

Comment Resolution Working Document

Clause 1 (definitions and acronyms)

Comments: 6

Clause 136 (electrical)

Presentation: dudek_3cd_01_0718 "Inter-operability risk for 50BASE-CR with Draft 3.3 ERL specifications"

Comments: 18

Clauses 138, 139, 140 (optical)

TDECQ methodology, rise/fall time

Presentation: lecheminant_01 - "Transition time measurement using the ~~SSPRQ~~ pattern (comment r03-44)"

TDECQ methodology, rise and fall time [44, 45, 46], [33, 38, 41]

TDECQ value for SMF/MMF

Presentation: tamura_3cd_01b_0718 - "Concerning Comments r03-21, -22, -42, -43 On TDECQ"

TDECQ value, SMF [21, 43, 22, 42]

TDECQ value, MMF 27

TDECQ general methodology and SECQ Methodology

Presentation: dawe_3cd_01_0718 - "Completing the family of TDECQ related specifications"

Presentation: mazzini_3cd_01_0718 - "Achieving closure on TDECQ/SRS"

Presentation: king_3cd_02_0718 - "TDECQ map and interpretation"

TDECQ methodology, general: [30,40], 36, [26,24]

SECQ methodology, SRS 39, 35, 7

TDECQ methodology, filter definition

Presentation: king_3cd_01_0718 - "SRS test source calibration"

TDECQ methodology, filter definition: [9,29]

TDECQ methodology, equalizer

Presentation: sun_3cd_01_0718 - "TDECQ EQ Constraints (updated)"

TDECQ methodology, equalizer 32, 31, 37, 47

Power Levels

Presentation: dawe_3cd_01_0718 - "Restoring the optical power levels for the 50GBASE-SR family"

Power levels 25

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TDECQ methodology, rise/fall time

Comments r03-44, r03-45, r03-46

Presentation: lecheminant_3cd_01_0715

Updated proposal per email thread.

The transmitter transition time of each lane shall be within the limits given in Table 138–8 if measured using **a** test pattern specified for transmitter transition time in Table 138–12.

Transmitter transition time is defined as the slower of the time interval of the transition from 20% of OMA_{outer} to 80% of OMA_{outer}, or from 80% of OMA_{outer} to 20% of OMA_{outer}, for the rising and falling edges respectively, as measured through an optical to electrical converter (O/E) and oscilloscope with a combined frequency response of a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 13.28125 GHz. Compensation may be made for any deviation from an ideal fourth-order Bessel-Thomson response.

The 0% level and the 100% level are P0 and P3 as defined by the OMA_{outer} measurement procedure (see 138.8.4), with the exception that the square wave test pattern **can be** used. **When the SSPRQ pattern is used, the rising edge used for the measurement is that within the 00000333333 symbol sequence and the falling edge is that within the 33333000000 symbol sequence.**

Used the above within the response. No need to refer back to this. Also, noted consequential changes to pattern tables.

Captured all in comment r03-44.

Comments 45 and 46 point back to 44.

Comment 33, 38, and 41 point back to 44 and provided additional response.

TDECQ value for SMF/MMF

~~Presentation: Concerning Comments r03-21, -22, -42, -43 On TDECQ (updated)~~

~~TDECQ value, SMF [21, 43, 22, 42]~~

~~TDECQ value, MMF 27~~

TDECQ value for 50GBASE-FR

Change from 2.8 dB to 3.0 dB.

Consensus to make this change.

TDECQ value for 50GBASE-LR

Change from 3 dB to 3.2 dB.

Consensus to make this change.

TDECQ value for 100GBASE-DR

Change from 3 dB to 3.4 dB.

Consensus to make this change.

TDECQ value for 50GBASE-SR, 100GBASE-SR2, 200GBASE-SR4

Change from 4.5 dB to 4 dB.

No consensus to make any changes.

TDECQ general methodology and SECQ Methodology

~~Presentation: dawe_01 - Completing the family of TDECQ-related specifications (updated)~~

~~Presentation: mazzini_01 - Achieving closure on TDECQ/SRS (updated)~~

~~Presentation: king_02 - TDECQ map and interpretation~~

~~TDECQ methodology, general: [30,40], 36, [26,24]~~

~~SECQ methodology, SRS 39, 35, 7~~

TDECQ cutting off upper left region

SECQ TDECQ coverage

From mazzini, for 138?, 139?, 140?

