802.3ck D2.2 Comment Resolution Clause 162, Annex 93A

Howard Heck, Intel

162 RITT Cal
107

Cl **162**	*SC* **162.9.4.3.3**	*P* **180**	*L* **34**	# 107

Dawe, Piers — Nvidia

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

Help the reader understand what is going on

SuggestedRemedy

Please add the plot of Hhp to Figure 162-5, NSD(f) constraints

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The referenced equation is a simple first order high-pass filter with 6 GHz corner frequency. Plotting this simple, well understood response is unnecessary. Adding to the current plot would detract from the intent of the plot.
[Editor's note: Changed page from 179 to 180.]

162 Tr
149

Cl **162** *SC* **162.9.3.5** *P* **176** *L* **11** # 149

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *Tr*

Transition time is defined by the referenced 93A.5 which refers to 93A.2 which refers to 86A.5.3.3 which says "for electrical signals, the waveform is observed through a 12 GHz low-pass filter response (such as a Bessel-Thomson response)", and it's dependent on state of emphasis.

SuggestedRemedy

Change "Transition time" to "Rise time". Explain that that is 20-80%, unfiltered, as if at neutral emphasis. Coordinate with the maintenance project.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The terminology is consistent with 93A.5 in both 802.3cd-2018 and the latest 802.3dc draft. Any related changes in the new revision (802.3dc) can be considered once they are incorporated in the next draft.

162 TX EOJ 103, 103

Cl 162 SC 162.9.3.4 P 174 L 47 # 102

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **D** *TX EOJ*

Having alternative normative patterns to measure one thing when the choice makes a difference, adds cost because the test has to be done both ways (if one way passes and the other fails). Also, the spec limit was relaxed from 0.019 UI to 0.025 to allow for PRBS13. We understand that the result would look better with PRBS9. There is no requirement to generate PRBS9.

SuggestedRemedy

Make PRBS13 normative, as usual. Use a different set of PRBS13Q pattern symbols used for jitter measurement vs. Table 120D-4 to reduce the pattern dependency issue.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This is a restatement of comment #109 against D2.1 which was rejected by the task force (insufficient remedy and lack of consensus to make the change). The comment does not provide new data or analysis to support it.

Cl 162 SC 162.9.3.4 P 174 L 49 # 103

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **D** *TX EOJ*

We know that CRU corner frequency makes a difference to EOJ measurement. Allowing an unbounded "4 MHz or anything you like that's lower" is very bad: how many attempts must the tester try before he can fail a bad part?

SuggestedRemedy

Pick a single definitive CRU corner, e.g. 1 MHz or 2 MHz. Add informative NOTE saying that we expect that if it passes with the usual 4 MHz, it would also pass with the lower corner frequency.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This is a restatement of comment #109 against D2.1 which was rejected by the task force (insufficient remedy and lack of consensus to make the change). The comment does not provide new data or analysis to support it.

162 TX Jitter

Cl **162** *SC* **162.9.3** *P* **170** *L* **46** # 65

Mellitz, Richardd Samtec

Comment Type **TR** *Comment Status* **D** *TX jitter*

Since the jitter at TP2 may be viewed though a channel with a loss of approximately 17 dB (package, host interconnect, HCB) there will likely be measurements error from the phase modulation of the voltage time quantization. The consequence is the measured jitter will be larger than in table 162-10

SuggestedRemedy

Increase J_RMS, J3u, Even-odd jitter, pk-pk to [#,#, #] respectively. As consequence the jitter specified in the receiver interference tolerance (162.9.4.2) step d needs to change since it measured near the beginning of the channel. Change the reference on page 179 step d form table 162-10 to table 163-5

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3ck D2.2 and D2.1 or the unsatisfied negative comments from previous drafts. Hence it is not within the scope of the recirculation ballot.
The comment does not provide sufficient evidence to justify the proposed changes.
For task force review.

