Cl **47** *SC* **3.4.5** *P* **292** *L* **40** # **99017**

Gaither, Justin — Xilinx

Comment Type **TR** *Comment Status* **R** *D4.0 #4*

Input impedance should be specified the same as the output impedance.

SuggestedRemedy

Change text similar to the way output impedance is specified.

Response *Response Status* **U**

REJECT. Maintain response from D4.0 below.

Input impedance spec is not considered to be a problem according to test data supplied indicating a valid spec problem with output impedance. Recevier test data indicates that a flat 10 dB input return loss was achievable.

The impact of loosening transmitter return loss as agreed to for D4.0 comment resolutions results in an increase in return loss contribution to deterministic jitter from 0.03 UI to 0.049 UI. The additional impact of loosening receiver return loss as requested by this comment would result in a return loss contribution of 0.072 UI of deterministic jitter. This amount of additional jitter is excessive (blows the jitter budget) in light of the absence of proof of an existing problem with the current input impedance spec.

If evidence is received indicating that the current receiver return loss spec is not acheivable, then other driver and/or receiver parameters must be adjusted in order to maintain a working jitter budget.

Cl **49** *SC* **49.2.12** *P* **373** *L* **5** # **17**

Tim Warland — Quake Technologies

Comment Type **TR** *Comment Status* **A**

Assuming the committee "does the right thing" with respect to the pattern generator in section 49.2.8, we must also invert the input prior to entering the PRBS31 checker.

SuggestedRemedy

Install an inverter between "input" and the "T" at S0.

Response *Response Status* **W**

ACCEPT.

Cl **49** *SC* **49.2.13.2.1** *P* **373** *L* **43** # **15**

Tim Warland — Quake Technologies

Comment Type **TR** *Comment Status* **R**

Not sure if this is the best place to insert this comment. The definition for Local_Fault declaration is not robust enough. The 64b/66b PCS layer crosses clock boundaries from the XGMII clock to the clock defined by the PMA. As was the case in the XGXS, there exists a remote possibility that a situation causes the gearbox (which crosses clock domains) to overflow or under run. Tracing through the logic in Clause 49, there is no mechanism for the PCS to generate a Local Fault ordered set (tx_coded<=LBLOCK_T) if such a condition occurs. A mechanism is required for the PCS transmit process to generate a local_fault ordered set in the condition of transmit FIFO overflow or under run, particularly since we are always crossing time domains in this clause.

SuggestedRemedy

Either modify the definition for the gearbox in 49.2.7 such that the gearbox will produce (tx_raw) = Local_Fault ordered set in the condition of FIFO overflow or under run. Or, create a state machine in the transmit process which monitors the gearbox fill level. If the gearbox overflows or under runs, the Tx state machine returns to the TX_INIT condition and resets the gearbox.

Response *Response Status* **W**

REJECT. FIFO underrun/ FIFO overrun and clock mismatch is an implementation dependent problem. It is possible to generate the transmit output clock from the transmit input clock and the receive output clock from the receive input clock in which case FIFO underrun or overrun will not occur.

In implementations where there is a clock boundary, FIFO underrun or overrun do not necessarily indicate a link fault. It could be a transient condition such as an excessively large packet. Also, it would be an oscillating condition as FIFO underrun and overrun cannot occur when one is receiving idle or sequence ordered sets. Therefore, local fault would not be an appropriate response,

Cl **49** *SC* **49.2.8** *P* **371** *L* **30** # **16**

Tim Warland Quake Technologies

Comment Type **TR** *Comment Status* **A**

After a lengthy discussion, I believe the conclusion is that the PRBS31 generator selected is not compatible with "Normal" PRBS31 patterns as defined by both the ITU and the Test and Measurement community. The PRBS31 generator requires an output inverter to maximize compatibility. Since we don't really care what the bits are in the sequence only that the pattern is fully defined, what difference does it make to anyone whether we add an inverter to the output? Even if the pattern generator was exclusively for IEEE802.3ae use, as long as transmit and receive process are identical, the inverter is moot. However by adding an inverter to the output, we become compatible with the defacto industry standard for PRBS31. Furthermore, if we add the inverter now, the people who run the test will believe we have implemented a normal PRBS pattern generator/detector. If we don't we will regularly be answering question from test engineers wondering why the PRBS31 won't sync to the test equipment unless they press the invert button.

