100GBASE-KP4 Transmitter Characteristics Ad Hoc

10 January 2013

- This call is an IEEE appointed ad hoc.
- The meeting rules apply regarding IP, cost, confidential clauses, etc.

Attendance

- If you are on the call, please send me an email
- * 6 to mute and unmute

Agenda

- IEEE patent policy reminder
  http://www.ieee802.org/3/patent.html
- Open Action Items
- Discuss next steps

Open Action Items in Ad Hoc

- EEE definition for PMA
- transition time & pattern
- tap adjustment state machine
- ALERT pattern clarifications
- P(k) value for TX bandwidth
- TX low frequency jitter measurement

EEE definition for PMA (#218/94/219/220)

Cl 94 SC 94.2.1 P 240 L 22 # 218
Brown, Matthew Applied Micro

Comment Type T *Comment Status* X

The editor's note points out that the behavior in response to tx_mode and rx_mode must be defined.

SuggestedRemedy

Define the PMA behavior in response to rx_mode and tx_mode. A proposal will be provided.

Proposed Response *Response Status* O

Cl 94 SC 94.2.1 P 240 L 22 # 94
Healey, Adam LSI Corporation

Comment Type T *Comment Status* X

The editor's note highlights that the functional behavior of a Clause 94 PMA that supports the optional Energy Efficient Ethernet (EEE) capability is undefined. Also see 94.2.3 and 94.2.5.

SuggestedRemedy

Define the Clause 94 PMA behavior for the optional EEE capability.

Proposed Response *Response Status* O

Cl 94 SC 94.2.3 P 246 L 4 # 219
Brown, Matthew Applied Micro

Comment Type T *Comment Status* X

The editor's note points out that the PMA transmit EEE behavior must be defined.

SuggestedRemedy

Define the PMA EEE behavior. A proposal will be provided.

Proposed Response *Response Status* O

Cl 94 SC 94.2.5 P 247 L 24 # 220
Brown, Matthew Applied Micro

Comment Type T *Comment Status* X

The editor's note points out that the PMA receive EEE behavior must be defined.

SuggestedRemedy

Define the PMA receiver EEE behavior. A proposal will be provided.

Proposed Response *Response Status* O

- Matt Brown to draft a proposal

Transition Time & Pattern (#19/222)

Cl **94** *SC* **94.3.12.5** *P* **270** *L* **35** # 91

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **X**

Editor's note states that suitable pattern, methodology, and values for [minimum] transition time are needed.

SuggestedRemedy

Define pattern, methodology, and values. Update PICS TC16 accordingly.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.5** *P* **270** *L* **36** # 222

Brown, Matthew — Applied Micro

Comment Type **T** *Comment Status* **X**

The editor's note points out that pattern, methodology, and value are required for transition time. Specifically, a lower bound on transition time is required.

SuggestedRemedy

Provide pattern, methodology, and value. A proposal will be provided.

Proposed Response *Response Status* **O**

- Kent and Adee working on proposed solution

Transition Times?

- Measure transition times on QPRBS13 pattern
  - Measure on PRESET (EQ off)
    - Spec tr/tf = 20%-80% (-1 to +1 PAM4 symbol only)
    - Pk-pk 800-1200mV
    - Define min SNDR to ensure linearity
- Linear fit vs. isolated edge difference highlighted in Clause 93
- Consider measurement in frequency domain

Tap Adjust State Machine (#17/16)

Cl **94** *SC* **3.10.6.4** *P* **260** *L* **11** # 17

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **X**

Allowing for multiple tap change requests to be made simultaneously complicates the response behavior of the PMD when the change takes a given tap to or beyond its operating range. It also highly complicates the logic needed to deal with these circumstances (both at the edge, and in the center of the EQ range), and what was applied and was not applied is when a MIN/MAX response is given is dependent upon the link partner implementation, thus it's unknown. Which can cause interoperability issues.

SuggestedRemedy

Change "Coefficient increment and decrement update requests must not be sent in combination with initialize or preset."
to
"A tap coefficient increment or decrement update request must not be sent in combination with initialize, preset or other tap cofficient update requests."

Proposed Response *Response Status* **O**

Cl **94** *SC* **3.10.6.4** *P* **260** *L* **9** # 16

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **X**

Allowing for Coefficient change requests to "trickle" in may cause interoperabily issues since different designs will respond to the trickle in different manners.

SuggestedRemedy

Change "for that tap is not_updated." to "for all taps is not_updated."

Proposed Response *Response Status* O

ALERT Pattern Clarifications (#221/95/233/232)

Cl **94** *SC* **94.3.11.1.10** *P* **267** *L* **15** # 221

Brown, Matthew — Applied Micro

Comment Type **T** *Comment Status* **X**

The editor's note points out that that the diagram is intended to show a transition at any phase alignment offset (PAO), but the PRBS13 pattern is relevant to PA0 = 0.

