Comment discussion:
KR Test Fixtures – TP0v

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Scope

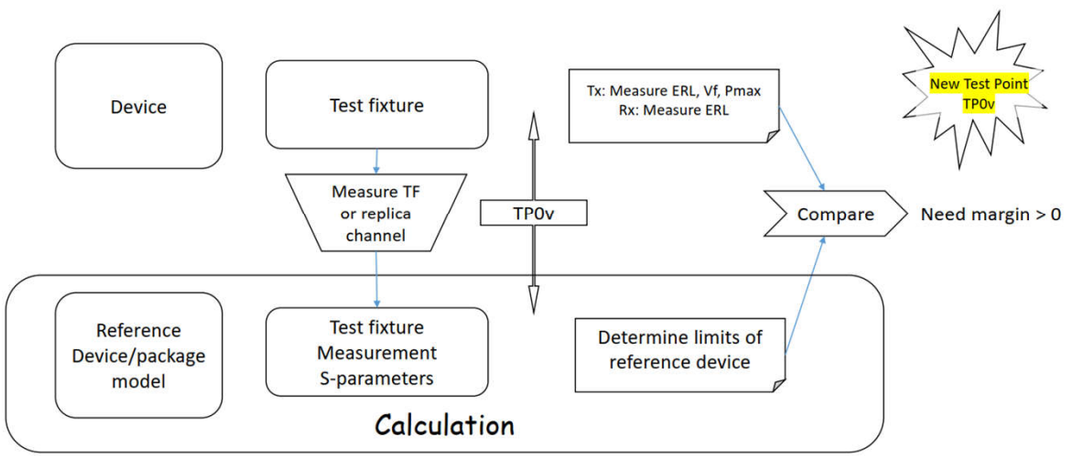
Provide editor's view of what the draft would look like if we adopt the proposed TP0v test point and methodology proposed in comments #33 & #153.

Comment Summary

C#	Summary	Notes
31	Increase the TP0-TP0a IL to 2.4 – 3.2 dB @ 26.56 GHz	Current: 1.2-2.4 dB
33	Define new measurement point TP0v, which may vary with implementation.	
34	Specify TP0-TP0v: IL=5 dB @ 26.56 GHz w/ ILD=0.2 dB & specify informative parameters @ TP0a.	http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf
153	Replace test fixture normative requirements with equation-based S-parameters for a 4 dB fixture transmission line & create informative specs @ TP0a. Use new methodology to specify normative requirements.	
154	Eliminate test fixture return loss requirement	
35	Increase loss for Rx test fixture to 3 – 4 dB @ 26.56 GHz with ILD = 0.2 dB.	

http://www.ieee802.org/3/ck/public/20_07/heck_3ck_01_0720.pdf

Enabling implementation-dependent test fixture



IEEE 802.3 100 Gb/s, 200 Gb/s, and 400 Gb/s Electrical Interfaces Task Force 8

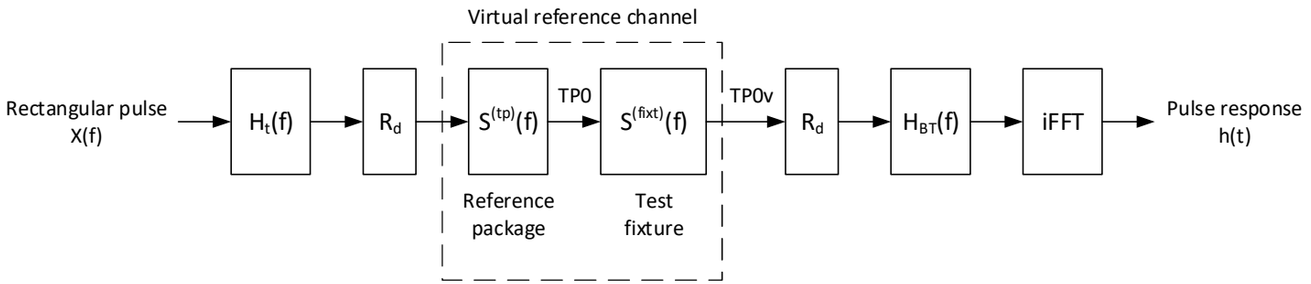
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

Overview

- CL163/AN93A initial rough draft
  - Addressing the TP0v proposal
  - Also apply to 120F
- Implementation approach:
  - Specify normative method in annex 93A.
  - Specify requirements in Clause 163.