SuggestedRemedy

Place an inverter between the "T" to S0 and the "PRBS31 pattern output". Change the polynomial to G(x) = !(1+x^28+x^31)

Response *Response Status* **W**

ACCEPT IN PRINCIPLE. We will add an inverter. We will not add an ! to the polynomial equation because changing the polynomial that way would change the sequence. It would mean that the inverted signal is also the input to the shift register. Instead we will state that the PRBS is the inversion of that produced by G(x) = (1+x^28+x^31).

Cl **51** *SC* **4** *P* **427** *L* # **99019**

Gaither, Justin Xilinx

Comment Type **TR** *Comment Status* **R** *D4.0 #3*

As stated in the Note on page 421. XSBI is based on the OIF SFI-4 specification. The OIF specification includes the optional use of a Dual Data Rate clock which the XSBI implementation is missing.

An optional Dual Data Rate clock should be included in the standard as part of the XSBI interface for the following reasons:
1. Maintain continuity between OIF interface and XSBI
2. Broad market availability of LVDS IO at <400 Mhz (FPGA & ASIC)
3. >600 Mhz LVDS IO requires higher cost. (ASIC only, higher license fee)
4. lower EMI radiation.

SuggestedRemedy

The following changes will be required:
1. pg. 422 Table 51-1: add "SDR Mode defined as Single data rate clock mode of operation in which data is latched on the rising edge of the clock signal"
2. pg 422 Table 51-1: add "DDR Mode defined as Optional Dual Data Rate clock operation in which data is latched on both the rising and falling edge of the clock signal."
3. pg. 423 line 4: add text to read "...edge of the PMA_TX_CLK for SDR mode or the corresponding edge for DDR mode."
4. pg. 423 line 10 and 11. removed ", PMA_RX_CLK, which is at 1/16 the bit rate,"
5. pg 423 Table 51-4: Change active level for PMA_TX_CLK and PMA_RX_CLK to indicate rising edge for SDR Mode and both edges for DDR Mode.
6. pg 424 line 45: add text to read "rising edge of PMA_TX_CLK is used to latch data into the PMA in SDR mode and both edges of PMA_TX_CLK are used to latch data into the the PMA in DDR mode."
7. pg 425 line 11: add text to read "presented to the PMA client on the rising edge of PMA _RX_CLK in SDR Mode or both edges of PMA_RX_CLK in DDR Mode.
8. pg 427 line 10: add text to read "positioning clocks relative to the data in SDR mode."
9. pg 427 line 16: Change title of 51.6.1 to read "XSBI transmit interface timing for SDR mode" Similarly add for SDR mode to subclause titles as needed.
10. Insert new subclause 51.6.2 containing content similar to 51.6.1 except referenced to DDR mode. (I will gladly create the figures and text). specifications should be similar to OIF standard.
11. pg 429 line 50: add text to read "positioning clocks relative to the data in SDR mode"
12. pg 430 line 1: Change the title of 51.7.1 to read "XSBI receive interface timing for SDR Mode" Similarly add for SDR mode to subclause titles as needed.
13. Insert new subclause 51.7.2 containing content similar to 51.7.1 except referenced to DDR mode. (I will gladly create the figures and text). specifications should be similar to OIF standard.
14. pg 429 Table 51-8: existing spec should be specified for SDR mode. Add another row specifing DDR mode frequency.
15. pg 432 Table 51-12: existing spec should be specified for SDR mode. Add another row specifing DDR mode frequency.

Response *Response Status* **U**

REJECT.

The DDR option was voted out over one year ago in working groups. This feature last

appeared in draft 1.1(Oct 2000). Since draft 2.0 (Dec 2000) this option was longer in XSBI. There was consensus in the working groups that there was no extensive usage of this mode in the industry.
[Note: Prior vote to remove the 3xx MHz mode.
"Move to accept resolution.
Vote: For: 12 Against: 2 Abstain: 6 (motion carries)"]

The XSBI is an OPTIONAL interface. The commenter is free to implement a proprietary internal interface if desired.

Including different options for the same interface is highly deprecated as it tends to split the market and offer little benefit for the end users. If the commenter believed that the DDR interface had significant benefits, the comment should have proposed substitution of the DDR interface for the present XSBI interface, not offering it as an option.

