Clause 163, 120F Comment Resolution

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Comments to be Discussed

Category	Comment ID	Notes
~~Test fixture~~	~~64, 227, [65, 161]~~	Done
~~Vf/vpeak/erl~~	~~[13, 5], [61, 83, 84]~~	Done
RITT Np	[279, li_3ck_01_1020.pdf], [280, 86]	For CL163, Annex 120F
RITT	[71, 166, 194], 2, [70 ran_3ck_03_1020, 231], 168	
SNDR	226	
Example Test Fixture	228, 140, [73, 6], [229, 136, 26, 162, 204], 137	

RITT Np for CL163 Comment # 279

Notes: this is Np for RITT

Cl **163** *SC* **163.9.3.3** *P* **182** *L* **3** # 279

Li, Mike Intel

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

Np TBD

SuggestedRemedy

Np = 29, see li_3ck_01_0920

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
The referenced presentation is located here:
https://www.ieee802.org/3/ck/public/20_10/li_3ck_01_1020.pdf
Implement the suggested remedy.
For task force review.

Spec being commented:

e) For the calculation of test channel COM, the following parameters are based on values measured from the test transmitter. The parameter SNR_{TX} is set to the measured value of SNDR with Np = TBD, the parameter R_{LM} is set to the measured value of R_{LM}, and the parameters A_{DD} and σ_{RJ} are calculated from the measured values of J3u and J_{RMS} using Equation (163–2) and Equation (163–3) respectively, where $Q3$ is 3.2905.

RITT Np for 120F Comment [# 280, #86]

Cl **120F** *SC* **120F.3.2.3** *P* **213** *L* **1** # 280

Li, Mike Intel

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

Np TBD

SuggestedRemedy

Np = 11, see li_3ck_01_0920

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
The referenced presentation is here:
https://www.ieee802.org/3/ck/public/20_10/li_3ck_01_1020.pdf
Implement the suggested remedy.
For task force review.

Cl **120F** *SC* **120F.3.2.3** *P* **213** *L* **1** # 86

Brown, Matt Huawei

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

For the SNDR measurement in item e) of receiver interference tolerance test considerations the value for N_p is not set.

SuggestedRemedy

Replace TBD with an appropriate value.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

[Editor's note: Addresses incomplete specification.]
The suggested remedy does not give an actionable proposal.
Resolve using the response to comment #280.

Notes: this is Np for RITT

Spec being commented:

e) For the calculation of test channel COM, the following parameters are based on values measured from the test transmitter. The parameter SNR_{TX} is set to the measured value of SNDR with Np=TBD, the parameter R_{LM} is set to the measured value of R_{LM}, and the parameters A_{DD} and σ_{RJ} are calculated from the measured values of J4u and J_{RMS} using Equation (120D–10), and Equation (120D–11), respectively.

RITT Channel ERL Comment [#71, #166, #194]

Cl **163** *SC* **163.9.3.3** *P* **181** *L* **42** # 71

Ran, Adee Intel

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

In item b, Equation 163-2 is a calculation of A_DD, not related to return loss.

The transmitter's test fixture only has an ERL spec, and that is defined from TP0v towards the DUT. It is not an appropriate ERL for TP5 replica (e.g. has only N=20 UI).

The breakout from the package is typically controlled by the PMD's vendor and is practically part of the DUT. Therefore we should not add ERL specifications for the TP5 replica - they may be irrelevant and even incorrect for a specific implementation.

This is similar to the case of a transmitter's test fixture where ERL is specified toward the DUT, but not from the DUT toward TP0v.

Instead, the test channel's ERL should be specified to meet the ERL specifications in 163.10.3.

Also applies in 120F.3.2.3 item b which has "The return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the return loss specifications in 163.9.2.1" - but there are no return loss specifications in 163.9.2.1 anymore.

SuggestedRemedy

Replace item b with the following:

The return loss of the test channel measured at TP5a towards TPt meets the requirements in 163.10.3.

