

IEEE P802.3aq Draft 2.2 Comments

Cl 68 SC 68.4.1 P 25 L 15 # 20
Swanson, Steve

Comment Type TR Comment Status R Page num: 25. PDF page: 26

Specify a single launch for each fiber type.

SuggestedRemedy

Replace: ""The optical launch condition at TP2 is either the preferred launch or the alternative launch (at the user's choice), as specified in 68.5.1. A compliant PMD shall support both options. The launch is selected by using either a single-mode fiber offset-launch mode-conditioning patch cord or a regular multimode fiber patch cord inserted between the MDI and TP2, consistent with the media type."" with ""The optical launch condition a TP2 is specified in Table 68-3. A compliant PMD shall support both options. The launch is selected by using either a single-mode fiber offset-launch mode-conditioning patch cord or a regular multimode fiber patch cord inserted between the MDI and TP2, consistent with the media type.""

Proposed Response Response Status U

REJECT.

See response to comment 25.

Cl 68 SC 68.4 P 25 L 8 # 22
Abbott, John

Comment Type TR Comment Status R Page num: 25. PDF page: 26

INTEROPERABILITY:

In Fall of 2004 the LRM group passed a motion specifying the minimum terms of acceptance for demonstration of interoperability and requiring a demonstration prior to sponsor ballot. Interoperability has not been demonstrated. The results in http://ieee802.org/3/aa/public/mar05/bhoja_1_0305.pdf draw attention to a problem with center launch. In the OM2 fibers in the cable all 3 Tube 5 fibers are expected to fail CL based on the RNFs. Only one was tested (5 Orange) which failed. Thus 3/6 of the 12/96 OM2 fibers are expected to fail CL launch using this cable.

SuggestedRemedy

Remedy: Demonstration interoperability per 802.3aq LRM TaskForce Motion from Fall 2004.

Proposed Response Response Status U

REJECT.

There is no proposed change to the draft.

Compliance to LRM specification only requires success with either the preferred or alternative launch. The March interoperation test was conducted on an OM2 fiber at 300 m and was successful.

There are OM2 fibers that will work for centre launch too.

The Task Force agrees that additional interoperability testing beyond what was done in March 05 is required to satisfy Motion 3 Nov. 04.

Move to reject:

M: J McVey
S: E. Bergmann
Y: 23 N: 0 A: 8
PASSES

Move: Hostile amendment to strike 2 & 3 paragraphs:

M: S. Swanson
S: J Gwinn
Y: 12 N: 14 A: 3
FAILS

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CI 68 SC 68.5.3.1 P 28 L 51 # 33
John George

Comment Type TR Comment Status A Page num: 28. PDF page: 29

If channel responses are expected to vary by 10 Hz, receivers should be required to tolerate this condition given the clear expectation that such variations will be present in the field.

SuggestedRemedy

SuggestedRemedy: Change "recommended" to required".

Proposed Response Response Status U

ACCEPT IN PRINCIPLE.

This text has not been changed for D2.0 or D2.1 to require a normative test. The TF will change "recommended" to be "highly recommended" to emphasize the desire for tolerance to dynamic response.

Y: 22 N: 2 A: 3
PASSES

Historical information:

The committee has already discussed, at length, the topic of a normative dynamic receiver test.

A selection of comments on this topic, and voting results:

D2.1 comment 1067, suggesting a normative dynamic test.
Vote to reject: For: 21; Against: 6; Abstain: 3

D2.1 comment 1117, suggesting a dynamic aspect to the comp. rx test. Vote to reject: For: 24; Against: 5; Abstain: 5

D2.0 comment 215, suggesting that the statement on dynamic behavior be made normative. Vote to reject: For: 21; Against: 6; Abstain: 3

D2.0 comment 333, suggesting dynamic aspect to the comp. rx test. Vote to reject: For: 24; Against: 5; Abstain: 5

CI 68 SC 68.5.3.1 P 28 L 53 # 34
Swanson, Steve

Comment Type TR Comment Status R Page num: 28. PDF page: 29

Replace informative text with requirement on dynamic response.

SuggestedRemedy

Replace ""Channel responses are expected to vary with time at rates of up to 10 Hz. It is recommended that receivers tolerate such time varying channel responses."" with ""The receiver shall tolerate time varying channel responses to 10 Hz.""

Add appropriate PICs.

Proposed Response Response Status U

REJECT.

See response to comment 33.

CI 68 SC 68.5.31 P 28 L 53 # 36
Abbott, John

Comment Type TR Comment Status A Page num: 28. PDF page: 29

See 1066: Dynamic Penalty.

This clause gives no real guidance to the problem of dynamic variation of the link. In the fall of 2004 the task force looked into this problem, showed a number of examples where it occurs, both for true dynamic and quasi-static cases. The task force was unable to resolve how to solve the problem. This is a particular issue for LRM and within the scope of clause 68. because EDC will work for some pulses and not all.