Cl **52** *SC* *P* *L* # **11**

Ohlen, Peter Optillion

Comment Type **TR** *Comment Status* **A**

The receiver sensitivity is currently specified using the stressed sensitivity, measured with a conditioned input signal to which both jitter and ISI has been added. Although the method has been simplified, it still has a limited track record. There are a few parameters which can put you in different corners of a multi-dimensional "stress space". Different receivers designs have different strong and weak points, and depending on which corner you choose, you punish or favor different devices. For some, the nominal sensitivity is more critical, for others, SJ stress is most difficult. For yet another rx, DCD is more difficult.What do we really want to to? We want to find a set of parameters for the stressed eye such that the subsets (1)[passes_test & not_working] and (2)[fails_test & works] are both minimized. This calls for extensive testing and development of test procedures.At the time we want to make products that we can sell to the market-place without revising the spec numbers every other month.These two things don't go along very well, and we might need to give up one of the two options.

SuggestedRemedy

Settle on something that we think works today, with numbers that can easily be validated. Do one or several of the following:

1. Make the currently informative receiver sensitivity normative. This measurement is easier to calibrate but does not test jitter.

Separate the jitter and the ISI in the RX stress tests:

2. Remove the jitter from the stressed eye, only use a low-pass filter. Thi s would guard against low-bandwidth signals caused by TX and/or fiber impairments.

3. Introduce a SONET-style jitter tolerance test to ensure that the receiver can cope with a jittered input signal.

Other things we could do:

4. Keep the stressed eye, but follow the precedent of 1GbE and take out the margin for the stressed sensitivity because of the large uncertainty in how the actual penalty and stress (VECP measured on the oscilloscope) correlate.

5. Recognize that we have gathered enough measurement data to say that the stressed eye methodology is well understood and the we have confidence in the chosen numbers and know their significance to ""mission mode"" performance.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. Keep current specification and methodology, but recognize that measurements are still needed to prove viability. It is believed that the current methodology is sound.

16:4

Cl **52** *SC* **52** *P* **437484** *L* # **99024**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **R** *D4.0 #43 test*

Need to prove viability of all optical test methods and detailed optical spec numbers, and/or make changes to achieve viability.While technical feasibility of PMDs has been demonstrated, although with tiny numbers of samples, feasibility of some of the measurement and specification procedures has not. Some procedures have not been exercised; some have and have been shown to be not viable. Until we have measurement procedures that work we cannot freeze the specification values.

SuggestedRemedy

Continue, and ramp up, the engineering work to refine and/or replace optical test methods and detailed optical spec numbers.Set a non-binding target hurdle of proof of feasibility such as:
For test procedures: procedure satisfactorily demonstrated in at least three organizations, on at least three samples per site, with a high level of confidence in the repeatability and the correlation from site to site.For PMD spec values: PMDs from at least three implementers compliant per feasible measurement techniques consistent with draft standard, with at least three samples per site, with a high level of confidence in interoperability across the compliant parameter space.This is a pretty weak level of experimental confidence and, I understand, represents a tiny fraction of the numbers of parts measured for the Gigabit Ethernet standardization process.In some instances we may be able to develop confidence by reference to other work, e.g. OC-192 parts.To avoid needless program slippage and churn, delay the issue of Draft 4.1 until we have demonstrated at least one of everything and have developed procedures, parameter limits and text which at least appear to be viable and worth further refinement.

Response *Response Status* **U**

REJECT. This is a process request, not a comment against the draft.

9:1:2

Cl **52** *SC* **52.15.4** *P* **479483** *L* # **99026**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **A** *D4.0 #82*

Should there be more in the Value/Comment column? Compare other clauses.

SuggestedRemedy

I have made this a TR so you can gather suggestions over more than one editing cycle.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. No specific recommendations here. We are still finalizing contents of clause, so comments may be premature. Specific suggestions are encouraged for these cells.

8:2:3

Cl **52** *SC* **52.3** *P* **453** *L* **36** # **181**

Thaler, Pat — Agilent Technologies

Comment Type **TR** *Comment Status* **A**

D4.0 comment resolution changed the names of fault conditions to remove "local".

SuggestedRemedy

replace local_fault and local fault with fault

Response *Response Status* **W**

ACCEPT.

Cl **52** *SC* **52.4.6** *P* **455** *L* **29** # **88**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **A**

Not clear. I believe we mean to report faults within this PMD by this function, not faults elsewhere that could in other sublayers invoke "LF". It's implementation specific anyway.

SuggestedRemedy

I would appreciate advice from the logic gurus. My suggestion is, replace "local fault" with "fault associated with the PMD", and add "The faults detected by this function are implementation specific."

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. See #181. "PMD_fault is the logical OR of PMD_receive_fault, PMD_transmit_fault and any other implementation specific fault."

Also, forgot to implement D4.0 #270: Need to change text in PMD_receive_fault to: "PMD_receive_fault is the logical OR of NOT SIGNAL_DETECT and any implementation specific fault."