Apply similar change in 120F.3.2.3 with the reference to requirements in 120F.4.3 instead.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Replace item b with "The return loss of the test channel measured at TP5a towards TPt meets the requirements in 163.10.3."
CC: 163, 120F

References:

163.10.3 Channel ERL

ERL of the channel at TP0 and at TP5 are computed using the procedure in 93A.5 with the values in Table 163–12. Parameters that do not appear in Table 163–12 take values from Table 163–11.

Channel ERL at TP0 and at TP5 shall be greater than or equal to TBD dB.

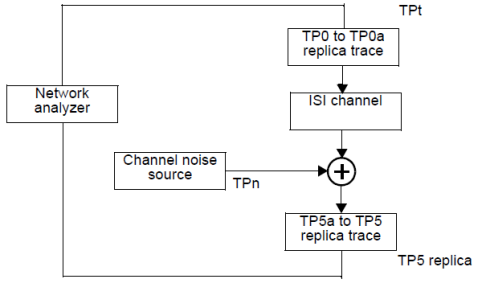

Figure 93C–4—Interference tolerance channel s-parameter test setup

Spec being commented:

b) The return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the requirements of Equation (163–2).

RITT Channel ERL Comment [#71, #166, #194] Contd.

Cl **163** *SC* **163.9.3.3** *P* **181** *L* **42** # 166

Dudek, Mike Marvell.

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

Equation 163-2 is nothing to do with return loss. Also it would be better to use ERLas the parameter.

SuggestedRemedy

Change to "The ERL of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the
requirements for ERL in 163.9.2.1.2 with the exception that the length of the reflection signal N is 3500 UI"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #71

Cl **163** *SC* **163.9.3.3** *P* **181** *L* **42** # 194

Wu, Mau-Lin MediaTek

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

The reference equation, Equation (163-2), is not correct. It shall be the original equation (equation 163-2) in D1p2 and be removed from D1p3.

SuggestedRemedy

Copy Equation 163-2 in D1p2 & related description to D1p3. Put them in the appropriate location & correct the referred Equation ID.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #71

Resolve using response to comment #71

RITT RSS_DFE4 Comment #2

Cl **120F** *SC* **120F.3.2.3** *P* **213** *L* **31** # 2

Mellitz, Richard Samtec

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

DFE4_RSS > 0.05 may be difficult to achieve with test equipment. The published C2C have a DFE4_RSS range between 0.03 V and 0.065 with a mean of 0.047 .

SuggestedRemedy

Since these represent design expectation set DFE4_RSS to 0.03 which would be achievable in test setups.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement the suggested remedy.
For task force discussion.

Spec being commented:

Table 120F–5—Receiver interference tolerance parameters

Parameter	Test 1 (low loss)			Test 2 (high loss)			Units
	Min	Max	Target	Min	Max	Target	
FEC Symbol error ratio[a]	—	10^{-4}	—	—	10^{-4}	—	—
Insertion loss at 26.5625 GHz[b]	9.5	10.5	—	19.5	20.5	—	dB
RSS_DFE4[c]	0.05	—	—	0.05	—	—	—
COM including effects of broadband noise[d]	—	—	3	—	—	3	dB

RITT JTOL TX Setup Comment [#70, #231]

CI **163** SC **163.9.3.3** P **181** L **34** # 70

Ran, Adee Intel

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

The exception that "transmitter equalization is configured by management..." is taekn from the AUI-C2C (Annex 120D) which does not have a training protocol.

This clause is for the KR PMD that does have a training protocol defined, so this exception is out of place. The procedure in Annex 93C should be used as is.