162 Tx Vf, part 1
25, 69

Cl 162 SC 162.9.3.1.2 P 173 L 3 # 25

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **D** *TX Vf*

The definition of the steady-state voltage is currently a pointer to 136.9.3.1.2 with essentially three exceptions: the fitted pulse is calculated by another procedure (162.9.3.1.2), and Np and Nv are different. 136.9.3.1.2 itself is a simple definition of a sum of Nv values; there is no need for a reference to this definition, when all other things are exceptions.

What the reader is not told is that the required specification is with equalization turned off; this is written in 136.9.3.1.2 but as part of a normative requirement for the limits, which does not hold here (the values are different). One could interpret it as if it is required for all equalization settings (as implied by the text in 162.9.3.1.2), which is clearly not what we intend.

SuggestedRemedy

Change the first paragraph of 162.9.3.1.2 to the following:

The steady-state voltage v_f is defined as the sum of the linear fit pulse p(1) through p(M×Nv) divided by M, measured with transmit equalizer set to preset 1 (no equalization). Nv is set equal to Np. The linear fit procedure for obtaining p and the values of M and Np are defined in 162.9.3.1.1.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The proposed solution is a further improvement on the changes made in response to C#30 against D2.1. Implement the proposed response maintaining consistency with the resolution to comment #69.
For task force discussion.

Cl 162 SC 162.9.3.1.2 P 173 L 4 # 69

Healey, Adam Broadcom Inc.

Comment Type **T** *Comment Status* **D** *TX Vf*

Steady state voltage is measured at the output of a lossy host channel without equalization and its value will be larger for larger Nv (at least up to a point). Setting Nv to 200 may overestimate the amplitude that the receiver will actually see since that amplitude will only be realized when Nv consecutive identical symbols are transmitted. The number of consecutive identical symbols transmitted during normal operation is likely to be much lower. This suggests that the value of Nv should be lower so that the measured steady state voltage is closer to the amplitude the receiver might see in practice.

SuggestedRemedy

Change Nv for the Clause 162 steady-state voltage calculation to 29.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
The proposed solution requires consideration by the task force.
For task force review.

162 Tx Vf, part 2
25, 69

162.9.3.1.2, p. 173

~~The steady-state voltage v_f is defined in 136.9.3.1.2, and is determined from the linear fit pulse calculated by the procedure in 162.9.3.1.1 with the exception that N_p and N_v are equal to 200. The steady-state voltage shall meet the requirements specified in Table 162–10.~~

The steady-state voltage v_f is defined as the sum of the linear fit pulse p(1) through $p(M \times N_v)$ divided by M, measured with transmit equalizer set to preset 1 (no equalization). Nv is set equal to Np. The linear fit procedure for obtaining p and the values of M and N_p are defined in 162.9.3.1.1.

$N_v = N_p$ or $N_v = 29$

162 Host/CA IL budget, part 1
87, 88

Cl **162** *SC* **162.9.3** *P* **170** *L* **32** # **87**

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *CR loss budget*

The draft CR loss budget wastes over 3 dB in nearly every case. The relative range of host losses, 6.875/2.3 = 3:1, is too small for switch layout yet not needed for NICs.
The recommendation for the host traces plus BGA footprint and host connector footprint, 6.875 dB, compares very poorly with C2M's host insertion loss up to 11.9 dB, making passive copper to this draft expensive and unattractive for a switch, yet a full range of NICs can be made with only 3.75 dB. Server-switch links are asymmetric in form factor (e.g. QSFP-DD to 2 x QSFP) and will get made with an asymmetric loss budget, so it would be better for the standard to regularise what will happen anyway. C2M already has short and long ports.
This change would also benefit CR switch-switch links because the shortest ports would get credit for their low loss.
The symmetric budget is used for some designs under way and may be useful in future for LOM, so it is kept here, and the better way added.