SuggestedRemedy

REMEDY: reword to
""Receivers shall tolerate such time varying channel responses.""

Proposed Response Response Status U

ACCEPT IN PRINCIPLE.

See response to comment 33.

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CI 68 SC 68.6.6Table68-3 P 33 L # 44

Abbott, John

Comment Type TR Comment Status R Page num: 33. PDF page: 34

Worst Case Design Philosophy: linkage to new OM1 & OM2 link lengths and stressors in draft 2.2.

Link length & stressors need to be chosen to accomodate IEEE worst case design philosophy. The PIE-D and finite equalization penalties & link length need to be consistent with less than a 1% failure rate on duplex links with a 2- and 1- connector design. Need to show the new stressors meet a 1% failure rate on OM1 and OM2 fiber. New data will be presented indicating that the assumption of zero correlation between center and offset launch for OM1 is incorrect. Analysis is required on OM2 fiber to establish the % failure rate on duplex links with connectors.

SuggestedRemedy

Remedy: Review OM1 data, redo analysis, Complete detailed OM2 analysis analogous to OM1.

Proposed Response Response Status U

REJECT.

There is no specific change proposed to the draft.

OM1 and OM2 models have been benchmarked against Ethernet worst case spreadsheet model. This has shown that the D2.2 220 m operating range based on ~ 4 dB PIE_D stressors is appropriate for OM1 and conservative for OM2 fibers with a dual launch.

M: L. Thon
S: J. McVey
Y: 20 N: 2 A: 7
PASSES

CI 68 SC 68.6.6 P 33 L 33 # 49

Ali, Ghiasi

Comment Type TR Comment Status R Page num: 33. PDF page: 34

The only parameter which limits the DCD to 0.5 UI is the Eye mask

SuggestedRemedy

To eliminate some pathological scenario propose to add maximum DCD parameter in the table with value of 0.2 UI p-p

Proposed Response Response Status U

REJECT.

The combination of TWDP and eye mask are sufficient protection against excessive DCD. Move to reject as per the response.

M: M. Dudek
S: J. Gwinn
Y: 16 N: 3 A: 14
PASSES

Move to add a max DCD parameter with the value of 0.15 UI p-p.

M: A. Ghiasi
S: J. Gwinn
Y: 3 N: 17 A: 15
FAILS

CI 68 SC 68.5.1 P 33 L 35 # 51

Swanson, Steve

Comment Type TR Comment Status R Page num: 33. PDF page: 34

10GBASE-LRM should specify a defined launch for guaranteed operation on each fiber type rather than complicate the standard and field implementation of 10GBASE-LRM for the sole purpose of improving the statistical probability of success.

SuggestedRemedy

Delete ""Preferred"" two places in Table 68-3.

Delete ""Encircled flux for alternative launch"" two places in Table 68-3.

Proposed Response Response Status U

REJECT.

See response to comment 25.

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CI 68 SC 68-6 P 33 L 35 # 53
John George

Comment Type TR Comment Status R Page num: 33. PDF page: 34

The alternative launch specified in table 68-3, which is a center launch as specified by encircled flux, will result in about a 35% link failure rate for 220 meter links of FDDI or OM1 (i.e. 62.5 micron), OM2, or 400/400 50 micron fibers, based on the comprehensive stressed receiver test and test pulses signals specified in 68.6.9. Given that most end users will attempt to use the lower cost alternative launch and that 30% of building backbone links are between 201 and 300 meters (per flatman_1_0304 slide 7), end users will in aggregate frequently (for 10 - 15% of links) have to experiment with using mode conditioning patch cords on one or both ends of the link to achieve functionality. An end user having most links close to the 220 meter limit will have to perform such unwieldy experiments for 30% of links. This is an undesirable and unacceptable end user mitigation burden that is not required by other IEEE 802.3 optical standards, and thus market acceptance is unlikely.

SuggestedRemedy

SuggestedRemedy: In table 68-3 remove center launch for 62.5 micron, OM2, and 400/400 50 micron fibers from table 68.3. Specifically, remove all content between lines 38 and 40, and lines 44 and 46, of table 68.3. Also delete note d for table 68.3. Change comprehensive stressed receiver test signals to reflect PIE-D = ~ 4.9 dB to assure 99% coverage of installed 62.5 micron, OM2, and 400/400 50 micron fibers with offset launch.

Proposed Response Response Status U

REJECT.

Benchmarking of the OM1 and OM2 fiber models using dual launch with the Ethernet spreadsheet model suggests that 220 m operating range based on ~4 dB PIE_D stressors is supported.

Regarding suggested change to receiver test: Committee believes that test, as specified in D2.2 is appropriate. See D2.1 comment 1036, in which the receive test stressors were adopted by a vote on an accept in principle. Voting was: Yes: 45; No: 3; Abstain: 3

See response to comment 25.

