Cl **00** *SC* *P* *L* # 6

George, John

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

The parameters in clause 68 create a specification that will enable compliant transceivers to support a certain percentage of single installed multimode fibers - known as fiber coverage. In past IEEE optical PMDs where coverage was relaxed to less than 100% (99%) the coverage was calculated for bi-directional links. 10GBASE-LRM requires two fibers on which to operate a bi-directional link and the end user is concerned with link coverage. For example, if the 95% fiber coverage being proposed is adopted it will result in a dangerously low 90% link coverage which is unacceptable for a PMD that will be used primarily in backbone applications.

SuggestedRemedy

SuggestedRemedy: For all modeling and affected parameters in clause 68, adjust values to assure an agreed upon bi-directional link coverage. For example, to achieve 95% link coverage requires 97.5% fiber coverage (0.975^2=0.95), and 99% link coverage requires 99.5% fiber coverage.

Proposed Response *Response Status* **U**

REJECT.
Motion to accept in principle
Stating that no changes required to document.
Moved: Mike Dudek
Seconded: Paul Kolesar

Vote to call question:
For: 23
Against: 11
Abstain: 1

Vote on motion
For: 9
Against: 23
Abstain: 4

Motion to reject
No specific remedy suggested.

Moved: Nick Weiner
Seconded: Jan Peeters Weem

Motion to call question:
For: 32
Against: 2
Abstain: 0

Vote on Motion:
For: 27
Against: 7
Abstain: 2
Motion passes.

Cl **68** *SC* **68.5** *P* **17** *L* **10** # 160

Kolesar, Paul Systimax

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

In Table 68-2, the maximum operating range for 50 um fibers with 500/500 and 400/400 MHz-km modal bandwidths have not been substantiated by simulation or experimental data. The properties of populations of these fibers are substantially different from 62.5 um and OM3 fibers so that they must be analyzed independently for each 50 um fiber type. For example, all specifications for operation on 62.5 and OM3 fibers were based on analysis with fibers having no less than 500 MHz-km bandwidth at 1300 nm. In addition the installed base of 50 um fibers with 500/500 bandwidth has a distinctly different bandwidth distribution than that of 62.5 um fibers.

SuggestedRemedy

Perform necessary analysis and experiments to determine actual range limits. To that end, the Task 1 Channel Modeling ad-hoc group have been developing ""worst case"" fiber models for 50 um fibers of similar sort to that of the 108-fiber model developed for 62.5 um fibers. This work must be brought to completion and the results applied to determine actual operating ranges on the 500/500 and 400/400 MHz-km grades of 50 um fiber. Monte Carlo models or, preferably, actual fiber data will also be required to analyze statistical distributions and the dual launch approach.

Proposed Response *Response Status* **U**

REJECT.
Specific change to document not suggested.

Cl **68** *SC* **68.5** *P* **17** *L* **78** # 165

Abbott, John — Corning Incorporated

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

The long standing philosophy in 802.3 is to employ worst case design values to ensure a robust system. The LRM specifications need to balance requirements for (a) worst case design (i.e. failure rate of less than 1%); (b) functional objectives (i.e. 300m & BER<10^-12), and (c) low cost/complexity (i.e. PIE-D = 5dB). The ISI parameters in Table 68-4 for the comprehensive stressed receiver test are not consistent with a 1% duplex link failure rate based on Monte Carlo modeling with the Gen67YY data set; nor are they consistent with a 1% single channel failure rate based on calculations using actual 98-99 fiber DMD data. Hence the link length will need to be reduced so that (a)-(b)-(c) are all met.

SuggestedRemedy

The specific suggested remedy based on simulation results and actual fiber DMD data is to reduce the length 15% to 255m in table 68-2 p.17 lines 7-9 for 62.5.um fiber. The required change in target length needs to be finalized by 802.3aq once the complexity (c) is finalized.

Proposed Response *Response Status* **U**

REJECT.
See comment 158.

Motion to accept in principle.
See comment 158; Beyond this, further change not required.
Moved: David Law
Seconded: Mike Dudek.

Motion to amend
See comment 158; Also change 62.5um and 500/500 50um 300m operating range upper limits to 220m in Table 68-2.
Moved: Paul Kolesar
Seconded: Steve Swanson
For: 7
Against: 23
Abstain: 2
Motion to amend fails

Motion to amend
Reject with same explanation.
Moved: Piers Dawe
Seconded: Jonathan King
For: 22
Against: 6
Abstain: 3

Motion becomes:

Motion to reject.
See comment 158; Beyond this, further change not required.
Moved: David Law
Seconded: Mike Dudek.

For: 30
Against: 4
Abstain: 2

Cl **68** *SC* **68.5** *P* **18** *L* **9** # 166

Abbott, John — Corning Incorporated

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

The center wavelength range of the laser in table 68-3 is 1260-1355nm. A calculation has been done to determine the impact on failure rate as the laser wavelength is shifted from 1300 to 1355nm. A similar calculation was done by TIA during the development of the OM3 product (see Pepeljugoski et al., JLT vol.21 No.5 May 2003 p.1273 figure 17); in that case the failure rate increased by 0.3% as the wavelength shifted 5nm off of 850nm. Calculations based on the Gen67YY Monte Carlo set indicate that shifting from 1300 to 1355nm increases the failure rate between .75%(PIE-D=5) and 1.5%(PIE-D=4) depending on PIE-D required. Hence the target length will need to be reduced slightly.

SuggestedRemedy

The specific suggested remedy based on simulation results is to reduce the LRM length by 10% to 270m in table 68-2 p.17 lines 7-9 for 62.5.um fiber. The calculation of the required change in target length needs to be verified by the 802.3aq LRM task force. The calculation will need to be repeated and the target length will change if there are adjustments in the required complexity (c) [PIE-D implicit in comprehensive stressed receiver test] and target % failure rate [coverage of installed base]. A similar effect is expected with OM3 fiber.

Proposed Response *Response Status* **U**

REJECT.

Motion to reject with the explanation:
TP2 group has recommended that we choose or create TP2 stressors that are approximately 0.07dB greater than TP3 stressors and enter into TWDP code. However no changes to Draft 2.0.
Moved: David Law
Seconded: Norm Swenson
Passed without opposition

Cl **68** *SC* **68.5.2** *P* **20** *L* **7** # 213

Thompson, Geoff

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

The receiver max input should be able to tolerate the max transmitter output likely to be encountered (plus margin) and be stated as such.

SuggestedRemedy

Change the text that reads:
"f The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having a power level equal to the average receive power (max) plus at least 1 dB."

To:
"f The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having a power level equal to the average transmit power (max) of any 802.3 optical transmitter plus at least 1 dB."

Proposed Response *Response Status* **U**

REJECT.
The present value covers existing 802.3 multimode PMDs. Not possible to anticipate future standards.

Cl **68** *SC* **68.52** *P* **17** *L* **20** # 215

George, John

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

Statement must be normative.

SuggestedRemedy

Receivers will have to tolerate dynamically changing impulse response shapes and PIE-D with changes in polarization and fiber shaking. This has been shown is balemarthy_1_0105, king_1_1104, and meadowcroft_1_0105. Thus, the statement should clearly be identified as normative by removing the words "Also, for information".

Proposed Response *Response Status* **U**

REJECT.
See proposed response to comment 1.

Motion to accept this response:
Moved: Jonathan King
Seconded: Piers Dawe

For: 21
Against: 6
Abstain: 3

Cl **68** *SC* **68.6.6.2** *P* **24** *L* **30** # 293

Swenson, Norman ClariPhy Communicati

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

The TWDP algorithm scales the OMA of the measured waveform to 1 and sets the noise spectral density accordingly. A matched filter bound for a rectangular pulse with OMA 1 is used as a reference point for determining TWDP. This penalizes waveforms with larger OMAs and less predistortion in a manner that does not accurately predict link performance.

SuggestedRemedy

Change the TWDP algorithm to accurately measure the matched filter bound of the transmitted waveform and compare that to the effective SNR at the slicer of the reference equalizer. Define limits that will ensure link closure with a compliant channel and receiver.

Proposed Response *Response Status* **U**

REJECT.
See motion recorded in response comment 255.