SuggestedRemedy

As in dawe_3ck_01a_0721.pdf:
3 classes of CR ports, host loss allocations of A 10, B 6.875, C 3.75 dB. B is as D2.1.
A connects to C, B to B or C, C to A, B or C.
Use 2 bits in the training control field to advertise A, B or C to the other end.
In Table 162-10, add limits A and C for linear fit pulse peak ratio (min). Change text in 162.9.3.1.2 to refer to the table.
In Table 162-14, add columns for Test 2 (high loss), A and C, with test channel insertion loss: A: 6.875-3.75 = 3.125 dB lower (20.5 dB to 21.5 dB), and C: 9.5-6.875 = 2.625 dB higher (26.25 dB to 27.25 dB). No change needed for Test 1.
In 162A.4, add equations for IL_PCBmax and ILHostMax A and B and show them in Fig 162A-1 and 2. In 162A.5, add Value columns A, C in Table 162A-1 (ILChmin and ILMaxHost differ). Adjust figures 162A-3 and 4.
Add MDIO registers to report local and remote host ability to station management, for inventory and diagnostics.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a restatement of comment #92 against D2.1, which was rejected by the task force. This new comment provides only minor changes to the suggested remedy. A related straw poll (#10) indicated strong opposition to adopting this proposal therefore there was no consensus to make the proposed changes.
July 2021 Straw Poll #10 is reproduced here for reference…
Strawpoll #10 (direction)
I support P802.3ck specifying multiple CR host types such as in dawe_3ck_01_0721.
Y: 7 N: 24 A: 8

D2.1 C# 92

Cl **162** *SC* **162.9.3** *P* **163** *L* **18** # **92**

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **X**

The draft CR loss budget wastes over 3 dB in nearly every case. The relative range of host losses, 6.875/2.3 = 3:1, is too small for switch layout yet not needed for NICs.
The recommendation for the host traces plus BGA footprint and host connector footprint, 6.875 dB, compares very poorly with C2M's host insertion loss up to 11.9 dB, making passive copper to this draft expensive and unattractive for a switch, yet a full range of NICs can be made with only 3.75 dB. Server-switch links are asymmetric in form factor (e.g. QSFP-DD to 2 x QSFP) and will get made with an asymmetric loss budget, so it would be better for the standard to regularise what will happen anyway. C2M already has short and long ports.
This change would also benefit CR switch-switch links because the shortest ports would get credit for their low loss.
The symmetric budget is used for some designs under way and may be useful in future for LOM, so it is kept here, and the better way added.

SuggestedRemedy

3 classes of CR ports, host loss allocations of A 10, B 6.875, C 3.75 dB. B is as D2.1.
A connects to C, B to B or C, C to A, B or C.
Use 2 bits in Clause 73 Auto-Negotiation Link codeword Base Page to advertise A, B or C to the other end. In the Priority Resolution function, an A port ignores a 100G/lane Technology Ability Field bit from an A or B port, a B port ignores a 100G/lane Technology Ability Field bit from an A port.
In Table 162-10, add limits A and C for linear fit pulse peak ratio (min). Change text in 162.9.3.1.2 to refer to the table.
In Table 162-14, add columns for Test 2 (high loss), A and C, with test channel insertion loss: A: 6.875-3.75 = 3.125 dB lower (20.5 dB to 21.5 dB), and C: 10-6.875 = 3.125 dB higher (26.75 dB to 27.75 dB). No change needed for Test 1.
In 162A.4, add equations for IL_PCBmax and ILHostMax A and B and show them in Fig 162A-1 and 2. In 162A.5, add Value columns A, C in Table 162A-1 (ILChmin and ILMaxHost differ). Adjust figures 162A-3 and 4.

Proposed Response *Response Status* **O**

162 Host/CA IL budget, part 2
87, 88

Cl **162** *SC* **162.11** *P* **184** *L* **29** # 88

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *CA IL budget*

The poor max cable loss makes CR unattractive, while all NICs and some ports on any switch have host loss going to waste. Enabling longer cables on a minority of links is needed.
In the remedy, each host knows the other host's loss class through the training protocol and the cable's loss class from its I2C compliance code, so no extra management features needed in the spec for the long cable class.

