

P802.3cu D1.0 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength 1st Task Force review com

CI 0 SC 0 P0 L0 # 17

Nicholl, Gary

Cisco

Comment Type E Comment Status A

Several people have submitted minor editorial comments outside of the official comment review process.

*SuggestedRemedy*

Allow the editorial team to address the received editorial comments with editorial licence.

Response Response Status C

ACCEPT.

CI 1 SC 1.4 P17 L26 # 20

Cole, Chris

II-VI

Comment Type T Comment Status A *nomeclature*

LR in 400GBASE-LR4 has been associated with 10km reach at recent rates

*SuggestedRemedy*

Replace every instance of 400GBASE-LR4 throughout the document with 400GBASE-LR4-6

Response Response Status C

ACCEPT IN PRINCIPLE.

Adopt 400GBASE-LR4-6 per cole\_3cu\_01a\_1119.

Motion #3 was made and passed (Y/N/A: 33/0/2)

CI 30 SC 30.5.1.1.2 P19 L44 # 21

Trowbridge, Steve

Nokia

Comment Type E Comment Status A

The normal order seems to be increasing MAC rate, then increasing reach for PHYs of the same MAC rate, then decreasing lane count for PHYs with the same reach

*SuggestedRemedy*

As the reach of 400GBASE-LR4 is 6km, it should go before rather than after 400GBASE-LR8 which has 10km reach

Response Response Status C

ACCEPT IN PRINCIPLE.

Two comments were received on this topic (#21 and #22).

During the 802.3cu TF meeting in Hawaii, Nov 2019 it was agreed to change the name of 400GBASE-LR4 to 400GBASE-LR4-6 (Motion #3).

Change the order of 400GBASE-LR4-6 in the various lists and tables throughout the draft with editorial license (e.g. Clause 30, 78 and 116), to reflect the reduction in reach from 10km to 6km, i.e. after the 2km PMDs and before the 10km PMDs.

CI 116 SC 116.1.4 P33 L3 # 16

Nicholl, Gary

Cisco

Comment Type E Comment Status A *bucket*

Need to fill in TBD

*SuggestedRemedy*

Replace TBD with "IEEE Std 802.3cm-20xx"

Response Response Status C

ACCEPT.

CI 116 SC 116.1.4 P33 L12 # 22  
 Trowbridge, Steve Nokia  
 Comment Type E Comment Status A bucket  
 The normal order seems to be increasing MAC rate, then increasing reach for PHYs of the same MAC rate, then decreasing lane count for PHYs with the same reach  
 SuggestedRemedy  
 As the reach of 400GBASE-LR4 is 6km, it should go before rather than after the 400GBASE-LR8 column which has 10km reach  
 Response Response Status C  
 ACCEPT IN PRINCIPLE.  
 See response to comment #21.

CI 140 SC 140.6 P41 L # 10  
 Mazzini, Marco Cisco  
 Comment Type TR Comment Status A Tx avg min  
 Relax 100GBASE-FR1 transmitter Average launch power (min)  
 SuggestedRemedy  
 Into mmazzini\_3cu\_adhoc\_101519, a change 100GBASE-LR1 transmitter Average Launch power (min) has been proposed, to allow higher transmitter's extinction ratio and align with 100GBASE-DR minimum power requirement.  
 Response Response Status C  
 ACCEPT IN PRINCIPLE.  
 See response to comment #9.

CI 140 SC 140.6.2 P L # 5  
 Stassar, Peter Huawei  
 Comment Type TR Comment Status A LR1 FR1 interop  
 As clarified in  
[http://www.ieee802.org/3/cu/public/cu\\_adhoc/cu\\_archive/stassar\\_3cu\\_adhoc\\_102319.pdf](http://www.ieee802.org/3/cu/public/cu_adhoc/cu_archive/stassar_3cu_adhoc_102319.pdf)  
 the maximum average power into the 100GBASE-FR1 receiver is actually 0.5 dB too high for the 100GBASE-FR1 application. For interworking with a 100GBASE-LR1 transmitter the minimum loss in the link needs to be 0.3 dB. In order to meet an engineering desire to have a minimum loss of 0 dB in case of interworking this maximum power, also called overload, should be raised another 0.3 dB which may be technically challenging and impacting cost. Unless it will be demonstrated that raising the overload by 0.3 dB will not impact cost, it is proposed to reduced the overload by 0.5 dB, as well as the damage threshold and increase the minimum loss for interworking between an LR1 transmitter and an FR1 receiver to 0.8 dB.