CI 68 SC 68.6.6Table68-3 P 33 L 36 # 54
Abbott, John

Comment Type TR Comment Status R Page num: 33. PDF page: 34

Refer to comment 1031. Because OM1 and OM2 are not laser-optimized fiber, the 802.3aq LRM standard should not allow centered laser launch as a normative option. The offset launch previously specified for 1000BASE-LX on multimode fiber and 10GBASE-LX-4 on multimode fiber in the Current Ethernet standard should be used. Center launch should only be included as part of an informative annex.

SuggestedRemedy

REMEDY: change ""preferred"" to ""normative"". Move center launches for OM1, OM2 to informative annex.

Proposed Response Response Status U

REJECT.

See response to comment 25 which adds a note of clarification.

CI 68 SC 68.5.1 P 33 L 38 # 56
Kolesar, Paul

Comment Type TR Comment Status R Page num: 33. PDF page: 34

The specification of multiple launch conditions to achieve higher probability of link operation is unprecedented in the history of Ethernet specifications and places an undue burden on the end user to experiment with up to four launch condition combinations per channel to find an operative combination by means of exchanging two types of patch cords. This complexity encumbers the PMD to the point where it runs an unreasonable risk of no longer satisfying the broad market potential criterion. And while deployment of the specified mode conditioning patch cord for 1000BASE-LX may often be on an as-needed basis, the link length at which the cord is needed is almost always in excess of 200 m. The user may choose to ignore the specification at their own risk, but the standard specifies a single launch condition that is functional at for the entire operating range. By comparison, the link failure rate for LRM on legacy fibers with center launch is expected to be about 25% for links of 200 m length, rendering the endorsement of such a solution by inclusion in the standard an act of irresponsibility.

SuggestedRemedy

Delete the alternative launch specifications. Delete the word preferred and move the callout for footnote d to the end of the lines that begin ""Optical launch ..."". Modify footnote d to read: ""The PMD must support both the use of a single-mode fiber offset-launch mode-conditioning patch cord and a regular multimode fiber patch cord between the MDI and TP2.""

Proposed Response Response Status U

REJECT.

See response to comment 25.

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CI 68 SC 68.6.6 P 36 L 34 # 67
Ali, Ghiasi

Comment Type TR Comment Status R Page num: 36. PDF page: 37

The maximum jitter tolerance specified is at 200 KHz, but IEEE 802.3ae, XFI, and This document on page 41 defines CRU with 4 MHz bandwidth. The disconnect between transmitter and receiver may cause significant interoperability issues. Passing transmitters may fail to operate with receivers, because the receiver can not handle SJ frequency up to 4 MHz which comes through the transmitter CDR.

Suggested Remedy

Add additional line to jitter tolerance at 4 MHz with 0.1 UI of SJ p-p amplitude.

Proposed Response Response Status U

REJECT.

Straw poll:

Accept remedy: 7, 10

Reject remedy: 6, 7

Proposed accept remedy:

Y 10 N 7 A 8

Fails

Propose reject:

It is believed that the specification is adequate. Commenter encouraged to bring more data to the committee.

Y 18 N 2 A 3

Passes

CI 68 SC 68.6.6.2 P 38 L 22 # 76
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

Validation of Modeling Results with Experiments

Gen67 data set used for determination of stressors does not agree with actual data for center launch. Also the OFL BW distribution diverges from OFL BW statistics for higher BW fibers. This leads to erroneous statistics with dual launch and center launch for OM1.

The premise that a center launch will statistically improve the chances of the link working are flawed because the Gen67 set was constructed with the center perturbations uncorrelated with the outer perturbations. This does not affect the result for single launches but gives an erroneous impression of improvement with a dual launch. Actual DMD data has been presented showing that the data is somewhat correlated reducing the benefit. Mode Delays from measured index data will also be contributed showing a modest correlation undermining the premise of the dual launch.

Suggested Remedy

REMEDY: verify the center launch and offset launch are uncorrelated to the satisfaction of the committee, or shift to single launch.

REMEDY 2: the duplex link statistics are to be calculated assuming the link uses either all center launch or all offset launch, but not a mixed launch which complicates things for the customer

Proposed Response Response Status U

REJECT.

There is wide consensus within the committee that the dual launch approach improves the link coverage statistics (experimental results of Meadowcroft_1_0105, for example).

The Cambridge 108 model predicted the improvement as well.

The committee believes that the effect of this correlation is small and doesn't warrant further investigation. Formal proof of statistical independence is not necessary for increased probability of a functional link with dual launch.

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CI 68 SC 68.6.6.2 P 38 L 22 # 77
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

See Also p. 36 Table 68-6
CENTER LAUNCH and 0.75UI specification for stressors.
Use of 0.75UI is inappropriate with center launch because the low order modes can have extremely large lag- or precede-times. Within the TWDP code we are not limited by the spacing of the impulses.