13:1

Cl **52** *SC* **52.5.3** *P* **447** *L* **7** # **99027**

Paul Kolesar — OFS Fitel

Comment Type **TR** *Comment Status* **A** *D4.0 #359 budgets*

The 7.3 dB power budget value does not seem to be supported by the transmitter and receiver specs. Using clause 52.6 as an example, it appears that the power budget is derived by taking the highest signal level in the triple trade off table and subtracting the receiver sensitivity. In this example (-3.2) - (-12.6) = 9.4 power budget. Following this approach with clause 52.5 yields (-2.8) - (-11.98) = 9.2, not the 7.3 dB stated in Table 52-10.

SuggestedRemedy

Rectify by adjusting appropriate Tx and Rx parameters following consistent philosophy for both S and L PMDs.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. Arbitrary spectral characteristics chosen for budget values, not worst case.

Cl **52** *SC* **52.6 to 52.9** *P* **444** *L* # **39**

Thaler, Pat — Agilent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 comment*

Many of the test methods specified here do not have demonstrated viability. For instance:

stressed eye generation measurement and stressed sensitivity needs further work.

BERT bathtub "W" test appears to be producing misleading results.

We thought we could create a worst case pattern for jitter tests to shorten test time - the psuedo-random data pattern of 49.2.8. However, we are finding that the worst case pattern is not predictable and we get bit errors with a long (2^31) PRBS pattern under conditions that don't get errors for the psuedo-random pattern. Therefore, we may have to give up on a short cut and revert to testing with random/psuedo-random bit streams.

SuggestedRemedy

Verify all test methods before approval of the draft. Modify as necessary. This modification of the tests may also require modification of some parameter values in the specification.

See the comments of Piers Dawe for more specifics.

Response *Response Status* **W**

REJECT. Duplicate… Delete

Cl **52** *SC* **52.6.1** *P* **448** *L* **35** # **99030**

Jim Tatum — Honeywell

Comment Type **TR** *Comment Status* **R** *D4.0 #1*

There is no specification for rise and fall time for the 10GBASE -L and 10GBASE-E transmitters in tables 52-12 and 52-17. In addition, it makes no sense to talk about side mode suppression in Table 52-12 when the allowed RMS spectral bandwidth is clearly multimode.

SuggestedRemedy

Add rise and fall time specs to tables 52-12 and 52-17.Remove reference to side mode suppression in table 52-12.

Response *Response Status* **U**

REJECT. Insufficient evidence to reinstate rise and fall times for -L and -E. SMSR is necessary to complete specification.

Cl **52** *SC* **52.6.1** *P* **449** *L* **3-39** # **99032**

Juergen Rahn — Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #94 ttc*

In 10GBASE-L: 1310 nm 10km triple-trade-off is used.This trade-off is intended to optimize the yield of laser transmitters to support this spec; the resulting difference in optical power levels from the model is only a few 0.1 dB; considering that the general measurement accuracy and reproducibility of optical power measurements is of the order of +/- 0.25 dB the “gain” of this trade-off is to be doubted; even more the amount of testing needed to verify spec compliance is much more than the actual gain in component yield; finally the validity of the model as such is still not confirmed. So if the main reason for the optical spectrum broadening is chirp this may interact with fibre dispersion in a positive or negative way.(positive way : pulse compression ; negative way : pulse broadening) This behavior cannot be modeled by simple spectral measurement and may lead to wrong conclusions. However if the validity of the model is not proven and this model is used as a basis for specification and as such also for verification, this can only lead to rejecting good devices and approving bad devices, which does not serve this industry.

SuggestedRemedy

triple tradeoff should be removed from the 1310 nm interface and the spec should be further simplified, e.g. by specifying a minimum OMA output power of -3.5 dBm (or any other value that serves this application). The gain of allowing up to -4 dBm due to the model is not significant enough to justify the model; it is only unnecessarily complicated.

Response *Response Status* **U**

REJECT. Triple tradeoff curves do simplify normative compliance over a wider range of laser parameters than permitted by a point specification. Specifically, allowed OMA range is 0.8 dB which is relatively significant for emerging DFB-like technologies (example: LW-VCSELs).

9:2:1

Deferred until Piers recalculates TTC and tables with TDP.