Initial draft text & figures for CL163 & AN93A

Normative Method (93A.6)



Note: the transmitter reference package uses the maximum trace length specified in the referring clause.

93A.6.1 Reference Parameter Determination

Measure the scattering parameters of the TP0-TP0v channel for the device and lane under test, $S^{(fixt)}$, using the method specified in Annex 93A.1.1.

Obtain the scattering parameters of the virtual reference channel, $S^{(0)}$, using equation (93A-xx), where the cascade function is defined in 93A.1.2, and $S^{(tp)}$ is the scattering parameters for the transmitter reference package. $S^{(tp)}$ is calculated using the method in 93A.1.2 and the package electrical characteristics defined in the referring clause.

$$S^{(0)} = cascade\left(S^{(tp)}, S^{(fixt)}\right) \quad \text{(93A-xx)}$$

Calculate the voltage transfer function, $H_{21}(f)$, of the terminated virtual reference channel from $S^{(0)}$ using equations (93A-17) and (93A-18) with the single-ended termination, R_d, equal to 50ohms and reference impedance, R_0, set to 50ohms.

Normative Method (93A.6)

- Calculate the voltage transfer function for the full signal path, $H^{(0)}(f)$, using equation (93A-xy).

$$H^{(0)}(f) = H_t(f)\, H_{21}(f) H_{BT}(f) \qquad \text{(163-xy)}$$

where $H_t(f)$ is calculated using equation (93A-46) with T_r supplied by the referring clause.
$H_{BT}(f)$ is calculated using equation (52-2) with 40GHz bandwidth.

- Calculate the output pulse response, $h(t)$, using equations (93A-23) and (93A-24) with $H^{(0)}(f)$ from equation (163-xy), and A_t and T_b from the referring subclause.
- From the pulse response calculate the reference values for the transmitter output steady state voltage (v_f). $$ Note: Need to supply the method for calculating vf from pulse response. Work to do over the weekend. $$
- Find the pulse response peak, v_{peak}, from the peak value of $h(t)$.

Normative Method (93A.6)

- Calculate the pulse time-domain reflection (PTDR) response, $PTDR(t)$, from $S^{(0)}$ using equations (93A-58) and (93A-59).
- From the PTDR response calculate the reference value of the effective return loss (ERL) using the method defined in 93A.5.2.

Normative Method (93A.6)

93A.6.1 Delta Parameter Determination $$ Need a better name? $$

Measure v_f and v_{peak} using the method defined in 162.9.3.1.2.

Measure ERL using the method in 93A.5.

Calculate the difference between the measured and reference steady state voltages, Δv_f.

$$\Delta v_f = v_f^{(meas)} - v_f^{(ref)}$$

Calculate the difference between the measured and reference pulse peak, $\Delta peak$.

$$\Delta peak = \frac{v_{peak}}{v_f}\Big|_{meas} - \frac{v_{peak}}{v_f}\Big|_{ref}$$

$$ need a name/definition &
need to use correct convention for the symbols $$

Calculate the difference between the measured and reference effective return loss

$$\Delta ERL = ERL^{(meas)} - ERL^{(ref)}$$

Clause 163

Need some text to introduce the TP0v approach and a figure to show the test point & illustrate the method.

Also may need to explicitly spell out the input parameters that get used in 93A.6 (Tr, Tb, Av, BT bandwidth)

163.9.1 Transmitter characteristics

Add the following to Table 163-5:

Parameter	Reference	Value	Units
Difference between measured and reference steady state voltage (min.), Δv_f	93A.6	0	-
Difference between measured and reference pulse peak (min.), $\Delta peak$	93A.6	0	-
Difference between measured and reference effective return loss (min.), ΔERL	93A.6	0	-

163.9.1.1 Transmitter ERL

Change "Transmitter ERL at TP0a shall be greater than or equal to TBD dB." to
"The difference between the measured transmitter ERL and the reference ERL at TP0v shall be greater than or equal to 0 dB. The method for obtaining the reference ERL is defined in 93A.6."