SuggestedRemedy

Delete the sendence "with the exception that transmitter equalization is configured by management (see 120D.3.2.3) to the settings that provide the lowest FEC symbol error ratio".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

CI **163** SC **163.9.3.3** P **181** L **35** # 231

Dawe, Piers Nvidia

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

This isn't right: "transmitter equalization is configured by management (see 120D.3.2.3) to the settings that provide the lowest FEC symbol error ratio". It's the receiver's responsibility to choose an adequate transmitter equalization setting. Further, the transmitter could be a test instrument that doesn't do 802.3 management. What has 120D.3.2.3 got to do with it? Was this text copied from a C2C clause?

SuggestedRemedy

Correct the text. The transmitter equalization is what the receiver asks for after it's had a chance to train, or a default if it doesn't ask for anything in particular.
Same for 163.9.3.4 Receiver jitter tolerance.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve the issue with 163.9.3.3 using the response to comment #70.
For 163.9.3.4, insert an exception as follows:
"a) The transmitter coefficients are set according to the procedure in 93C.2."
For task force review.

Spec being commented:

163.9.3.3 Receiver interference tolerance

Receiver interference tolerance is defined by the procedure in Annex 93C with the exception that transmitter equalization is configured by management (see 120D.3.2.3) to the settings that provide the lowest FEC symbol error ratio. The receiver on each lane shall meet the FEC symbol error ratio requirement with

163.9.3.4 Receiver jitter tolerance

Receiver jitter tolerance is verified for each pair of jitter frequency and peak-to-peak amplitude values listed in Table 162–15. The test setup shown in Figure 93–12, or its equivalent, is used. The test channel meets the insertion loss requirement for Test 2 in Table 163–10. The synthesizer frequency is set to the specified jitter frequency and the synthesizer output amplitude is adjusted until the specified peak-to-peak jitter amplitude for that frequency is measured at TP0v. The test procedure is the same as the one described in 120D.3.2.1, with the following exceptions:

References:

93C.2 Test method

The interference tolerance test is performed using the following method:

1) Set the channel noise source to zero.
2) Using the test setup in Figure 93C–2, initiate the training sequence, allow the training sequence to complete, and retain the resulting transmitter tap coefficients.

Updated Response for #231:

ACCEPT IN PRINCIPLE.
Resolve the issue with 163.9.3.3 using the response to comment #70.
For the issue with 163.9.3.4, implement the changes highlighted in slide 5 of https://www.ieee802.org/3/ck/public/20_10/ran_3ck_03_1020.pdf.
Implement with editorial license.

RITT Tr Parameter Comment #168

Cl **163** *SC* **163.9.3.3** *P* **181** *L* **50** # 168

Dudek, Mike Marvell.

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

The relationship between Tr of the transmitter and the Trm measurement will be a function of the loss between TP0 and TP0v and the Nyquist frequency. The equation used was only valide for the loss of the test fixture of 1.4dB with a Nyquist frequency of approx 12.5GHz.

SuggestedRemedy

Replace the equation with TBD.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add an editor's note stating that this equation should be revisited.
For task force review.

References:

The voltage transfer function for each signal path $H_{21}^{(k)}(f)$ (see 93A.1.3) is multiplied by a set of filter transfer functions to yield $H^{(k)}(f)$ as shown in Equation (93A–19).

$$H^{(k)}(f) = H_{ffe}(f)H_t(f)H_{21}^{(k)}(f)H_r(f)H_{ctf}(f) \quad (93A–19)$$

If the test transmitter presents a high-quality termination, e.g., it is a piece of test equipment, the transmitter device package model $S^{(tp)}$ is omitted from the calculation of $S_p^{(k)}$ and the filtered voltage transfer function $H^{(k)}(f)$ in 93A.1.4 includes the filter $H_t(f)$ defined by Equation (93A–46) where T_r is the 20% to 80% transition time (see 86A.5.3.3) of the signal as measured at TP0a.