SuggestedRemedy

Update the diagram to correct this. A proposal will be provided.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.11.1.10** *P* **267** *L* **17** # 95

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **X**

The editor's note states that the PRBS13 sequence in Figure 94–9 is based on a PAO of zero and the sequence will be different for other
PAO values. This clarification is relevant even after final publication (at which point the editor's note is removed).

SuggestedRemedy

Incorporate this information into subclause text or figure or generalize the figure so that it is correct regardless of PAO value. Delete the editor's note.

Proposed Response *Response Status* **O**

- Kent to investigate

ALERT Continued

IEEE P802.3bj D1.3 100 Gb/s Backplane and C

Cl **94** *SC* **94.3.11.1.3** *P* **266** *L* **5** # 233

Brown, Matthew — Applied Micro

Comment Type **T** *Comment Status* **X**

As specified in 94.3.11.1.9, the "receiver ready" status field alway indicate 1.

SuggestedRemedy

In Table 94-13, in the description column for "receiver ready" replace the text with "Always set to 1."

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.11.1.6** *P* **266** *L* # 232

Brown, Matthew — Applied Micro

Comment Type **T** *Comment Status* **X**

The PMA/PMD transmitter cannot differentiate between WAKE and REFRESH modes since tx_mode indicates only ALERT and DATA for both. The EEE mode indication is therefore not usable.

SuggestedRemedy

Remove the EEE state bit from the ALERT frame status field.
Delete section 94.3.11.1.6.
In Table 94-13, indicate cells 17:16 as being reserved.

Proposed Response *Response Status* **O**

P(k) Value for TX BW (#229/268)

Cl **94** *SC* **94.3.12.6.2** *P* **272** *L* **50** # 229

Brown, Matthew — Applied Micro

Comment Type **T** *Comment Status* **X**

The peak value of p(k) should be increased to enforce faster transition time at the transmitter. It is reasonable to expect that the transition time should be similar to that achievable by a PAM2 transmitter. In other words, the assumed transmitter bandwidth may be doubled and the peak value of p(k) can be derived on this basis. The current transmitter bandwidth assumption is 0.375*fb.

SuggestedRemedy

Select a value for peak value of p(k) such that worst case transmitter bandwidth is 0.75*fb.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.6.2** *P* **272** *L* **50** # 268

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **X**

The Peak value in table 94-14 should match the Peak value listed in this sub-clause.

SuggestedRemedy

Make them match. I suggest Change 0.85*Vf to 0.8*Vf here.

Proposed Response *Response Status* **O**

- Adam Healey to draft proposal

TX Low freq BW (#109/133/140)

Cl **94** *SC* **94.3.13.3** *P* **276** *L* **40** # 109

Dawe, Piers — IPtronics

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

Transmitter jitter is measured after a high-pass jitter filter. The receiver must be able to tolerate low frequency jitter, and the spec must require it. This could be enforced by including low frequency jitter in the receiver interference tolerance specification or by a separate jitter tolerance specification. The latter seems easier. A 2-point spec as used in e.g. 40GBASE-SR4 could be used (just two jitter frequencies rather than a mask).

SuggestedRemedy

Add a low frequency jitter tolerance specification to each of clauses 92, 93, 94, as a separate item (not part of receiver interference tolerance, but possibly using the same high loss channel). Make consistent with the transmitter jitter specs, in particular the 3 dB frequency of the jitter measurement filter used for transmitter output jitter measurement.

Proposed Response *Response Status* **O**

Cl **94** *SC* **3.12.8** *P* **274** *L* **32** # 133

Ghiasi, Ali — Broadcom

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

Due to complexity of KP4 reciver allowing tracking up to Fbaud/2500 over burden the reciver when low cost oscilaltor exist to tigthen the TX loop BW

SuggestedRemedy

Propose to use Fbaud/10000 or 1.36 MHz for the KP4 CDR loop BW

Proposed Response *Response Status* O

Cl **94** *SC* **3.13.1** *P* **276** *L* **54** # 140

Ghiasi, Ali — Broadcom

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

Add standalone reciver tracking and inteference test with sinousiodal jitter

SuggestedRemedy

The unstress jitter tolernace test is as the following:
Test patern is PRBS31 each lane must operate with BER 1E-8 or better.
The applied stress is sinousiodal stress of
25 KHz with p-p jitter of 5 UI
125 Khz with p-p jitter of 1 UI

See ghiasi_01_0113

Proposed Response *Response Status* O

- Coordination of defining the test with the RX interference tolerance ad hoc.

BACKUP