Clause 163

163.9.1.2 Transmitter test fixture

Add the following:

Measurements for v_f, v_{peak} and ERL are made at TP0v using the method defined in 93A.6.

This still lacks a description of TP0v.

Proposed Responses

#	Comment	Proposed Remedy	Proposed Response
C#33	TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.	Measurement to be done at a newly defined TP0v which may vary according to implementation. A presentation will be provided with details, parameters values and method.	Accept in principle. Implement using the contents of heck_3ck_04_0720 with editorial license.
C#153	(Cross-clause) The test feature normative insertion loss requirements are not realistic for real devices, especially with multiple lanes. Also, as presented in http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf, the variations allowed within the recommendations create significant variations in results of compliance parameters. This is obvisouly not a viable methodology anymore. It is suggested to replace the test fixture requirements with an explicit equation describing s-parameters of a transmission line with 4 dB IL (using equation 93A–14 with appropriate parameters) such that TP0a is well-defined, and create informative specifications at this TP0a. Alternatively, informative specifications can be given at TP0. Normaitve requirements should use a new methodology based on measued or extracted test fixture s-parameters. Also applies to Annex 120F.	A presentation with more details will be provided.	Accept in principle. Resolve using the response to comment #33.

Thank you!

Comments (Full Text)

CommentID	CommenterName	CommenterCo	Clause	Subclause	Page	Line	CommentTyp	Comment	SuggestedRemedy
31	Wu, Mau-Lin	Mediatek	163	163.9.1.2	178	52	T	The insertion loss of TP0a test fixture is still keep as between 1.2 dB and 1.6 dB at 26.56 GHz. It may be critial for the state-of-art PCB technology to achieve this small IL value.	Propose to change '1.2 dB and 1.6 dB at 26.56 GHz' to '2.4 dB and 3.2 dB at 26.56 GHz'.
33	Ben Artsi, Liav	Marvell Technology	163	163.9.1	177	26	T	TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.	Measurement to be done at a newly defined TP0v which may vary according to implementation. A presentation will be provided with details, parameters values and method.
34	Ben Artsi, Liav	Marvell Technology	163	163.9.1.2	178	47	T	A reference TP0 - TP0a test fixture is specified while its loss values are not practical.	Specify a more feasible reference TP0 to TP0a specification alongside informative parameters for reference in TP0a. Specify an additional test fixture range of TP0 - TP0v Loss at ~26.56GHz = 5dB ; ILD = 0.2dB ; ERL. A presentation is to be provided with the actual suggestion
35	Ben Artsi, Liav	Marvell Technology	163	163.9.2.2	179	27	T	The Rx test fixture definition is extremely hard to achieve, if even possible and anyhow embedded as part of the interconnect when used for the interference tolerance test. Thus, should allow a higher max loss for Rx test fixture.	Recommend increasing loss limits to a minimum of 3 and max of 4dB at 26.56GHz with ILD=0.2dB
153	Ran, Adee	Intel	163	163.9.1.2	178	52	T	(Cross-clause) The test feature normative insertion loss requirements are not realistic for real devices, especially with multiple lanes. Also, as presented in http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf, the variations allowed within the recommendations create significant variations in results of compliance parameters. This is obvisouly not a viable methodology anymore. It is suggested to replace the test fixture requirements with an explicit equation describing s-parameters of a transmission line with 4 dB IL (using equation 93A–14 with appropriate parameters) such that TP0a is well-defined, and create informative specifications at this TP0a. Alternatively, informative specifications can be given at TP0. Normaitve requirements should use a new methodology based on measued or extracted test fixture s-parameters. Also applies to Annex 120F.	A presentation with more details will be provided.
154	Ran, Adee	Intel	163	163.9.1.2	179	48	T	The reference return loss requirements have questionable value or justification, the RL specifications have been replaced by ERL. The ERL calculation practically excludes the test fixture effect.	Delete the content from "The differential return loss of the test fixture" to the end of 163.9.1.2.

Reference:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf