote b, change:
"as defined in 92.8.3.9.2 c), shall be from 10^-4 to 2.5 x 10^-3" to:
"as defined in 92.8.3.8.2 c), shall be from 10^-6 to 10^-4"

Cl **83D** *SC* **83D.4** *P* **157** *L* **49** # i-89

Dudek, Michael QLogic Corporation

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

With the change to using a DFE receiver it would be more convenient for vendors to use the same continuous time filter as is used for Clause 93. Also Mellitz_01_042414_caui presented to the CAUI-4 ad hoc showed that this continuous time filter provides better performance than the present one.

SuggestedRemedy

Change the continuous time filter DC gain, zero frequency and pole frequencies in table 83D-6 to match those in Table 93-8. Also delete table 83D-7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-4

Cl **83D** *SC* **83D.4** *P* **157** *L* **17** # i-90

Dudek, Michael QLogic Corporation

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

The channel is being tested in COM with a transmitter that has small quantization steps and is being adjusted for optimum performance, whereas in the system the transmitter has large quantization steps and there is no training defined. There should be a guard band between the COM the channel is allowed to provide and the value used for the receiver interference tolerance test.

SuggestedRemedy

Change the COM value for the channel from 2dB to 3dB.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

The quantization steps for COM are defined in Table 83D-6 as 0.05 which is the same as the system transmitter, so no guard band is required.

Cl **83D** *SC* **83D.3.3.1** *P* **156** *L* **40** # i-91

Dudek, Michael QLogic Corporation

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

RSS_DFE4 was introduced in Clause 93 to make sure that the ISI test channel had degradations that tested the ability of the receiver to equalize ISI that required a relatively long DFE. We are only using a 5 tap DFE for COM for CAUI4 chip to chip. Requiring this RSS_DFE4 will degrade COM and result in less noise being added. A practical receiver that has a longer DFE however will be able to equalize this and therefore will be understressed for noise like impairments.

SuggestedRemedy

Delete the RSS_DFE4 row. Or consider replacing it with a new parameter RSS_DFE2 that would be the RSS of taps 2-5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change "RSS_DFE4" to "RSS_DFE2"
Add note stating "RSS_DFE2 is equivalent to RSS_DFE4 described in 93A.2 except that n1=2 and n2=5."

Cl **83D** *SC* **83D.3.1.1** *P* **154** *L* **45** # i-92

Dudek, Michael QLogic Corporation

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

With the change to using the pulse fitting methodology for meaurement of the equalization settings all the settings are normalized to the tap setting 0. It therefore does not make sense to have this large tolerance for tap setting 0 in tables 83D-2 and 83D-3

SuggestedRemedy

Delete the +/-12.5% for the tap setting 0 in these tables.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events. Table and tolerance has been modified by comment i-9. See ran_01_0714_optx.

Cl **83D** *SC* **83D.3.3.1** *P* **156** *L* **22** # i-93

Dudek, Michael QLogic Corporation

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

It says "The transmitter taps are set via management to the optimal transmitter equalizer settings described in 83D.3.1.1.". However how the optimal transmitter equalizer settings are determined is not described.

SuggestedRemedy

Replace "The transmitter taps are set via management to the optimal transmitter equalizer settings described in 83D.3.1.1.". With "The transmitter taps described in 83D.3.1.1 are set to the values that provided the lowest error ratio."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-38

Cl **83D** *SC* **83D.1** *P* **152** *L* **11** # i-94

Dudek, Michael QLogic Corporation

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

CAUI-4 is different from XLAUI-4 and CAUI-10 in that the total channel specifications are significantly different for CAUI-4 chip to chip and CAUI-4 chip to module, meaning that a CAUI-4 component is different between the applications. It would be good to make this differentiation

SuggestedRemedy

In Figure 83D-2 change "CAUI-4 component" to "CAUI-4 chip to chip component". In Figure 83E-2 change "CAUI-4 component" to "CAUI-4 chip to module component"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In Figure 83D-2 change "CAUI-4 component" to "CAUI-4 chip-to-chip component".
In Figure 83E-2 change "CAUI-4 component" to "CAUI-4 chip-to-module component"

Cl **83E** *SC* **83E.3.1.6** *P* **169** *L* **18** # i-95

Dudek, Michael QLogic Corporation

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

The host output should be tested with crosstalk equivalent to a worst case module and therefore the crosstalk target transition time should match the module minimum risetime. (Note that pre-emphasis can be used in the crosstalk generator to achieve a faster risetime.). An equivalent change is not being suggested for the module output test because the worst case link from the module to the host has long traces and therefore the hosts risetime will be slow for this worst case link.

SuggestedRemedy

Change the target transition time 19ps to the same value as is used for the module minimum risetime in table 83E-3. This value however does appear to be faster than is realistic from a module measured at TP4 and therefore it is suggested that both numbers should be changed to 12ps.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change:
"The crosstalk generator is calibrated at TP4 with target differential peak-to-peak amplitude of 900 mV and target transition time of 19 ps."
to:
"The crosstalk generator is calibrated at TP4 with target differential peak-to-peak amplitude of 900 mV and target transition time of 12 ps."