Cl **52** *SC* **52.6.2** *P* **450** *L* **14** # **99033**

Juergen Rahn Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #93 clock tolerance*

For the 10GBASE-LW receive optical specifications a clock tolerance of +/-100ppm is specified in table 52-14. This is more than is required in relation to the transmitter specification and any possible transport network such as SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such, the specification is internally inconsistent and also inconsistent with respect to transport equipment. There is no reason to require the receiver to have a tolerance of +/- 100 ppm because no received signal will ever have a frequency offset greater than +/- 20 ppm. The receiver specification should be changed to what is required in line with the transmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW in table 52-14 with 9.95328 GBd as rate and +/- 20ppm as clock tolerance in the same way as it is in Table 52-12.

Response *Response Status* **U**

REJECT. This is consistent with Clauses 46-51. This would be a flip-flop of a previous decision after much discussion to set the receiver frequency tolerance to +/- 100 ppm (the suggested change was rejected once)

6:1:3

Cl **52** *SC* **52.7.1** *P* **452** *L* **24** # **99035**

Juergen Rahn Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #40*

For 10GBASE-E: 1550nm 40km an Extinction Ratio minimum of 3 dB is specified: Considering directly modulated lasers in 1310nm a minimum of 4 dB for 1310 nm, which can be justified for those directly modulated sources, a lower value for indirectly modulated lasers is totally out of place. In contrast to this it has been proven during the feasibility investigation that a lower value than 8.2 dB results in an increased path penalty. If there is a need to allow future new technologies then there should be an idea of what that is. Currently we are not aware of any alternative (cheaper) technology (besides EML) that could support 40 km transmission at 1550 nm. There might be also impact on other parameters then Extinction Ratio.

SuggestedRemedy

Change the minimum extinction ratio to 8.2 dB for 1550 nm EML source.

Response *Response Status* **U**

REJECT. This would make Extinction Ratio the primary specification, where OMA is the desired specification.

11:1:4

Cl **52** *SC* **52.7.2** *P* **453** *L* **14** # **99036**

Juergen Rahn Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #92 clock tolerance*

For the 10GBASE-EW receive optical specifications a clock tolerance of +/-100ppm is specified in table 52-18. This is more than is required in relation to the transmitter specification and any possible transport network such as SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such, the specification is internally inconsistent and also inconsistent with respect to transport equipment. There is no reason to require the receiver to have a tolerance of +/- 100 ppm because no received signal will ever have a frequency offset greater than +/- 20 ppm. Thereceiver specification should be changed to what is required in line with the transmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW in table 52-18 with 9.95328 GBd as rate and +/- 20ppm as clock tolerance in the same way as it is in Table 52-17.

Response *Response Status* **U**

REJECT. See #93.

5:1:4

Cl **52** *SC* **52.8** *P* **455** *L* **25** # **99037**

Juergen Rahn Lucent Technologies

Comment Type **TR** *Comment Status* **A** *D4.0 #91*

The transmitter and receiver jitter requirements for the WAN interfaces are defined to be 0.35 UI pk to pk DJ for 10GBASE-E and 0.3 UI pk to pk DJ + some amount of random jitter for the 10GBASE-L. Measurements have shown that this will result in a penalty of about 3 dB and 2.5 dB respectively (Typical), while no tolerance difference between 1550nm and 1310 nm receivers have been observed so far. Due to the fact of measuring at TP3, the related penalty is a part of transmitter and path penalty also, and it is in total too big and needs to be reduced significantly. A jitter only penalty value a bit above 1dB could be acceptable at this reference point. This jitter tolerance penalty should be possible to be achieved for worst case EOL conditions under 0.2 UI pk to pk DJ conditions following the measurement results.

SuggestedRemedy

Change the maximum deterministic pk to pk jitter values in table 52-20 BERT mask specifications Table for 10GBASE-L from 0.30 UI pk to pk to 0.2 UI pk to pk and the values for the 10GBASE-E from 0.35 UI pk to pk to pk to the same value of 0.2 UI pk to pk, which will serve feasibility of the receivers.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. Section replaced by new jitter methodology.

Cl **52** *SC* **52.9** *P* *L* # **99039**

Lindsay, Tom — Stratos Lightwave

Comment Type **TR** *Comment Status* **A** *D4.0 #293*

A Golden PLL is required in several places. Although parameters and values are not included in the standard, their performance can greatly affect measured results.

SuggestedRemedy

From test equipment manufacturers, require demonstration of golden PLL performance acceptable for 802.3ae or at least a path to acceptability.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. Technical feasibility to be demonstrated, even though this comment does not directly address a text change.