Cl **68** *SC* **68.6.9.1** *P* **28** *L* **11** # 333

Kolesar, Paul Systimax

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

The comprehensive stressed receiver sensitivity test insufficiently tests the capability of the receiver. Experimental reports from more than one laboratory (e.g. Balemarthy_1_0105) have shown that waveform changes induced by variations in singlemode polarization state cause variations up to 2.5 dB in PIE-D. The ability of the receiver to track such changes is untested, although the ability to support such waveform changes is required in clause 68.5.2. While arguments have been put forth that these waveform variations happen at speeds well below the feedback loop time constants of EDC chips, there are other aspects besides speed of adjustment that determine the ability of the equalizer to faithfully track such changes without inducing bit errors. For examples, the chips ability to hold accurate clock recovery, correctly adjust its coefficients (tracking accuracy), and have sufficient headroom in its adjustment range are not established only by the speed of its feedback loop. These aspects can be checked in aggregate by a test that induces variation in the received waveform that emulate changes induced by mechanical perturbation observed experimentally.

SuggestedRemedy

Add a dynamic aspect to the comprehensive stressed receiver sensitivity test. One means of accomplishing this would be to vary the tap weights of the ISI generator of figure 68-10 to emulate experimentally captured waveform changes induced by polarization state variations or multimode fiber shaking. This approach has the advantage of leveraging the measurement configuration of the existing test. The frequency of the variation should be at least 10 Hz, and the amplitude of the tap weight changes within a full cycle should be sufficient to cause an increase of 2.5 dB in PIE-D relative to the three presently defined comprehensive stressed receiver test signals of table 68-6. A possible alternative approach, if it can be shown to impart similar rigor, would be to continuously vary the test signals from the defined pre-cursor to split symmetrical to post-cursor conditions (and back again) at a rate of at least 10 Hz during the comprehensive stressed receive test.

Proposed Response *Response Status* **U**

REJECT. See proposed response to comment 1.

Also, to further address specific points raised in the comment:
Commenter> .. The chips ability to hold accurate clock recovery
Editor> This is tested during the separate comprehensive stressed receiver tests.
Commenter> .. Correctly adjust its coefficients (tracking accuracy)
Editor> Correct (and accurate) adjustment of coefficients is verified by the existing comprehensive stressed receiver tests. Tracking ability is the only aspect that would be verified by a dynamic test, and this is easily verified using informal methods.
Commenter>.. Have sufficient headroom in its adjustment range
Editor> This is verified by the existing comprehensive stressed receiver tests.

Motion to accept above response:
Moved Scott Schube
Seconded Jan Peeters Weem

Motion to call the question:
For: 24
Against: 5
Abstain: 4

Vote on motion:
For: 24
Against: 5
Abstain: 5

Cl **68** *SC* **68.8** *P* **34** *L* **4** # 367

Thompson, Geoff

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

The text:
"Insertion loss measurements of installed multimode fiber cables are made in accordance with ANSI/TIA/EIA-526-14A/Method B or IEC 61280-4-1/Method 1." is ambiguous. I don't know how to do a conformance check on this unless I do both tests. Since this is supposed to be drafted as an international standard the TIA reference should be deleted.

SuggestedRemedy

Change the text to read:
"Insertion loss measurements of installed multimode fiber cables are made in accordance with IEC 61280-4-1/Method 1."

Proposed Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Change the text to read:
"Insertion loss measurements of installed multimode fiber cables are made in accordance with IEC 61280-4-1/Method 2"
Method 1 was incorrectly referenced in Draft 2.0.

Cl **68** *SC* **68.9.1** *P* **28** *L* **1** # 369

George, John

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

The comprehensive stress receiver sensitivity test does not include response variations caused by polarization changes and fiber shaking. Such impairments have been shown to occur in MMFs in balemarthy_1_0105, king_1_1104, and meadowcroft_1_0105.

SuggestedRemedy

A dynamic component must be added to the comprehensive stressed receiver sensitivity test. A suggested approach: During the comprehensive stressed receiver sensitivity test, the tap weights of the ISI stressors should be randomly varied at a frequency from 6 to 20 Hz in such a way as to produce PIE-D variations, relative to the statically measured PIE-D, of +/- 1.25 dB for offset launch and +/- 1.75 dB for center launch.

Proposed Response *Response Status* **U**

REJECT.
See response to comment 1.

Response agreed by consensus

Cl **68A** *SC* **6** *P* **19** *L* **44** # 414

Ghiasi, Ali
Broadcom

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

Current jitter tolerance test only at a single frequncy will not detect potential weakness in the receiver. Suggest to use jitter tolerance mask per IEEE 802.3ae Fig 52-4.

SuggestedRemedy

Proposed Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See response to comment 222.