$$H_t(f) = \exp(-2(\pi f T_r/1.6832)^2) \quad (93A–46)$$

Spec being commented:

d) In the calculation of COM, if the transmitter is a device with known S-parameters and transition time, these parameters should be used instead of the transmitter package model in 93A.1.2. If a calibrated instrument-grade transmitter is used, the transmitter device package model $S^{(tp)}$ is omitted from Equation (93A–3) in the calculation of COM. The filtered voltage transfer function $H^{(k)}(f)$ calculated in Equation (93A–19) uses the filter $H_t(f)$ defined by Equation (93A–46), where T_r is calculated as $T_r = 1.09 \times T_{rm} - 4.32$ ps and T_{rm} is the measured 20% to 80% transition time of the signal at TP0v. T_{rm} is measured using the method in 120E.3.1.5. T_{rm} is measured with the transmitter equalizer turned off.

Note: T_r and T_rm are both defined as 20% to 80% rise time at TP0a (TP0v).

SNDR Footnote Editorial Comment #226

Cl **163** *SC* **163.9.2** *P* **177** *L* **12** # 226

Dawe, Piers — Nvidia

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

It's surprising that the only definition of SNDR is table footnote c. The reader could miss the deviation from 120D.3.1.6.

SuggestedRemedy

At least put 162.9.3.1.1 in the Reference column with 120D.3.1.6

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Deviation from 120D.3.1.6 is described in the footnote c.

Spec being commented:

Table 163–5—Summary of transmitter specifications at TP0v *(continued)*

Parameter	Reference	Value	Units
Transmitter waveform[b]			
abs step size for $c(-3)$, $c(-2)$, $c(-1)$, $c(0)$, and $c(1)$ (min)	162.9.3.1.4	0.005	—
abs step size for $c(-3)$, $c(-2)$, $c(-1)$, $c(0)$, and c(1) (max)	162.9.3.1.4	0.025	—
value at minimum state for $c(-3)$ (max)	162.9.3.1.5	−0.06	—
value at maximum state for $c(-2)$ (min)	162.9.3.1.5	0.12	—
value at minimum state for $c(-1)$ (max)	162.9.3.1.5	−0.34	—
value at minimum state for $c(0)$ (max)	162.9.3.1.5	0.54	—
value at minimum state for $c(1)$ (max)	162.9.3.1.5	−0.2	—
Signal-to-noise-and-distortion ratio SNDR (min)[c]	120D.3.1.6	32.5	dB
Jitter (max)[d]			
J_{RMS}	162.9.3.3	0.023	UI
J3u	162.9.3.3	0.106	UI
Even-odd jitter, pk-pk[e]	162.9.3.3	0.019	UI

[a]Measurement uses the method described in 93.8.1.3 with the exception that the PRBS13Q test pattern is used.
[b]Implementations are recommended to use the same step size for all coefficients
[c]Measurement uses the method described in 120D.3.1.6 with the exception that the linear fit procedure in 162.9.3.1.1 is used.

Note: 162.9.3.1.1 describes linear fitting procedure.

Test Fixture RL Frequency Range Comment #228

Cl **163** *SC* **163.9.2.1.3** *P* **178** *L* **26** # 228

Dawe, Piers Nvidia

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

It doesn't make sense to have an RL spec for the test fixture only to 26.56 GHz, while the spec for the item under test extends to 40 GHz (see 162.9.3.5, referenced from Table 163-5: is that the right cross-reference?)

SuggestedRemedy

Provide a CM RL spec for the test fixture up to the same frequency as the product spec.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change referece in Table 163-5 from 162.9.3.5 to 163.9.2.1.3.
Change the text in 163.9.2.1.3 to "The common-mode to common-mode return loss shall be greater than or equal to 2 dB at all frequencies between 0.2 GHz and 40 GHz."

Spec being commented:

Common-mode to common-mode return loss (min)	162.9.3.5	2	dB

References:

163.9.2.1.3 Test fixture common-mode return loss

The common-mode return loss of the test fixture shall be greater than or equal to 10 dB from 0.05 GHz to 26.56 GHz.

