Cl **140** *SC* **140** *P* **35** *L* **3** # 1

Cole, Chris
II-VI

Comment Type **E** *Comment Status* **D** *SECQ naming*

There is a more descriptive name for SECQ to be used for 100GBASE-FR1 and 100GBASE-LR1 (Note, cannot make similar name change for 100GBASE-DR at this point in time as it is out of scope).

SuggestedRemedy

Replace SECQ with TECQ throughout Sub-clause 140 for 100GBASE-FR1 and 100GBASE-LR1 only. Update any figures or tables as necessary,

Proposed Response *Response Status* **W**

PROPOSED REJECT

SECQ is a characteristic of a stressed test signal used to test the SRS of a receiver. SECQ is defined in 121.8.9.1 as "Stressed eye closure for PAM4 (SECQ)". It is used in numerous places throughout the standard.

TECQ is a characteristic of a transmitter, and is defined in 151.8.6 as "Transmitter eye closure for PAM4 (TECQ)".

It's not technically correct to say that TECQ is the same thing as SECQ in the context of receiver testing.

Cl **140** *SC* **140.6** *P* **40** *L* **19** # 14

Kimber, Mark
Semtech

Comment Type **E** *Comment Status* **D** *Interop*

The statement on interoperability should be clarified to alert users to the requirement that attenuation is required between DR, FR1 and LR1 PMDs. The statement on interoperability is copied from Clause 122.7 (802.3cn project). In Clause 122, the FR8 and LR8 have the same Tx power and no attenuation is required to interoperate. The other interoperability between PMDs is for Erx to FRx or LRx. It is standard to have attenuation for ERx type PMDs.

SuggestedRemedy

Change wording from:
"provided that the channel requirements for 100GBASE-DR are met."
to
"provided the inter-operability requirements of the fiber optic cabling (channel) characteristics for 100GBASE-DR are met."

This also applies to lines 19 and 22.

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **140** *SC* **140.6.1** *P* **41** *L* **29** # 15

Dawe, Piers — Mellanox

Comment Type **E** *Comment Status* **D**

In Table 140-6, transmit characteristics, the two rows for OMA - TDECQ could be combined (with three sub-rows). Similarly for the "allocation for penalties" rows in Table 140-8, illustrative link power budgets.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

There should be four sub-rows:
for extinction ratio >= 5 dB
for extinction ratio < 5 dB
for extinction ratio >= 4.5 dB
for extinction ratio < 4.5 dB

Implement in the following locations:
- Table 140-6 for "Launch power in OMAouter minus TDECQ (min)
- Table 140-8 for "Power budget (for max TDECQ)"
- Table 140-8 for "Allocation for penalties (for max TDECQ)"

Cl **140** *SC* **140.6.1** *P* **41** *L* **35** # 2

Cole, Chris — II-VI

Comment Type **T** *Comment Status* **D** *TDECQ-10logCeq*

TDECQ -10log10(Ceq) is a problematic spec. Implement suggested remedy for 100GBASE-FR1 and 100GBASE-LR1 only (Note, cannot make similar change for 100GBASE-DR at this point in time as it is out of scope).

SuggestedRemedy

Make the following changes to Table 140-6:

- Remove the entries in the row "TDECQ -10log10(Ceq)" for 100GBASE-FR1 and 100GBASE-LR1
- Insert a new row below "TDECQ -10log10(Ceq)" called "TECQ" with no entry for 100GBASE-DR and with values of 3.0 and 2.5dB for 100GBASE-FR1 and 100GBASE-LR1 respectively.
- Insert another new row below "TECQ" called "TDECQ-TECQ"with no entries for 100GBASE-DR and with values of 2.0dB and 2.5dB for 100GBASE-FR1 and 100GBASE-LR1 respectively.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The proposed remedy includes three changes to Table 140-6:
-removing TDECQ-10log10(Ceq) for 100GBASE-FR1 and -LR1;
-adding TECQ to the table with values for 100GBASE-FR1 and -LR1;
-adding TDECQ-TECQ with values for 100GBASE-FR1 and -LR1.

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

There is no clear consensus to remove TDECQ-10log10(Ceq).

There is no clear consensus that adding TECQ as separate parameter is necessary.

There is no clear consensus that adding TDECQ-TECQ is necessary for PMDs with low chromatic dispersion penalties.

Task force consensus is needed before making these substantial changes to the draft.

For task force discussion.

Cl **140** *SC* **140.6.1** *P* **41** *L* **40** # 3

Cole, Chris II-VI

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

There is no fast corner limit

SuggestedRemedy

Add Transmitter over/under-shoot (max) spec with 12% value for both FR4 and LR4-6.