- For SRS, remove requirement for SECQ to be at least half due to low-pass filter
- For TDECQ, Add new constraint TDECQ: $TDECQ - 10 \log_{10}(CEQ) \leq TDECQ (max)$

From Dawe

- For Clause 140, Same as Mazzini, plus

- For 138, 139, 140. Two SRS test points rather than one. [note that the draft current defines a large range where the receiver may be tested; not just one point]
- For Clause 140, Limit OMA_{outer} minus TDECQ₂ > -5.9 dBm

$$TDECQ_2 = 10 \cdot \log_{10}(OMA_{out}/(6 \cdot Q_t \cdot R)) + \max(10 \cdot \log_{10}(C_{eq}), 0)$$

[park this for now]

From King

- No need to limit TDECQ as proposed by Mazzini
- No changes to SECQ specification

Discussion #1:

Add new constraint for TDECQ: $TDECQ - 10 \log_{10}(CEQ) \leq TDECQ(\max)$

TDECQ (max) is 3, 3.2, and 3.4 for 50GBASE-FR, 50GBASE-LR, and 100BASE-DR

TDECQ (max) is 4.5 dB for 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4

Straw Poll #3

For 50GBASE-FR, 50GBASE-LR, and 100GBASE-DR I support adding the constraint

$TDECQ - 10 \log_{10}(CEQ) \leq TDECQ(\max)$

Yes: 21

No: 13

Straw Poll #4

For 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4 I support adding the constraint

$TDECQ - 10 \log_{10}(CEQ) \leq TDECQ(\max)$

Yes: 18

No: 10

Discussion #2

For SRS, remove requirement for SECQ to be at least half due to low-pass filter

Straw Poll #5

For 50GBASE-FR, 50GBASE-LR, 100GBASE-DR, 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4 I support removing constraint for SECQ dB to be at least half due to ISI from the low-pass filter and E/O converter.

Yes: $4+15+4 = 23$

No: 0

Suggestion from Pete Anslow:

<start of Pete's proposal>

In the newly approved base standard "121.8.9.2 Stressed receiver conformance test signal characteristics and calibration" contains:

NOTE—A compliant PMD receiver is expected to meet the stressed receiver sensitivity requirements with a calibrated conformance test signal regardless of the proportion (as long as it is above half) of the dB value of the SECQ that is due to the frequency response of the combination of the low-pass filter and the E/O converter.

Since this is referenced by:

138.8.10 Stressed receiver sensitivity

139.7.10.2 Stressed receiver conformance test signal characteristics and calibration

140.7.7.10 Stressed receiver sensitivity

The principle is already established that the receiver has to meet the SRS requirement regardless of the proportion (as long as it is above half) of the dB value of the SECQ that is due to filtering.

Consequently, if it is desired to remove the constraint that half of the dB value comes from filtering, then I think that the changes required would be:

138.8.10

Add an extra exception:

— The restriction that at least half of the dB value of the SECQ is due to the frequency response of the combination of the low-pass filter and the E/O converter in 121.8.9.1 and 121.8.9.2 does not apply.

139.7.10.1

Delete:

"The combination of the low-pass filter and the E/O converter should have a frequency response that results in at least half of the dB value of the stressed eye closure (SECQ) specified in Table 139–7 for 50GBASE-FR and 50GBASE-LR before the sinusoidal and Gaussian noise terms are added, according to the methods specified in 139.7.10.2."

139.7.10.2

Add an extra exception:

— The restriction that at least half of the dB value of the SECQ is due to the frequency response of the combination of the low-pass filter and the E/O converter does not apply.

140.7.10

Add an extra exception:

— The restriction that at least half of the dB value of the SECQ is due to the frequency response of the combination of the low-pass filter and the E/O converter in 121.8.9.1 and 121.8.9.2 does not apply.

<end of Pete's proposal>

Need to also address the modification to the TDECQ limit based on CEQ.

Pete Anslow put together a late presentation show how the changes above to TDECQ limits and SRS calibration would be implemented.

http://www.ieee802.org/3/cd/public/July18/anslow_3cd_01_0718.pdf

We will use this as a basis for closing the comment.

TDECQ methodology, equalizer

Presentation: sun_3cd_01_0718 - TDECQ EQ Constraints (updated)

TDECQ methodology, equalizer SMF: 37, 47

TDECQ methodology, equalizer MMF: 32, 31

Reviewed and discussed the presentation.