6:1:2

Cl **52** *SC* **52.9** *P* **467** *L* **23** # **136**

Booth, Brad — Intel

Comment Type **TR** *Comment Status* **A**

In November 2001, the serial PMD group stood before the Task Force and stated that they had shown technical feasibility and that they had a path to compliance. The Task Force accepted this resolution as did the Working Group in granting conditional approval for the draft to go to Sponsor Ballot. After the first Sponsor Ballot circulation, the serial PMD group decided to change the test methodology for the serial PMDs. This major change to what was previously deemed technical feasible calls into question whether or not the serial PMD group and Task Force have achieved technical feasibility.

This new methodology and parameters for the serial PMDs has not been presented to the Task Force or Working Group to provide proof of technical feasibility in the form of manufacturability and ability to conformance test serial PMDs. Without proof that the new methodology and parameters are equal to or better than what the draft previously contained, one can only be left to assume that all previous statements about technical feasibility are now invalid and void.

SuggestedRemedy

Provide data to the Task Force that shows that at least 4 optical transceiver vendors can conform to the new specifications. Provide data to the Task Force that shows the difference between D4.0 and D4.1 test methodologies. Provide data to the Task Force that proves that vendors who comply with the D4.1 test methodology also comply with the BER, distance and interoperability requirements as per our objectives, PAR, and 5 criteria.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

Technical feasibility of transceivers was asserted and proved, but the measurement techniques were not. New methodologies and parameters were presented to the IEEE task force at the Santa Rosa meeting, where they were incorporated in D4.1.

There is a consensus opinion within the PMD track that the current direction is the best one to follow.

Comparing D4.0 and D4.1 methodologies or results is not helpful to moving the standard forward.

Verification of test methodology based on experimental results will be shown at April meeting.

[Note from commenter: I eagerly await the information to be presented at our next interim meeting with the expectation that with the experimental results shown, this comment will be withdrawn]

Cl **52** *SC* **52.9.11.1** *P* **478** *L* **21** # **139**

Pepeljugoski, Petar IBM

Comment Type **TR** *Comment Status* **A**

The Bessel-Thompson filters built-in the measurement equipment have very loose tolerances. These tolerances are +/- 0.85 dB for frequencies up to 7.45 GHz, and grow up to +/- 4dB at 14.9 GHz. Using these components in the receiver conformance testing adds additional level of variability in the measurement setup.

Simulations show that instead of nominally 2.2 dB, these filters can generate ISI penalties in the range of 1.6 dB to 3.4 dB.

The standard does not prescribe how to correct for these type of errors. For instruments and test implementations where the filters are built-in, it is impossible (or at least very difficult) for the end user to know the magnitude and direction of the error.

For filters built-in the scopes and other instruments it is impossible for the end user to determine the actual bandwidth

SuggestedRemedy

Modify the receiver conformance test setup to eliminate the 7.5 GHz filter used to calibrate the VECP of the stress signal and mandate high bandwidth receiver. Accordingly, modify Tables 52.9, 52.14 and 52.18 (the entry for the required VECP).

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. Replace text "The vertical and horizontal eye closures to be used for receiver conformance testing are verified using an optical reference receiver with a 7.5 GHz fourth order Bessel-Thomson response as specified in G.691 as the ITU-T STM-64 reference." with "The vertical and horizontal eye closures to be used for receiver conformance testing are verified using an optical reference receiver with a 7.5 GHz fourth order ideal Bessel-Thomson response. Use of G.691 tolerance filters may significantly degrade this calibration."

12:3

Cl **52** *SC* **52.9.12.3** *P* **481** *L* # **171**

Lindsay, Tom Stratos Lightwave

Comment Type **TR** *Comment Status* **A**

We discussed controlling the sampling point being +/- offset from the center. We need more verification of the "contract" between Tx and Rx (jitter and amplitude), but at least the Rx should represent typical behaviors and tolerance of receivers.

SuggestedRemedy

Specify the sampling point as +/-0.1 UI from the eye center.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. See #10.

Cl **52** *SC* **52.9.13** *P* **481** *L* **33** # **134**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **R**

Coming under renewed pressure from the food chain to declare the minimum mean power. Let's just do it, it won't hurt!

SuggestedRemedy

Add normative Tx specifications to three tables 52-7, 12, 17 which impose a minimum mean power about 0.5 dB above the hypothetical minimum mean power for minimum OMA, the most favorable triple trade off point and a very high extinction ratio. Suggested values were -5.5 dBm for BASE-L, -3 for BASE-E. See Pave_OMA-L.pdf and Pave_OMA-E.pdf
For BASE-S, if in-building links are less likely to be tested with power meters, we could either do the same or just include an informative note which gives the hypothetical minimum.

Response *Response Status* **U**

REJECT. This overspecifies a link and may confuse customers.

11:1

Cl **52** *SC* **52.9.5** *P* **469** *L* **38** # **109**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **R**

Following improvements agreed last time, this subclause can be condensed and brought further into line with industry practice. This also makes for cheaper measurements (because the DUT has to be exercised in fewer modes), and makes for a more relevant measurement. We could have reduced this to a one-liner "per ANSI/TIA/EIA-526-4A" but because OMA is relatively new, let's spell it out.

SuggestedRemedy

"52.9.5 Optical modulation amplitude (OMA) measurement

OMA is the difference in optical power for the nominal "1" and "0" levels of the optical signal as defined as b1 and b0 in ANSI/TIA/EIA-526-4A-1997 [B13]. It should be assured during system operation. However, measurements with pattern 1 or 3 defined in 52.9.1, or other patterns such as a 2^23-1 PRBS or a valid 10GBASE-R or 10GBASE-W or OC192c or STM-64 signal will give equivalent results. The measurement system, e.g. digital communications analyzer, has a 4th order Bessel-Thomson filter as specified in 52.9.7. On an eye diagram, b1 is the mean of the histogram of the upper half of the diagram in the time window from 0.4 to 0.6 UI where 0 and 1 UI are the mean crossing times of the signal. Similarly, b0 is the mean of the histogram of the lower half of the diagram in the same time window. OMA, known as "Eye Amplitude" in some digital communications analyzers, is b1 - b0. It is equivalent to
OMA = 2A((ER-1)/
(ER+1))
where A is the average optical power A (in mW) and ER = b1 /b0 is the extinction ratio (absolute ratio NOT dB). OMA may be quoted in dBm or mW."

Delete figures 52-6 and 52-7.

Response *Response Status* **U**

REJECT. Revert to square wave method (D4.0). State "OMA can be approximated by AN on Fig. XXX". (goes in OMA measurement section, replacing "An alternative… " paragraph.)

13:4

Cl **52** *SC* **52.9.6.3** *P* **472** *L* **12** # **113**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **A**

Wrong pattern. OMA in RIN test must use same pattern as OMA in OMA test!

SuggestedRemedy

Replace "square wave pattern of 52.9.1" by "a signal or pattern per 52.9.5"

Response *Response Status* **U**

ACCEPT IN PRINCIPLE. No change required because square wave already specified for OMA.

13:1

Cl **52** *SC* **52.9.7** *P* **472** *L* **41** # **116**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **R**

Time definitions "measured at the average value of the optical eye pattern" is what we want, but specifying it involves straying too far into the inner workings of oscilloscopes. I had a quick look at this: what they do seems to be good enough, and we have bigger issues to settle.

SuggestedRemedy

Delete "measured at the average value of the optical eye pattern".

Response *Response Status* **U**

REJECT. The definition is trying to emulate AC coupling which is typical for receivers.

12:2

Cl **52** *SC* **6.2** *P* **450** *L* **14** # **99046**

Geoffrey Garner Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #11 clock tolerance*

For the 10GBASE-LW receive optical specifications a clock toleranceof +/-100ppm is specified in table 52-14. This is more than is required inrelation to the transmitter specification and any possible transport network suchas SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such,the specification is internally inconsistent and also inconsistent with respect totransport equipment. There is no reason to require the receiver to have a tolerance of+/- 100 ppm because no received signal will ever have a frequency offset greater than+/- 20 ppm. Thereceiver specification should be changed to what is required in line with thetransmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW with 139.95328 GBd as rate and +/-20ppm as clock tolerance in the same way as it isin Table 52-12.

Response *Response Status* **U**

REJECT. See #93.

5:1:4

Cl **52** *SC* **6.2** *P* **450** *L* **14** # **99045**

Rick Townsend — Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #35 clock tolerance*

For the 10GBASE-LW receive optical specifications a clock toleranceof +/-100ppm is specified in table 52-14. This is more than is required inrelation to the transmitter specification and any possible transport network suchas SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such,the specification is internally inconsistent and also inconsistent with respect totransport equipment. There is no reason to require the receiver to have a tolerance of+/- 100 ppm because no received signal will ever have a frequency offset greater than+/- 20 ppm. Thereceiver specification should be changed to what is required in line with thetransmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW with 139.95328 GBd as rate and +/-20ppm as clock tolerance in the same way as it isin Table 52-12.

Response *Response Status* **U**

REJECT. See #93.