Add c footnote for both transition time and new spec wich states: " Using NRZ test pattern; defined for transition, over-shoot in 120.5.11.2.3, 120.5.11.2.4, respectively"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

Issues with the suggested remedy are:
- There is no clear consensus that 12% is the correct value.
- Incomplete remedy proposal. A full description is needed for the overshoot test before it can be added to the draft.
- The question of test pattern needs to be resolved, noting that the transition time test is currently done with either Square wave or SSPRQ and the OMAouter test is done either with PRBS13Q or SSPRQ. A combined time domain test could potentially cover three parameters with a common test pattern.

The suggested remedy is a change from the current methodology used for PAM4 PMDs.

For task force discussion.

Cl **140** *SC* **140.6.1** *P* **41** *L* **54** # 4

Cole, Chris II-VI

Comment Type **E** *Comment Status* **D**

DR name constrasts with FR1 and LR1 names

SuggestedRemedy

Add e footnote which states: "100BASE-DR to 100GBASE-DR1 name change will be considered in future Maintenance Project"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The suggested remedy is out of scope for this project.

Cl **140** *SC* **140.6.2** *P* **42** *L* **30** # 5

Cole, Chris II-VI

Comment Type **T** *Comment Status* **D** *RS equations*

Equation use in spec. table is cumbersome. Make Receiver Sensitivity (RS) a normative spec for both 100GBASE-FR1 and 100GBASE-LR1 (Note cannot make similar change for 100GBASE-DR at this point in time as it is out of scope).

SuggestedRemedy

Replace equations for Receiver sensitivity (OMAouter) (max) in Table 140-7 with values of -4.5dBm and -6.1 dBm for FR1 and LR1, respecitvely.

Replace footnote c in Table 140-7 with the following text:

"Receiver sensitivity (OMAouter) (max) for 100GBASE-DR is informative and is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity (OMAouter) (max) for 100GBASE-FR1 and 100GBASE-LR1 is defined for a reference transmitter with a value of TECQ up to 1.4 dB. For values of TECQ greater than 1.4 dB, see equation (140-2) for 100GBASE-FR1 and equation (140-3) for 100GBASE-LR1"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This comment proposes:
- in Table 140-7 replace Equations (140-2) and (140-3) with fixed values for SECQ up to 1.4dB, and expand the existing footnote to reference Equations (140-2) and (140-3) for SECQ > 1.4dB

Note: The suggested remedy assumes that comment # 1 is accepted (change the name of SECQ to TECQ) and also that comment # 7 is accepted (making RS normative).

The proposed remedy does not change the "Receiver sensitivity (OMAouter) (max)" values, just the way the information is presented in the table and in the draft. It is not clear that the suggested remedy is an improvement to the readability of the draft and it would be different to what was done for other PMDs (including 100GBASE-DR in the same clause).

For task force discussion.

Cl **140** *SC* **140.6.2** *P* **42** *L* **47** # 6

Cole, Chris II-VI

Comment Type **E** *Comment Status* **D**

DR name constrasts with FR1 and LR1 names

SuggestedRemedy

Add g footnote which states: "100BASE-DR to 100GBASE-DR1 name change will be considered in future Maintenance Project"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The suggested remedy is out of scope for this project.

Cl **140** *SC* **140.7.9** *P* **43** *L* **46** # 7

Cole, Chris II-VI

Comment Type **T** *Comment Status* **D** *RS normative*

Make Receiver Sensitivity (RS) a normative spec for both 100GBASE-FR1 and 100GBASE-LR1 (Note cannot make similar change for 100GBASE-DR at this point in time as it is out of scope).

SuggestedRemedy

Make the following changes to this section.

Change the sentence on page 43 and line 50 from:
"Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ..."
to:
"Receiver sensitivity for 100GBASE-DR is informative and is defined for a transmitter with a value of SECQ..."

Change the sentence on page 44 and line 1 from:
"Receiver sensitivity for 100GBASE-FR1 should meet Equation (140–2), which is illustrated in
Figure 140–5."
to:
"Receiver sensitivity for 100GBASE-FR1 is defined for a transmitter with a value of TECQ up to 3.4 dB. Receiver sensitivity should meet Equation (140–2), which is illustrated in Figure 140-5"

Change the sentence on page 44 and line 6 from:
"Receiver sensitivity for 100GBASE-LR1 should meet Equation (140–3), which is illustrated in
Figure 140–5."
to:
"Receiver sensitivity for 100GBASE-LR1 is defined for a transmitter with a value of TECQ up to 3.4 dB. Receiver sensitivity should meet Equation (140–3), which is illustrated in Figure 140-5"

Change the sentence on page 44 and line 16 from:
"The normative requirement for receivers is stressed receiver sensitivity"
to:
"The normative requirement for the 100GBASE-DR receiver is stressed receiver sensitivity. The normative requirement for the 100GBASE-FR1 and 100GBASE-LR1 receivers is both recevier sensitivity and stressed receiver sensitivity."