SuggestedRemedy  
 In Table 140-7:  
 Lower the 100GBASE-FR1 Receiver Average receive power (max) by 0.5dB to 4 dBm.  
 Lower the 100GBASE-FR1 damage threshold by 0.5 dB to 5dBm.  
 In Table 140-16:  
 Increase the 100GBASE-LR1 transmitter to 100GBASE-FR1 receiver minimum loss from 0.3 dB to 0.8 dB.  
 Response Response Status C  
 ACCEPT IN PRINCIPLE.  
 A straw poll was taken and the consensus was to accept the proposed remedy.  
 In Table 140-7 for 100GBASE-FR1:  
 Change the Damage threshold value from 5.5 dBm to 5 dBm.  
 Change Average receive power (max) from 4.5dBm to 4 dBm.  
 Change Receive power (OMAouter) (max) from 4.7dBm to 4.2 dBm.  
 In Table 140-16 increase the 100GBASE-LR1 transmitter to 100GBASE-FR1 receiver minimum loss from 0.3 dB to 0.8 dB.

CI 140 SC 140.10b P L # 6

Stassar, Peter Huawei

Comment Type TR Comment Status A LR1 FR1 interop

When connecting 100GBASE-LR1 optics on one side of the link to 100GBASE-FR1 optics on the other side of the link, the link loss can be larger than the maximum of 4 dB for 100GBASE-FR1, without increasing the maximum distance of 2 km. In the link from an LR1 Tx to an FR1 Rx the transmitter power is 1.2 dB higher, allowing 5.2 dB loss in the link instead of 4 dB.

In the other direction from an FR1 Tx to an LR1 Rs the receiver is 1.6 dB more sensitive. Therefore the link can tolerate a maximum loss of 5.6 dB instead of 4 dB.

**SuggestedRemedy**

In Table 140-16:  
For the "100GBASE-LR1 transmitter to 100GBASE-FR1 receiver" direction increase the maximum loss from 4 to 5.2 dB.  
For the "100GBASE-FR1 transmitter to 100GBASE-LR1 receiver" direction increase the maximum loss from 4 to 5.6 dB.

Response Response Status C

ACCEPT IN PRINCIPLE.

Values change due to accepted response to comment #5 and #9.

In Table 140-16:  
Change the maximum loss values to 4.9 dB in the LR1 to FR1 direction, and to 5.1 dB in the FR1 to LR1 direction.

Additionally, in Table 140-15:  
Change the maximum loss values to 3.9 dB in the LR1 to DR direction and to 4.5 dB in the DR to LR1 direction.

CI 140 SC 140.10b P49 L21 # 14

Mazzini, Marco Cisco

Comment Type TR Comment Status R LR1 FR1 interop

Remove 'Attenuators may be used to achieve the required losses'.

**SuggestedRemedy**

Into mmazzini\_3cu\_adhoc\_101519, a change into Table 140-7 was proposed, to align 100GBASE-FR1 to 100GBASE-LR1 and avoid the usage of an external attenuator of 0.3dB value.

Response Response Status C

REJECT.

See reponse to comment #5.

CI 140 SC Table 140-6, 140-7 P41 L # 9

Mazzini, Marco Cisco

Comment Type TR Comment Status A Tx average min

Relax 100GBASE-LR1 transmitter Average launch power (min)

**SuggestedRemedy**

Into mmazzini\_3cu\_adhoc\_101519, change 100GBASE-LR1 transmitter Average Launch power (min), has been proposed, to allow infinite transmitter's extinction ratio.

Response Response Status C

ACCEPT IN PRINCIPLE.

In Table 140-6:  
Change Average launch power (min) for 100GBASE-LR1 from -1.1 dBm to -2 dBm.  
Change Average launch power (min) for 100GBASE-FR1 from -2.4dBm to -2.9 dBm.

In Table 140-7:  
Change Average receive power (min) for 100GBASE-FR1 from -6.4dBm to -6.9 dBm  
Change Average receive power (min) for 100GBASE-LR1 from -7.4dBm to -8.3 dBm.