139.7.5.4 currently includes the following:

“Tap 1, tap 2, or tap 3, has the largest magnitude tap coefficient, which is constrained to be at least 0.8.”

For comment r03-47, the proposal is to add:

“For 50GBASE-FR, Tap 1 or tap 2 has the largest magnitude tap coefficient.” [Note that the original sentence would have to be prefixed with “For 50GBASE-LR”.]

For comment r03-37, the proposal is to change change "Tap 1, tap 2, or tap 3, has" to "Tap 1 or tap 2 has". [This would affect both FR and LR.]

Straw Poll #6.

For 50GBASE-FR, I support constraining the largest magnitude tap coefficient to Tap 1 or tap 2.

Yes: 4

No: 19

Straw Poll #7

For 50GBASE-LR, I support constraining the largest magnitude tap coefficient to Tap 1 or tap 2.

Yes: 0
No: 19

138.8.5.1 has the following sentence:

“The sum of the equalizer tap coefficients is equal to 1. Tap 1, tap 2, or tap 3, has the largest magnitude tap coefficient, which is constrained to be at least 0.8.”

Straw Poll #8

For 50GBASE-SR, 100GBASE-SR2, and 200GBASE-SR4, I support constraining the largest magnitude tap coefficient to Tap 1 or tap 2.

Yes: 1
No: 16

[Monday Meeting ended here.]

Power Levels

~~Presentation: dawe_3cd_02_0718 -- Restoring the optical power levels for the 50GBASE-SR family~~

~~Power levels-25~~

The presentation was reviewed.

http://www.ieee802.org/3/cd/public/July18/dawe_3cd_02_0718.pdf

The suggested remedy for comment r03-25 requests the following changes:

“Increase OMA-TDECQ from -5.9 to -5.5 dBm. Increase SRS OMA from -3.4 back to -3 dBm (as in D1.0 and D3.2). Increase the other receiver sensitivity, equation 138-1, from max(-6.5, SECQ - 7.9) to max(-6.1, SECQ - 7.5).”

Straw Poll #9

I would support implementing the changes proposed in the suggested remedy for comment r03-25.

Yes: 3
No: 12

TDECQ methodology, filter definition

~~Presentation: king_01 -- SRS test source calibration~~

~~TDECQ methodology, filter definition: [9,29]~~

The proposal for changes to the SECQ measurement are outlined on slide 11 of

http://www.ieee802.org/3/cd/public/July18/king_3cd_01_0718.pdf.

There was no opposition to implementing the above relating to SECQ.

There is concern (per comment r03-9) that the same filter should also be used for transmitter TDECQ and rise/fall time.

Straw poll #10

I support specifying the measurement filter for receiver SECQ, transmitter TDECQ, and transmitter rise/fall time based on king_3cd_01a_0718 slide 11.

Yes: 27

No: 2

The filter specified for TDECQ for MMF must be scaled differently than for the SMF PMDs. The scaling should be 1.5×22.4 GHz instead of 1.5×26.5625 GHz.

After some discussion the filter from slide 11 was adjusted to allow for some error in the filter to the following (reducing -25 to -24):

Modified proposal:

Change the SRS test source measurement bandwidth definition in 138.8.10 to:

“This frequency response should be followed to at least 1.5×26.5625 GHz and at frequencies above 1.5×26.5625 GHz the response should not exceed -24 dB.”

Change the SRS test source measurement bandwidth definition in 139.7.10.2 to:

“The filter response of the combination of the O/E and the oscilloscope used for the SECQ measurement should be a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 13.28125 GHz to at least 1.5×26.5625 GHz and at frequencies above 1.5×26.5625 GHz the response should not exceed -24 dB.”

Change the SRS test source measurement bandwidth definition in 140.7.10 to:

“The filter response of the combination of the O/E and the oscilloscope used for the SECQ measurement should be a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 26.5625 GHz to at least 1.3×53.125 GHz and at frequencies above 1.3×53.125 GHz the response should not exceed -20 dB.”

Modify the filter definitions for TDECQ and rise/fall time measurements to match those defined above for SRS test source measurement with one exception as follows.

For the MMF transmitter TDECQ measurement in Clause 138 the filter frequency point would be 1.5×22.4 GHz rather than 1.5×26.5625 GHz.

[copied the above to comment r03-9 for resolution]

General Test

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[Comment closed.]

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[Comment closed.]