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This comment proposes making Receiver Sensitivity (RS) a normative specification for 100GBASE-FR1 and -LR1.

Note: The suggested remedy assumes that comment # 1 is accepted (change the name of

SECQ to TECQ).

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

Task force consensus is needed before changing receiver sensitivity from informative to normative as this represents a substantial change to the current methodology used for all optical PMD specifications that include stressed sensitivity.

For task force discussion.

Cl **140** *SC* **140.10** *P* **49** *L* **34** # 16

Dawe, Piers Mellanox

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

There is guidance for interoperation between 100GBASE-LR1 and 100GBASE-DR, and between 100GBASE-LR1 and 100GBASE-FR1, but not between 100GBASE-FR1 and 100GBASE-FR1.

SuggestedRemedy

Even if there are no special requirements, add the subclause and say what the situation is.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The commenter may have intended to say "but not between 100GBASE-FR1 and 100GBASE-DR". If that is the case, then the paragraph at line 16 on page 40 already covers the requirements.

Cl **151** *SC* **151** *P* **53** *L* **1** # 8

Cole, Chris II-VI

Comment Type **E** *Comment Status* **D** *SECQ naming*

There is a more descriptive name for SECQ

SuggestedRemedy

Replace SECQ with TECQ throughout Sub-clause 151

Proposed Response *Response Status* **W**

PROPOSED REJECT.

SECQ is a characteristic of a stressed test signal used to test the SRS of a receiver. SECQ is defined in 121.8.9.1 as "Stressed eye closure for PAM4 (SECQ)". It is used in numerous places throughout the standard.

TECQ is a characteristic of a transmitter, and is defined in 151.8.6 as "Transmitter eye closure for PAM4 (TECQ)".

It's not technically correct to say that TECQ is the same thing as SECQ in the context of receiver testing.

Cl **151** *SC* **151.7.1** *P* **61** *L* **30** # 9

Cole, Chris II-VI

Comment Type **T** *Comment Status* **D** *TDECQ-10logCeq*

TDECQ -10log10(Ceq) is a problematic spec.

SuggestedRemedy

Remove TDECQ -10log10(Ceq), Replace with TECQ, values 3.0 and 2.5 dB for FR4 and LR4-6, respectively

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

The proposed remedy includes two changes to Table 151-7:
-removing TDECQ-10log10(Ceq) for 400GBASE-FR4 and -LR4-6;
-adding TECQ to the table with values for 400GBASE-FR4 and -LR4-6.

There is no clear consensus to remove TDECQ-10log10(Ceq).

There is no clear consensus that adding TECQ as separate parameter is necessary.

Task force consensus is needed before making these substantial changes.

For task force discussion.

Cl **151** *SC* **151.7.1** *P* **61** *L* **30** # 18

Dawe, Piers Mellanox

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

cole_3cu_adhoc_121119 proposes an overshoot measurement, overlooks the spec in place that limits ~average overshoot, and proposes removing TDECQ-10log10(Ceq), which is there to protect against bad signals (with too much noise or nonlinear distortion), not overshoot.

SuggestedRemedy

Find out what if anything apart from the typical overshoot is a problem for receivers. E.g. peak-peak swing? If the current draft spec does allow too much overshoot, in 151.8.5.4, change the minimum for the largest magnitude tap coefficient from 0.8 to e.g. 0.85 or 0.9. Do not remove the TDECQ-10log10(Ceq) spec, which has a different purpose.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The suggested remedy does not propose a clear change to the draft, or provide evidence that a change is necessary.

Cl **151** *SC* **151.7.1** *P* **61** *L* **32** # 17

Dawe, Piers — Mellanox

Comment Type **TR** *Comment Status* **D** *TDECQ-TECQ*

There is an entry for TDECQ – TECQ, or chromatic dispersion penalty. How does it concern the receiver whether the penalty came from the transmitter or from chromatic dispersion? The considerations in this spec are not the same as in an ITU-T spec

SuggestedRemedy

Explain why this new spec is needed or remove the row, 151.8.6, and associated text.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The is no proposed changed to the draft.

At the November 2019 task force meeting it was agreed to add TDECQ-TECQ as a replacement for TDECQ-SECQ for 400GBASE-LR4-6, and to use a value of 2.5 dB (comment #7).