TP0a Example Removal Comment #140]

Cl **120F** *SC* **120.F.3.1** *P* **208** *L* **1** # 140

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **T** *Comment Status* **D** *TP0v*

Until it is proven TP0v with real measurement the electrical characteristics should be at TP0a, there is no need create all this confusion and complexity by introducing TP0v when the solution is trivial just increase the DUT board loss to 2.4 dB as we have done for MCB and HCB!

SuggestedRemedy

Change TP0v to TP0a

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #135.
[Editor's note: CC: 120F, 163]

References:

Straw Poll #1:

I support keeping TP0v methodology as the normative specification (choose one)
Y: 27, N: 4, No Opinion: 11

Notes:

Pulled from the bucket.

Updated Response:

Reject

straw Poll #1 on 10/13 shows consensus to keep TP0v.

Resolve using response to comment #135

TP0a Example Removal Comment [#73, #6]

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

Brown, Matt — Huawei

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

The example test fixture using TP0a is no longer required. See the following ad hoc presentation;
https://www.ieee802.org/3/ck/public/adhoc/sept16_20/brown_3ck_adhoc_01a_091620.pdf

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

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

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

Mellitz, Richard — Samtec

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

TP0a is moot and replaced by TP0v

SuggestedRemedy

remove references to TP0a.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Respolve using the response to comment #73.

Spec being commented:

163.9.2.2 Example transmitter test fixture (informative)

An example test fixture meeting the requirements for TP0v is defined in this subclause. In this example, the TP0v point is referred to as TP0a.

References:

Straw Poll #2:

Assuming we keep TP0v methodology, I support removing the example test fixture in 163.9.2.2
Y: 10, N: 17 , No Opinion: 13

Updated Response:

Straw Poll #2 on 10/13 shows consensus to keep the example test fixture.

Reject Comment #73 and #6

TP0a Example IL and Threshold [#229, #136, #26, #162, #204]

Cl **163** *SC* **163.9.2.2** *P* **178** *L* **33** # 229

Dawe, Piers Nvidia

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

An example with a range is more complicated than it need be.

SuggestedRemedy

Pick a single example IL, e.g. 3.5 or 4 dB. Make this and the IL equation 163-3 consistent. Give the reference ERL, steady-state voltage and so on for the example.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment #73 suggests to remove TP0a. Comment #135 suggests to increase TP0a IL to make it a measurable test point. TP0a with a single exact IL value is not implementable. For task force review.

Spec being commented:

The insertion loss of the test fixture is between 1.2 dB and 1.6 dB at 26.56 GHz. The magnitude of the insertion loss deviation of the test fixture is less than or equal to 0.1 dB from 0.05 to 26.56 GHz.

The insertion loss of the test fixture is defined by Equation (163–1).

$$IL(f) = 0.0037 + 0.1052\sqrt{f} + 0.0337f \qquad 0.05 \le f \le 53.125 \qquad (163\text{–}1)$$

References:

Straw poll #3:

I support the test fixture TP0 to TP0a insertion loss being

A: a single value
B: a range
C: no opinion

Results: A: 18, B: 6, C: 8

Straw poll #4:

For the example test fixture, I support TP0 to TP0a insertion loss of: (Chicago rules)

A: 0 dB
B: between 0 and 2 dB
C: 2 dB
D: 2.5 dB
E: 3 dB
F: 3.5 dB
G: 4 dB
H: greater than 4 dB
I: no opinion

Results: A: 6, B: 4, C: 7, D: 13, E: 16, F: 10, G: 9, H: 1, I: 9

Updated Response for #229:

TP0a test fixture IL 2.8 dB?

Remove ILD?

IL equation and figure?

Give reference ERL, Vpeak, Vf instead of “the difference”? What are the values?