CI 140 SC Table 140-6, 140-7, 140 P41 L # 8

Mazzini, Marco Cisco

Comment Type TR Comment Status R DGD penalty

Relax 100GBASE-LR1 transmitter characteristics by 0.1dB

**SuggestedRemedy**

Into mmazzini\_3cu\_adhoc\_101519, a change of 0.1dB of 100GBASE-LR1 transmitter characteristics has been proposed, a reduction of 0.1dB of DGD penalty (from 0.3dB to 0.2dB) seems acceptable, given that two different and independent contributions are proposing 0.25dB and 0.2dB penalty.

Response Response Status C

REJECT.

A straw poll was taken.

There was no concensus to make the proposed change.

P802.3cu D1.0 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength 1st Task Force review com

CI 140 SC Table 140-7, Table 140- P41 L # 13  
 Mazzini, Marco Cisco  
 Comment Type TR Comment Status R LR1 FR1 interop  
 Align some 100GBASE-FR1 and LR1 receiver characteristics so to allow compatibility between 100GBASE-FR1 and 100GBASE-LR1.  
 SuggestedRemedy  
 Into mmazzini\_3cu\_adhoc\_101519, a change into Table 140-7 was proposed, to align 100GBASE-FR1 to 100GBASE-LR1 and avoid the usage of an external attenuator of 0.3dB value.  
 Response Response Status C  
 REJECT.  
 See resolution to comment #5

CI 151 SC 151.1 P53 L52 # 3  
 Stassar, Peter Huawei  
 Comment Type E Comment Status A bucket  
 The last paragraph on page 53 seems redundant. It seems to be reused from Clause 122, where there are both 4 lane and 8 lane PMDs. In other PMD clauses where WDM is used for 4 lane PMDs, 87 and 88, an equivalent paragraph has not been inserted.  
 SuggestedRemedy  
 Remove the last paragraph on page 53 in clause 151.1  
 Response Response Status C  
 ACCEPT.

CI 151 SC 151.6 P L # 4  
 Stassar, Peter Huawei  
 Comment Type ER Comment Status A bucket  
 In the text of clause 151.6 no reference is included to the lane assignments of 400GBASE-LR4.  
 SuggestedRemedy  
 Modify the first paragraph of 140.6 to:  
 The wavelength range for each lane of the 400GBASE-FR4 and 400GBASE-LR4 PMDs is defined in Table 151-5. The 400GBASE-FR4 and 400GBASE-LR4 center wavelengths are members of the CWDM wavelength grid defined in ITU-T G.694.2 and are spaced at 20 nm.  
 Response Response Status C  
 ACCEPT.

CI 151 SC 151.7.1 P L # 7  
 Stassar, Peter Huawei  
 Comment Type TR Comment Status A TDECQ-SECQ  
 In Table 151-7 the value for "TDECQ - SECQ" is currently still labelled as TBD, which was agreed at the Indianapolis meeting in September 2019.  
 In line with the considerations in [http://www.ieee802.org/3/cu/public/Sept19/stassar\\_3cu\\_01\\_0919.pdf](http://www.ieee802.org/3/cu/public/Sept19/stassar_3cu_01_0919.pdf) it is proposed to replace "TBD" by "2.5".  
 An upper limit of 2.5 dB for TDECQ - SECQ should not be an overly conservative limit. An associated presentation will be submitted to the November 2019 cu TF meeting.  
 SuggestedRemedy  
 In Table 151-7, for "TDECQ - SECQ", replace TBD by 2.5.

Response Response Status C  
 ACCEPT IN PRINCIPLE.  
 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.

P802.3cu D1.0 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength 1st Task Force review com

CI 151 SC 151.7.1 P61 L20 # 19

Okabe, Ryo Fujitsu Optical Components, Ltd.

Comment Type T Comment Status R withdrawn

This comment is related to Tx OMA and Rx sensitivity. Tx OMA and Rx sensitivity are depicted in the lower figure, simultaneously. Blue and green line show current 6-km spec in IEEE802.3cu and alternative plan for 10-km spec, respectively. Both specs should be discussed and aligned each other.

Though 2.0-dB headroom for Tx max is kept with 6-km spec, on the other hand 10-km spec has only 1.7-dB headroom which is not sufficient for the manufacturing margin and yield. Headroom for 2.0 dB is necessary at least.

SuggestedRemedy

To keep more than 2.0 dB margin for Tx spec, there would be possible solutions as below;  
 1) decrease Tx OMA(min) from +0.2 to -0.1 dB  
 2) increase Tx OMA(max) from 4.4 to 4.7 dB  
 Rx sensitivity should be changed for corresponding the above change.