SuggestedRemedy

2 classes of cable, which could be called "short" (19.75 dB, as today) and "long", 19.75+2*(6.875-3.75) = 19.75+6.25 - 0.5 = 25.5 dB max (achievable cable length 3 m).
Long cables connect port types C (see another comment) at both ends, short cables connect a valid combination of A, B, C.
In 162.11.2, cable assembly insertion loss, change text to refer to Table 162-17.
In 162.11.7.1.1, add zp = 30.7 mm for the "short" cable.
In Table 162A-1, add a column for the A-short-A scenario (ILCamax differs).
Illustrate in figures 162A-3 and 162A-4.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a restatement of D2.1 comment #93 which was rejected as there were no changes to the host port types.
The suggested remedy is predicated on the adoption of Comment #87 to the draft.

93A b(n) eqn
113

Cl **93A** *SC* **93A.1.6** *P* **235** *L* **15** # 113

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **D** *b(n) eqn*

The equation for b(n) is clumsy and hard to understand. When you study it enough, you can see that it is repetitive.

SuggestedRemedy

Make a substitution: s(n) = h(0)(ts + n.Tb)
Then the equation becomes

$$b(n) = \begin{cases} bbmin(n) & s(n)/s(0) < bbmin(n) \\ bbmax(n) & s(n)/s(0) > bbmin(n) \\ s(n)/s(0) & \text{otherwise} \end{cases}$$

Similarly for Eq 93A-27.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This is a restatement of D2.1 comment #118 which was rejected by the task force due to lack of consensus. The new comment provides a new equation form to consider. The proposed solution does not improve upon the accuracy or clarity of the existing equation.

93A COM pkg, part 1
35

Cl **162** *SC* **162.11.7.1** *P* **192** *L* **8** # 27

Ran, Adee Cisco

Comment Type **E** *Comment Status* **D** *CA COM pkg (bucket1)*

The new equations 93A-13a and 93A-14a use a parameter z_p2 (instead of z_p in the existing equations 93A-13 and 93A-14). The text here refers to z_p, so the existing equations should be referenced instead.

SuggestedRemedy

Change 93A-13a to 93A-13 and 93A-14a to 93A-14.

Consider merging equations 93A-12a, 93A-13a, 93A-14a with their existing counterparts.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license

Cl **93A** *SC* **93A.1.2.3** *P* **233** *L* **13** # 35

Ran, Adee Cisco

Comment Type **E** *Comment Status* **D** *COM pkg*

The new equations 93A-12a through 93A-14a are identical to the existing ones (without the "a") except for parameter names z_p2 and Z_c2 instead of z_p and Z_c. Having essentially duplicate equations is not a good service to the reader.

SuggestedRemedy

Change the paragraph after the editorial instruction to the following:

"For clauses that use a second package transmission line segment described by parameters z_p2 and Z_c2, the scattering parameters for the second transmission line are defined by Equation (93A–12), Equation (93A–13), and Equation (93A–14), with z_p2 substituting z_p and Z_c2 substituting Z_c."

(with _ denoting subscript).

Delete equations 93A-12a through 93A-14a.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Resolve using the response to comment #27

93A COM pkg, part 2
35

93A.3.2.1, p. 233

Insert the following at the end of 93A.1.2.3:

For clauses that use a second package transmission line segment described by parameters z_{p2} and Z_{c2}, the scattering parameters for the second transmission line are defined by Equation (93A–12a), Equation (93A–13a) and Equation (93A–14a). The units of z_{p2} are mm.

$$\rho_2 = \frac{Z_{c2} - 2R_0}{Z_{c2} + 2R_0} \qquad \text{(93A–12a)}$$

$$s_{11}^{(l2)}(f) = s_{22}^{(l2)}(f) = \frac{\rho_2(1 - \exp(-\gamma(f)2z_{p2}))}{1 - \rho_2{}^2 \exp(-\gamma(f)2z_{p2})} \qquad \text{(93A–13a)}$$

$$s_{21}^{(l2)}(f) = s_{12}^{(l2)}(f) = \frac{(1 - \rho_2{}^2)\exp(-\gamma(f)z_{p2})}{1 - \rho_2{}^2 \exp(-\gamma(f)2z_{p2})} \qquad \text{(93A–14a)}$$

The scattering parameter matrix for the second transmission line is denoted as $S^{(l2)}$.

<clause> <topic> <comments>