Apply the response to #136, #26, 162, #204

TP0a Example IL and Threshold [#229, #136, #26, #162, #204]

Cl **163** *SC* **163.9.2.2.** *P* **178** *L* **33** # 136

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

Inccrease the loss from 1.2 dB and 1.6 dB

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

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

Cl **163** *SC* **163.9.2.2** *P* **178** *L* **39** # 26

Ben-Artsi, Liav — Marvell Semiconductor ltd.

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

The transmitter and reciever test fixture informative examples are irrelevant, since they have extremely low loss

SuggestedRemedy

Recommend changing equation 163.1 to IL(F) = 0.01+0.292*sqrt(F)+0.0936*F (F in GHz), which is more realistic and meets 4dB of loss at 26.5625GHz. It is also refered to in 163.9.3.2 on page 181 lines 22-24

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to #136.

Cl **163** *SC* **163.9.2.2** *P* **178** *L* **33** # 162

Dudek, Mike — Marvell.

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

The insertion loss of this example test fixture is un-realistically low. This applies to the Rx test fixture as well.

SuggestedRemedy

Change the loss to "between 2.4 and 3.2dB" and double the co-efficients in equation 163-1 and change Figure 163-4 to match. Note that the Rx test fixture refers to this equation and figure as well. Change the loss of the Rx test fixture to "between 2.4 and 3.2dB" on page 181 line 19.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #136.

Cl **163** *SC* **163.9.2.2** *P* **178** *L* **33** # 204

Wu, Mau-Lin — MediaTek

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

The IL and ILD specs here are too challenging to achieve. In this case, I see no points to provide this kind of "example TX test fixture". Based on that, I proposed to relax the IL and ILD specs of this example TX test fixture (TP0a). Detailed information had been included in wu_3ck_adhoc_01_092320.pdf. I plan to prepare one contribution, wu_3ck_02_1120.pdf, for this comment.

SuggestedRemedy

Change IL and ILD specs of the example TX test fixture (TP0a) to "between 2.0 dB and 2.8 dB at 26.56 GHz". ILD is less than or equal to 0.2 dB from 0.05 to 26.56 GHz
Remove the Equation (163-1), Figure 163-4, and related paragraphs since TP0a is just an example and informative

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

This comemnt involves multiple suggested rededies.
Resolve IL change using the response to comment #136.
Test fixture equation and figure have been in multiple standards. This comment does not provide sufficient justification to remove them.
Implement ILD change.
For task force review.
[Editor's note: Add presentation URL.]

TP5a Example IL [#137]

Cl **163** SC **163.9.3.2** P **181** L **18** # 137

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

Inccrease the loss from 1.2 dB and 1.6 dB

SuggestedRemedy

to 2.2 and 2.6 dB

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using the response to comment #40

Updated Response for #137:

Resolve with response to comment #40 to align TP0v and TP5v spec.

Resolve with response to comment #229 for receiver test fixture IL spec.

Spec being commented:

163.9.3.2 Receiver test fixture

The insertion loss of the test fixture shall be between 1.2 dB and 1.6 dB at 26.56 GHz. The magnitude of the insertion loss deviation of the test fixture shall be less than or equal to 0.1 dB from 0.05 GHz to 26.56 GHz.

Completed Comments

Test Fixture ILD Comment # 64

Cl 163 SC 163.9.2.1.1 P 177 L 48 # 64

Ran, Adee Intel

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

ILD definition in 93A.4 should be cross referenced.

This definition requires some parameters. Specifically the transition time Tt, which should correspond to the observable transition time at TP0 (larger than the internal value).

SuggestedRemedy

Append "Insertion loss deviation is calculated as specified in 93A.4, where T_t is 0.1 ns, and f_b and f_t values are taken from Table 163-11."

Proposed Response *Response Status* W

PROPOSED ACCEPT.

Spec being commented:

163.9.2.1.1 Test fixture insertion loss

The insertion loss of the test fixture shall be less than 5 dB at 26.56 GHz. The magnitude of the insertion loss deviation of the test fixture shall be less than or equal to 0.2 dB from 0.05 to 26.56 GHz.