SuggestedRemedy

REMEDY: review pulse shapes with center launch compared to proposed stressors.
Expand set of stressors if necessary

Proposed Response Response Status U

REJECT.

There is no specific change proposed to the draft.

The extremely large lag- or precede-times are likely to fail in any case; therefore, do not need to be considered. The commenter is encouraged to investigate whether extremely large lag- or precede-times with center launch would pass.

The methodology used to select the rx test stressors was developed methodically by committee members (Ewen_1_0305) to represent a meaningful set of stressors resulting from daul launch. It involves the design of three stressor types to represent difficult channel conditions.

It is also the desire of the committee to use the same stressors for the comp. rx test and for the TWDP code.

CI 68 SC 68.6.6.2 P 38 L 22 # 78
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

In software can use multiple stressors. No reason to limit to 3. Can fully test. Solution.
include stressors for center & offset launches, OM1, OM2,OM3. Include other UIs than 0.75.

SuggestedRemedy

Remedy: use multiple stressors in TWDP to reduce customer risk at little cost.

Proposed Response Response Status U

REJECT.

The strong consensus of the committee is that three stessors are sufficient. This would also increase the computation time for TWDP.

CI 68 SC 68.6.6.2 P 38 L 22 # 79
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

See also p.36 Table 68-6.
OM3 & Stressors
(e) OM3 uses only center launch and this issue is key to guaranteeing OM3 300m performance. Recall OM2 and OM3 fibers have the same mode group structure but differ only in the magnitude of index perturbations

SuggestedRemedy

Remedy: Need specific OM3 stressors tailored for center launch.

Proposed Response Response Status U

REJECT.

There is no specific change recommended.

See response to comments 80 and 77.

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CI 68 SC 68.6.6.2 P 38 L 22 # 80
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

Also see p. 36 Table 68-6.
OM2 FIBERS AND STRESSORS
analysis of OM2 center launch shows a large difference between penalty for PIE-D and finite equalizers.
This suggests that the assumption during the generation of stressors
http://ieee802.org/3/aa/public/mar05/ewen_1_0305.pdf does not apply to pulses generated by center launch.
This suggests that
(a) a different procedure is needed
(b) stressors are needed for both center & offset launch
(c) OM1 center launch should be reviewed
(d) OM1 stressors and OM2 stressors are not necessarily the same and need to be checked with modeling.
(e) OM3 uses only center launch and this issue is key to guaranteeing OM3 300m performance. Recall OM2 and OM3 fibers have the same mode group structure but differ only in the magnitude of index perturbations.

SuggestedRemedy

REMEDY: model OM2 fibers, determine if OM1 stressors are adequate and address above issues. Incorporate OM2 stressors if necessary. Resolve discrepancy between PIE-D and finite equalizer penalty for center launches and how current stressors were generated.

Proposed Response Response Status U
REJECT.

There is no specific change proposed to the draft.

The consensus of the committee is that the stressors are proxies for poor impulse responses that are close to ones fibers might produce. They are not meant to reflect all the details of fibers. The consensus was to design three canonical stressors that represent reasonably high stress values that would be generated by precursor, symmetric and post-cursor channels. The TF believes the implementation penalty for finite equalizers is similar for the stressors in the draft and real fibers.

Additional information was provided at the Sept. 05 interim, see [ewen_1_0905.pdf](#), [abbott_1_0905.pdf](#) and [linge_1_0905.pdf](#).

Passes by voice.

CI 68 SC 68.6.6.2 P 38 L 22 # 81
Abbott, John

Comment Type TR Comment Status R Page num: 38. PDF page: 39

There is an issue of variations in the channel (Quasi-static Time variation, see http://ieee802.org/3/aa/public/nov04/king_2_1104.pdf http://ieee802.org/3/aa/public/nov04/king_1_1104.pdf slide 10). In order to include this effect the modeling of LRM channels needs to include additional worst case mode power distributions beyond those used for simple gaussian beams (see ROFL launch in Gigabit Ethernet Networking). For center launches this means a more equal sharing of power between low order modes. Needs to be incorporated into coverage curves and derivation of stressors.

SuggestedRemedy

Remedy: modeling must be consistent with experimental results showing effects of quasi-static variation of the channel. Stressors must be based on this modeling. Worst Case Modal Bandwidth using equal sharing of power among mode groups improves agreement with quasi-static experimental data indicated above.

Proposed Response Response Status U
REJECT.

There is no specific change proposed for the draft.

Also, this topic was discussed at length within the ad-hoc sub-committee on launch conditions and also by the full committee. The consensus within the committee is to use single mode launch for modelling.

It is encouraged that fiber shaking be part of the interoperation testing.

Passes by voice.