Also, change the module minimum risetime in Table 83E-3 to 12 ps

Cl **83E** *SC* **83E.3.3** *P* **173** *L* **20** # i-96

Dudek, Michael QLogic Corporation

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

It is confusing to have TP4a as the test point for the Bit error ratio. The error rate test point is after the host CDR.

SuggestedRemedy

Change the test point to blank for the Bit error ratio line. Do the same for Table 83E-7 for the module input.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events, the BER rows in Tables 83E-4 in 83E-7 have been removed by comment i-32.

Cl **83E** *SC* **83E.3.3.1** *P* **173** *L* **41** # i-97

Dudek, Michael QLogic Corporation

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

Input bit error ratio is confusing.

SuggestedRemedy

Change Input here to receiver in this title and call it the CAUI-4 chip-to-module host receiver on line 43. Make the equivalent changes in 83E.3.4.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Overtaken by events, 83E.3.3.1 has been removed by comment i-32.

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **6** # i-98

Dudek, Michael QLogic Corporation

Comment Type **E** *Comment Status* **A**

grammer

SuggestedRemedy

Change "is" to "are" to read "Random jitter and the pattern generator output amplitude are adjusted"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-103

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **9** # i-99

Dudek, Michael QLogic Corporation

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

It is extremely unlikely that a vertical eye closure penalty of 4.5 to 5.5dB will be achievable with this test set up. A pattern generator with 9.5ps risetime and 0.28UI total jitter won't have this eye closure after equalization and there are no additional knobs to adjust.

SuggestedRemedy

Either delete the requirement for the Vertical eye closure penalty and reduce the Max vertical eye closure output from the module in table 83E-3 (suggested new value 3dB) or delete the 9.5ps risetime from the pattern generator and change the sentence to say "The pattern generator risetime should be set such that the host input test signal has a vertical eye closure in the range of 4.5 dB to 5.5 dB with a target value
of 5 dB.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Delete:
The target pattern generator 20% to 80% transition in the host stressed input test is 9.5 ps.

Notes:
- modifying the rise/fall time on a pattern generator may not be seen as a trivial request

With loss of mated compliance boards and cables ~5dB, and crosstalk, it has been demonstrated that ~4.5dB is possible from a BERT. This is also a target specification.
See:
http://www.ieee802.org/3/bm/public/cuadhoc/meetings/may30_13/misek_01_0530_caui.pdf

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Cl **83E** *SC* **83E.3.3.3.1** *P* **175** *L* **53** # i-100

Dudek, Michael QLogic Corporation

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

With a PRBS11 and a 150MHz low pass filter the "bounded jitter" is likely to only be at its maximum amplitude with a probability of the order of 5e-4. This may affect the extrapolation of the eye width (which starts from 1e-4). It would be better to restrict the bounded jitter to a higher probability.

SuggestedRemedy

Change "between PRBS7 and PRBS11" to "between PRBS7 and PRBS9" Also on page 179 line 3.

Response *Response Status* **C**

ACCEPT.

Cl **83E** *SC* **83E.3.4.2.1** *P* **179** *L* **10** # i-101

Dudek, Michael — QLogic Corporation

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

With a 9.5ps risetime from the pattern generator, even with the high loss channel the module receivers CTLE will not be fully tested. I intend to have a short presentation to show this.

SuggestedRemedy

Either increase the pattern generator risetime to 15ps or increase the trace loss to 12.5dB.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
See comment i-102
Note: the presentation associated with this comment is dudek_01_0714_optx.

Cl **83E** *SC* **83E.3.4.2.1** *P* **179** *L* **37** # i-102

RAN, ADEE — Intel Corporation

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

Eye width and eye height measurements refer to 83E.4.2, but in that subclause there are two values for each, one measured at 1e-6 and another extrapolated to 1e-15. It is not stated explicitly which width and height should be maximized and used.

The instructions are to measure x and y using z that maximizes x*y; this is a circular and confusing definition.

The text should be rephrased for clarity.

SuggestedRemedy

Change the text from

"Eye height and eye width are then measured at TP1a using the setting of the software CTLE which maximizes the product of eye height and eye width based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude are adjusted to result in the eye height and eye width given in Table 83E-8 using the reference receiver."

to

"Eye height and eye width, extrapolated to a probability of 10^-15, are measured at TP1a, using the methodology given in 83E.4.2, for each setting of the software CTLE. The software CTLE setting which maximizes the product of the measured eye height and eye width is retained. Random jitter and the pattern generator output amplitude are then adjusted to result in the eye height and eye width given in Table 83E-8 using the methodology given in 83E.4.2".