References:

93A.4 Insertion loss deviation

The insertion loss deviation $ILD(f)$ is the difference between the measured insertion loss $IL(f)$ and the fitted insertion loss $IL_{fitted}(f)$ (see 93A.3) as shown in Equation (93A–55).

$$ILD(f) = IL(f) - IL_{fitted}(f) \quad (93A–55)$$

A figure of merit for a channel that is based on $ILD(f)$ is given by Equation (93A–56). In Equation (93A–56), f_n are the frequencies considered in the computation of the fitted insertion loss and $W(f_n)$ is the weight at each frequency as defined by Equation (93A–57).

$$FOM_{ILD} = \left[\frac{1}{N}\sum_n W(f_n) ILD^2(f_n)\right]^{1/2} \quad (93A–56)$$

$$W(f_n) = \mathrm{sinc}^2(f_n/f_b)\left[\frac{1}{1+(f_n/f_t)^4}\right]\left[\frac{1}{1+(f_n/f_r)^8}\right] \quad (93A–57)$$

The variable f_b is the signaling rate. The 3 dB transmit filter bandwidth f_t is inversely proportional to the 20% to 80% rise and fall time T_t. The constant of proportionality is 0.2365 (e.g., $T_t f_t = 0.2365$; with f_t in Hertz and T_t in seconds). The variable f_r is the 3 dB reference receiver bandwidth.

The values assigned to f_b, T_t, and f_r are defined by the Physical Layer specification that invokes this method.

Test Fixture Minimum Loss Comment # 227

Cl **163** *SC* **163.9.2.1.1** *P* **177** *L* **47** # 227

Dawe, Piers Nvidia

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

Try to exclude unexplored / unnecessary areas of inaccuracy or poor reproducibility in measurement.

SuggestedRemedy

Set a minimum insertion loss for this test fixture as well as a maximum. It could be as low as 1.2 dB which we had before for TP0a, or it could be higher.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add minimum IL 1.2dB.
For task force discussion.

Spec being commented:

163.9.2.1.1 Test fixture insertion loss

The insertion loss of the test fixture shall be less than 5 dB at 26.56 GHz. The magnitude of the insertion loss deviation of the test fixture shall be less than or equal to 0.2 dB from 0.05 to 26.56 GHz.

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Test Fixture ERL Comment [# 65, #161]

Cl **163** SC **163.9.2.1.2** P **178** L **21** # 65

Ran, Adee Intel

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

Per resolution of comment 154 against D1.2 there should be a requirement on test fixture ERL:

"The ERL at TP0v shall be greater than or equal to TBD".

This part has not been implemented.

With N=20 the ERL of the test fixture is expected to be very good. The TBD may be changed to 15 dB (same as in clause 137) if there is consensus.

SuggestedRemedy

Add the following sentence after the table"

"The ERL at TP0v shall be greater than or equal to TBD dB".

Consider changing TBD to 15 dB.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

[Editor's note: Addresses incomplete specification.]

Cl **163** SC **163.9.2.1.2** P **178** L **5** # 161

Dudek, Mike Marvell.

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

There is no specification for the ERL of the test fixture

SuggestedRemedy

Insert a Paragraph "The ERL of the test fixture shall be greater than TBD dB"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Resolve using the response to comment #65.

Spec being commented:

163.9.2.1.2 Test fixture effective return loss

ERL of the test fixture at TP0v is computed using the procedure in 93A.5 with the values in Table 163–6. Parameters that do not appear in Table 163–6 take values from Table 163–11.