The final response to comment #7 against D1.0 at the November 2019 task force meeting is included below for reference:

****
A straw poll was taken and there was consensus to make the change.
Straw poll:
For 400GBASE-LR4-6, I would prefer to:
A) Remove the TDECQ - SECQ parameter
B) Replace the TBD with 2.5dB as the value for TDECQ-SECQ
A: 9 B: 16

Change parameter name of "TDECQ - SECQ" to "TDECQ - TECQ" in Table 151-7, and replace TBD by 2.5.

Introduce definition of TECQ with editorial license as below:

Title: Transmitter eye closure for PAM4 (TECQ):

The TECQ of each lane shall be measured using the methods specified for TDECQ in 121.8.5, except that the test fiber is not used.
****

Cl **151** *SC* **151.7.1** *P* **61** *L* **32** # 10

Cole, Chris — II-VI

Comment Type **T** *Comment Status* **D** *TDECQ-TECQ*

There is no value for TDECQ - TECQ for FR4

SuggestedRemedy

Enter 2.0dB for FR4

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

There is no clear consensus that adding TDECQ-TECQ is necessary for PMDs with low chromatic dispersion penalties, such as 400GBASE-FR4.

If the task force determines that it is helpful to specify a limit for TDECQ-TECQ for 400GBASE-FR4 then consensus is also needed on the value.

For task force discussion.

Cl **151** *SC* **151.7.1** *P* **61** *L* **36** # 11

Cole, Chris — II-VI

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

There is no fast corner limit

SuggestedRemedy

Add Transmitter over/under-shoot (max) spec with 12% value for both FR4 and LR4-6.

Add c footnote for both transition time and new spec wich states:
"Using NRZ test pattern; defined for transition, over-shoot in 120.5.11.2.3, 120.5.11.2.4, respectively"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See response to comment #3.

Cl **151** *SC* **151.7.2** *P* **62** *L* **29** # 12

Cole, Chris II-VI

Comment Type **T** *Comment Status* **D** *RS equations*

Equation use in spec. table is cumbersome. Make Receiver Sensitivity (RS) a normative spec.

SuggestedRemedy

Replace equations with -4.6 and -6.8 dBm value for FR4 and LR4-6, respecitvely.

Replace footnote c in Table 151-8 with the following text:

"Receiver sensitivity (OMAouter), each lane (max) is defined for a reference transmitter with a value of TECQ up to 1.4 dB. For TECQ greater than 1.4 dB, see equation (151-1) for 400GBASE-FR4 and equation (151-2) for 400GBASE-LR4-6."

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This comment proposes:
- in Table 151-8 replace Equations (151-1) and (151-2) with fixed values for SECQ up to 1.4dB, and update the existing footnote to reference Equations (151-1) and (151-2) for SECQ > 1.4dB
- Note: The suggested remedy assumes that comment # 8 is accepted (change the name of SECQ to TECQ) and also that comment # 13 is accepted (making RS normative).

The proposed remedy does not change the "Receiver sensitivity (OMAouter) (max)" values, just the way the information is presented in the table and in the draft. It is not clear that the suggested remedy is an improvement to the draft and would be different to what was done for other PMDs.

For task force discussion.

See also comment #5.

Cl **151** *SC* **151.8.10** *P* **68** *L* **34** # 13

Cole, Chris II-VI

Comment Type **T** *Comment Status* **D** *RS normative*

Make Receiver Sensitivity (RS) a normative spec for both 400GBASE-FR4 and 400GBASE-LR4-6.

SuggestedRemedy

Replace the sentence:
"For 400GBASE-FR4, receiver sensitivity is informative and is defined for a transmitter with a value of
SECQ up to 3.4 dB."
with:
"For 400GBASE-FR4, receiver sensitivity is defined for a transmitter with a value of TECQ up to 3.4 dB."

Replace the sentence:
"For 400GBASE-LR4-6, receiver sensitivity is informative and is defined for a transmitter with a value of
SECQ up to 3.5 dB."
with:
"For 400GBASE-LR4-6, receiver sensitivity is defined for a transmitter with a value of TECQ up to 3.5 dB."

Replace the sentence on page 69 and laine 28:
"The normative requirement for receivers is stressed receiver sensitivity."
with:
"The normative requirement for receivers is receiver sensitivity and stressed receiver sensitivity and

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This comment proposes making Receiver Sensitivity (RS) a normative specification for 400GBASE-FR4 and -LR4-6.

Note: The suggested remedy assumes that comment # 8 is accepted (change the name of SECQ to TECQ).

This was presented at the Dec 11th ad hoc meeting in presentation:
http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/cole_3cu_adhoc_121119.pdf.

Task force consensus is needed before changing receiver sensitivity from informative to normative as this represents a substantial change to the current methodology used for all optical PMD specifications that include stressed sensitivity.

For task force discussion.

See also comment #7.