The text is repeated verbatim starting in line 42. Change the second instance similarly, or rephrase the text to avoid the repetition.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the paragraph beginning:
"Eye height and eye width are then measured at TP1a ..."
in the equivalent way to comment i-103

Also change:
"For the high loss case, frequency dependent attenuation is added such that from the output of the pattern generator to TP1a is 10.25 dB loss at 12.89 GHz. Eye height and eye width are then measured at TP1a using the setting of the software CTLE which maximizes the product of eye height and eye width
based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude are adjusted to result in the eye height and eye width given in Table 83E–8 using the reference receiver. For the low loss case, discrete

frequency dependent attenuation is removed such that from the output of the pattern generator to TP1a comprises the mated HCB/MCB pair as described in 83E.4.1. Eye height and eye width are then measured at TP1a using the setting of the software CTLE which maximizes the product of eye height and eye width based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude are adjusted to result in the eye height and eye width given in Table 83E-8 using the reference receiver."
to:
"For the high loss case, frequency dependent attenuation is added such that from the output of the pattern generator to TP1a is 13.8 dB loss at 12.89 GHz. The 13.8 dB loss represents 10.25 dB channel loss with an additional allowance for host transmitter package loss. Eye height and eye width are then measured at TP1a based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude are adjusted (without exceeding the receiver's differential pk-pk input voltage tolerance specification as shown in Table 83E-7) to result in the eye height and eye width given in Table 83E–8 using the reference receiver with the setting of the software CTLE which maximizes the product of eye height and eye width. For the low loss case, discrete frequency dependent attenuation is removed such that from the output of the pattern generator to TP1a comprises the mated HCB/MCB pair as described in 83E.4.1. Eye height and eye width at TP1a are then adjusted in the same way as described for the high loss case."

Also see comments i-103 and i-101

Cl **83E** *SC* **83E.3.3.3.1** *P* **177** *L* **4** # i-103

RAN, ADEE
Intel Corporation

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

Eye width and eye height measurements refer to 83E.4.2, but in that subclause there are two values for each, one measured at 1e-6 and another extrapolated to 1e-15. It is not stated explicitly which width and height should be maximized and used.

The instructions are to measure x and y using z that maximizes x*y; this is a circular and confusing definition.

The text should be rephrased for clarity.

SuggestedRemedy

Change this paragraph to

"Eye height and eye width, extrapolated to a probability of 10^-15, are then measured at TP1a, using the methodology given in 83E.4.2, for each setting of the software CTLE. The software CTLE setting which maximizes the product of the measured eye height and eye width is retained. Random jitter and the pattern generator output amplitude are then adjusted to result in the eye height and eye width given in Table 83E-5 using the methodology given in 83E.4.2 with the retained software CTLE setting".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change:
"Eye height and eye width are then measured at TP4 using the setting of the software CTLE which maximizes the product of eye height and eye width based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude is adjusted to result in the eye height and eye width given in Table 83E-5 using the reference receiver."
to:
"Eye height and eye width, extrapolated to a probability of 10^-15, are then measured at TP4 based on the eye measurement methodology given in 83E.4.2. Random jitter and the pattern generator output amplitude are adjusted (without exceeding the receiver's differential pk-pk input voltage tolerance specification as shown in Table 83E-4) to result in the eye height and eye width given in Table 83E-5 using the reference receiver with the setting of the CTLE which maximizes the product of eye height and eye width."

Also see comments i-14, i-15, i-98, i-102

Cl **95** *SC* **95.8.8.2** *P* **117** *L* **25** # i-104

Dawe, Piers J G — Mellanox Technologie

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

This sentence probably needs revision following the change to including SJ in SRS: "When calibrating the conformance signal, the sinusoidal jitter frequency should be well within the 10 MHz to 10 times LB as defined in Table 95-11." What does "well within" mean? What's wrong with calibrating at 10 times LB or higher? Does one calibrate SJ anyway, or just J2 and J4?

SuggestedRemedy

Delete the sentence or (see another comment for this clock recovery unit), "When calibrating the conformance signal, the sinusoidal jitter frequency should be well above the bandwidth of the clock recovery unit."?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change:
"When calibrating the conformance signal, the sinusoidal jitter frequency should be well within the 10 MHz to 10 times LB as defined in Table 95-11." to:
"When calibrating the conformance signal, the sinusoidal jitter frequency should be within the 10 MHz to 10 times LB as defined in Table 95-11."

Cl **83E** *SC* **83E** *P* **163** *L* # i-105

RAN, ADEE — Intel Corporation

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

Annex 83E is currently defined under the assumption that a CAUI-4 C2M link has to operate at BER<1e-15. In practice, many if not most of the implementations of CAUI-4 C2M will be in 100GBASE-SR4 or 100GBASE-CR4 PHYs and will carry only RS-FEC encoded data. In such implementations, the BER on the CAUI-4 C2M segment can be as high as 1e-6 without significant impact on the full link BER (as was shown in past presentations).

Such implementations can either over-design the CAUI-4 components to comply with the current specifications, or ignore them for cost saving, which may be safe in many cases. This will make our standard less valuable.

It would be better to explicitly address implementations that rely on RS-FEC protection and specify which requirements can be relieved for such implementations.

Annex 83D may also benefit from addressing RS-FEC protected implementations.

SuggestedRemedy

Detailed proposal to be provided.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.