Table 163–6—Test fixture ERL parameter values

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.01	ns
Incremental available signal loss factor	β_x	0	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.618	—
Length of the reflection signal	N	20	UI
Equalizer length associated with reflection signal	N_{bx}	0	UI
Twice the propagation delay associated with the test fixture	T_{fx}	0	ns
Tukey window flag	*tw*	1	—

TP0v V_peak Comment [# 13, #5]

Cl **120F** *SC* **120F.3.1** *P* **208** *L* **20** # 13

Mellitz, Richard Samtec

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

We need to specify V_peak/V_f not V_peak I.e. pulse peak loss

SuggestedRemedy

Change
Difference between measured and reference linear fit pulse peak
To
Difference between measured and reference linear fit pulse peak loss (min) d(V_peak/V_f)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

It is assumed that the comment is requesting that the specification be for the ration of V_peak/V_f, rather than just V_peak.
If that is the case, implement the following with editorial license…
To make the parameter easier to read and use, define the ratio R_peak equal to V_peak/V_f.
Define the difference between the reference and measured ratio as dR_peak.
For task force review.
[Editor's note: CC: 163, 120F]

Cl **163** *SC* **163.9.2** *P* **176** *L* **50** # 5

Mellitz, Richard Samtec

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

We need to specify V_peak/V_f not V_peak. I.e. pulse peak loss

SuggestedRemedy

Change
Difference between measured and reference linear fit pulse peak
To
Difference between measured and reference linear fit pulse peak loss (min) d(V_peak/V_f)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Resolve using respongse to comment #13
[Editor's note: CC: 163, 120F]

Spec being commented:

Difference between measured and reference linear fit pulse peak (min), dv_{peak}	163A.3.2.1	TBD	V

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TP0v Thresholds Comment [# 61, #83, #84]

Cl **163** *SC* **163.9.2** *P* **176** *L* **44** # 61

Ran, Adee Intel

Comment Type **T** *Comment Status* **D** *vf/vpeak/erl*

Table 163-5 has multiple TBDs.

Reference ERL, v_f and v_peak are calculated with an idealized package model. Real products deviate from this model, so the limit values may need adjustment.

v_f and v_peak may be degraded by a device or pacakge, but that can be mitigated using higher than minimum launch voltage and some equalization. So for dv_f and dv_peak, a minimum of 0 V may be acceptable.

There is no straightforward method to improve ERL. So to allow a wide range of implementations, the minimum dERL should be less than 0 dB. A minimum of -3 dB may be acceptable.

SuggestedRemedy

Change value for dv_f in Table 163–5 from TBD to 0.

Change value for dv_peak in Table 163–5 from TBD to 0.

Change value for dERL in Table 163–5 from TBD to -3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

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

References:

Difference between measured and reference effective return loss (min), *dERL*	163A.3.2.2	TBD	dB
Common-mode to common-mode return loss (min)	162.9.3.5	2	dB
Difference between measured and reference steady-state voltage (min), dv_f	163A.3.2.1	TBD	V
Difference between measured and reference linear fit pulse peak (min), dv_{peak}	163A.3.2.1	TBD	V

Notes: comment #5 proposes to change V_peak to V_peak/V_f

Apply to comment #83, #84

TP0v Thresholds Comment [# 61, #83, #84] Contd.

Cl **120F** *SC* **120F.3.1** *P* **208** *L* **18** # 83

Brown, Matt Huawei

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

A value for dv_f is required. If an appropriate reference transmitter is defined, then a value of 0 should be correct.

SuggestedRemedy

Replace TBD with 0.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Implement the suggested remedy.
For task force review.

Cl **120F** *SC* **120F.3.1** *P* **208** *L* **21** # 84

Brown, Matt Huawei

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

A value for dv_peak is required. If an appropriate reference transmitter is defined, then a value of 0 should be correct.

SuggestedRemedy

Replace TBD with 0.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Editor's note: Addresses incomplete specification.]
Implement the suggested remedy.
For task force review.

Spec being commented:

Difference between measured and reference steady-state voltage, dv_f (min)	163A.3.2.1	TBD	V	18
Difference between measured and reference linear fit pulse peak, dv_{peak} (min)	163A.3.2.1	TBD	V	19 20 21