From a view point of power consumption, option-1) would have benefit of 0.2W/4-lane power saving according to our estimation.  
 Option-2) might lead over load issue for the Rx sensitivity.

In conclusion, FOC would like to propose spec refinement for Tx OMA and Rx sensitivity to decrease by 0.3 dB in order to keep 2.0 dB headroom for Tx OMA spec.

Response Response Status C

REJECT.

This comment was WITHDRAWN by the commenter.

CI 151 SC 151.8.5.2 P66 L37 # 18

Nicholl, Gary Cisco

Comment Type T Comment Status A FR4 dispersion

FR4 dispersion in Table 151-12 is based on slope of 0.093 whereas the LR4 value is based on 0.092. Need to align on 0.092.

SuggestedRemedy

Update FR4 dispersion values in Table 151-12 to be based on a slope of 0.092. Also update positive and negative dispersion values in Table 151-13 for 400GBASE-FR4 to be consistent with a dispersion slope of 0.092.

Response Response Status C

ACCEPT IN PRINCIPLE.

See responses to comments #1 and #2.

CI 151 SC 151.8.5.2 P66 L37 # 1

Kimber, Mark Semtech

Comment Type TR Comment Status A FR4 dispersion

Due to S0 changing in Table 151-14 from 0.093 to 0.092, the dispersion values for FR4 in Table 151-12 need to be updated accordingly.

SuggestedRemedy

In the FR4 dispersion equation change 0.0465 to 0.046 for both minimum and maximum dispersion.

Response Response Status C

ACCEPT.

CI 151 SC 151.10 P73 L34 # 2

Kimber, Mark Semtech

Comment Type TR Comment Status A FR4 dispersion

Due to S0 changing in Table 151-14 from 0.093 to 0.092, the dispersion values for FR4 in Table 151-13 need to be updated accordingly.

SuggestedRemedy

Change FR4 negative (min) dispersion to -11.7 from -11.9. Change FR4 positive (max) dispersion to 6.6 from 6.7.

Response Response Status C

ACCEPT.

CI 151 SC Table 151-7 P61 L # 15

Mazzini, Marco

Cisco

Comment Type TR Comment Status R TDECQ-SECQ

Remove TDECQ-SECQ parameter from Table 151-7

*SuggestedRemedy*

Into mmazzini\_3cu\_adhoc\_102319, the TDECQ-SECQ removal from Table 151-7 was proposed. This new parameter does not give any significant benefit to discriminate bad from good transmitters and add unwanted time and costs. To constraint distortion a reduction of TDECQ-10Log(Ceq) from 3.4dB to 3.3dB for 400GBASE-LR4 is also proposed.

Response Response Status C

REJECT.

A straw poll was taken and there was no 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

CI 151 SC Table 151-7 P61 L # 11

Mazzini, Marco

Cisco

Comment Type TR Comment Status A Tx off power

Relax Average launch power of OFF transmitter from -20 to -15dBm

*SuggestedRemedy*

As proposed into mmazzini\_3cu\_adhoc\_101519, the average power of OFF transmitter can be implemented by laser shout down or by a SiP switch for this technology. As already specified for 100GBASE PMDs, it would be good to relax this value to -15dBm too in consistency with 802.3bs and 802.3cd.

Response Response Status C

ACCEPT IN PRINCIPLE.

Discussion in the TF was that a value of -16dBm for Tx OFF was acceptable for 400GBASE-FR4 and 400GBASE-LR4-6.

Change "Average launch power of OFF transmitter, each lane (max)" in Table 151-7 from -20dBm to -16dBm for both 400GBASE-FR4 and 400GBASE-LR4-6.

CI 151 SC Table 151-7, 151-8, 151 P61 L # 12

Mazzini, Marco

Cisco

Comment Type TR Comment Status R DGD penalty

Relax 400GBASE-LR4 transmitter characteristics by 0.1dB

*SuggestedRemedy*

Into mmazzini\_3cu\_adhoc\_101519, a change of 0.1dB of 100GBASE-LR4 transmitter characteristics has been proposed, a reduction of 0.1dB of DGD penalty (from 0.3dB to 0.2dB) seems acceptable, given that two different and independent contributions are forecasting 0.2dB and 0.1dB penalty for a link of 6kms with 4ps DGD.

Response Response Status C

REJECT.

See response to comment #8.