5:1:4

Cl **52** *SC* **7.2** *P* **453** *L* **14** # **99047**

Rick Townsend — Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #34 clock tolerance*

For the 10GBASE-EW receive optical specifications a clock toleranceof +/-100ppm is specified in table 52-18. This is more than is required inrelation to the transmitter specification and any possible transport network suchas SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such,the specification is internally inconsistent and also inconsistent with respect totransport equipment. There is no reason to require the receiver to have a tolerance of+/- 100 ppm because no received signal will ever have a frequency offset greater than+/- 20 ppm. Thereceiver specification should be changed to what is required in line with thetransmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW with9.95328 GBd as rate and +/-20ppm as clock tolerance in the same way as it isin Table 52-17.

Response *Response Status* **U**

REJECT. See #93.

5:1:4

Cl **52** *SC* **7.2** *P* **453** *L* **14** # **99048**

Geoffrey Garner — Lucent Technologies

Comment Type **TR** *Comment Status* **R** *D4.0 #12 clock tolerance*

For the 10GBASE-EW receive optical specifications a clock toleranceof +/-100ppm is specified in table 52-18. This is more than is required inrelation to the transmitter specification and any possible transport network suchas SDH/SONET, OTN, and also old legacy 10 G WDM transponder equipment. As such,the specification is internally inconsistent and also inconsistent with respect totransport equipment. There is no reason to require the receiver to have a tolerance of+/- 100 ppm because no received signal will ever have a frequency offset greater than+/- 20 ppm. Thereceiver specification should be changed to what is required in line with thetransmitter and transport network specification.

SuggestedRemedy

Add an extra column for 10GBASE-LW with9.95328 GBd as rate and +/-20ppm as clock tolerance in the same way as it isin Table 52-17.

Response *Response Status* **U**

REJECT. See #93.

7:1:2

Cl **52** *SC* **7.2** *P* **456** *L* **20** # **1**

Juergen Rahn — Lucent Technologies

Comment Type **TR** *Comment Status* **R**

The sensitivity has again been made 1 dB more stringent. This is incontradiction to the feasibility investigation result.

SuggestedRemedy

Replace the nominal sensitivity with 13.4 dBm and thestressed with 10.3 dBm

Response *Response Status* **W**

REJECT. Current specifications reflect feasibility study results, are consistent (but not identical) with SONET, and maintain current link budget.

Cl **52** *SC* **8** *P* **466** *L* **12** # **2**

Juergen Rahn — Lucent Technologies

Comment Type **TR** *Comment Status* **R**

The jitter methodology has been changed to a new not verifiedprocedure. Itis not clear if this gives feasible results.

SuggestedRemedy

Change the method to industry practice . Reference ITUTG.783 for 10G WAN-Phy jitter specification.

Response *Response Status* **W**

REJECT. The SONET standard does not deal with jitter within a link. The SONET specification deals with accumulated jitter which is not relevant for an Ethernet (point-to-point) link.

Cl **52** *SC* **Table 52-14** *P* **450** *L* **22** # **99049**

Pepeljugoski, Petar IBM

Comment Type **TR** *Comment Status* **R** *D4.0 #114 stressed receiver*

The stressed receive sensitivity measurement is difficult to implement and calibrate (the input signal for the test). It has not been shown that it can be implemented in a repeatable manner.

SuggestedRemedy

Implement a stressed receive sensitivity measurement with input signal that has the vertical eye closure requirements, but not the jitter requirements (horizontal eye closure).

Response *Response Status* **U**

REJECT. Overtaken by new stressed receiver calibration.

6:1:4

Cl **53** *SC* **53.7.1** *P* **504** *L* **19** # **196**

Paul Kolesar OFS

Comment Type **TR** *Comment Status* **A**

120 ps rise and fall time results in ISI penalty at 300 m exceeding 3.6 dB. I believe the link model presently on the IEEE 802.3ae web site predicts 4 dB of ISI. Since the development of 1000BASE-LX, we have imposed an unwritten limit of 3.6 dB for good engieering practice. All other PMDs comply with this limit.

SuggestedRemedy

Reduce rise and fall spec to a value that results in no more than 3.6 dB ISI. For the model on the web site, this translates into 100 ps rise and fall time.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

The link model posted on the web is not up to date. The current link model does reflect a worst case ISI penalty of less than 3.6dB given the LX4 specification in Draft 4.1. Therefore, the suggested remedy by the commenter is not necessary.

However, it is recommended that the link model posted on the web be updated after each draft to reflect any possible changes in the link performance. This suggestion has been forwarded to committee.