Cl **00** *SC* **00** *P* *L* # **336**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

This is a duplicate of a comment against clause 58 because the solution is not wholly within clause 58; obviously the PMA and PCS are involved, as well as the Optical Multi-Point.
The timing parameters cannot be decided in isolation. We need to take the PMD, PMA and PCS into account, as well as upper layers. There is no point in flogging the electronics for high "efficiency" in bits delivered per nominal bit: a PON is a distributed switching system with severe latency challenges and like any such switching fabric would be expected to carry a substantial bandwidth overhead. Cost-efficiency, in bits delivered per dollar, is far more relevant.

SuggestedRemedy

Create a timing analysis which spans the full layer stack, "logic", "electronics" and "optics" before choosing timing parameters. Consider being flexible with the head end receiver timing parameters; after all, it controls the timing of the bursts it receives, so can take account its own capabilities.

Proposed Response *Response Status* **O**

Cl **00** *SC* **59.1** *P* **182** *L* # **601**

Tatum, Jim Honeywell

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

Text refers only to single mode fiber in line 4

SuggestedRemedy

Text must include relevant references to all fiber types.

Proposed Response *Response Status* **O**

Cl **00** *SC* **59.6** *P* **195** *L* # **621**

Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

refernces to MMF
Table needs to be completed per link budget calculations

SuggestedRemedy

Numb ers TBD from simulations at conference

Proposed Response *Response Status* **O**

Cl **00** *SC* **59-17** *P* *L* # **629**

Tatum, Jim Honeywell

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

Table incomplete

SuggestedRemedy

numbers to be generated at meeting

Proposed Response *Response Status* **O**

Cl **00** *SC* **Table 59-14** *P* **196** *L* # **622**

Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

Table incomplete

SuggestedRemedy

Fill in with values from simulations at confernece

Proposed Response *Response Status* **O**

Cl **00** *SC* **Table 59-15** *P* *L* # **623**

Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

Table contains references to TP1 and TP4

SuggestedRemedy

Remove as these are not valid test points

Proposed Response *Response Status* **O**

Cl **00** *SC* **Table 59-6** *P* **188** *L* **20** # **617**

Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

No value for max receive power, return loss, or 3dB bandwidth limit

SuggestedRemedy

max power =-3dBm
Return loss = 12dB
Recive BW max = 1500MHz

Proposed Response *Response Status* **O**

Cl **01** *SC* **1.4.15** *P* **209** *L* **15** # **255**

Dawe, Piers Agilent

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

Update 1.4.15 definition of 100BASE-X. (This comment is entered against clauses 1 and 60.)

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **24** *SC* **24.2.3.2** *P* **8** *L* **11** # **345**

Tom Mathey Independent

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

Use of register bit 6.5 will require opening clause 28 to add this bit to table.

SuggestedRemedy

As above.

Proposed Response *Response Status* **O**

Cl **24** *SC* **24.2.3.2** *P* **8** *L* **9** # **420**

Daines, Kevin World Wide Packets

Comment Type **TR** *Comment Status* **D**

The management register bit mr_oam_enable does not currently exist in the AN expansion register definitions contained within either Clause 28 or Clause 37. This bit likely needs to be added to both the 100 Mb and 1000 Mb Register 6 definitions.

Comment applies to 36.2.5.1.3, page 32, line 9 as well.

SuggestedRemedy

Add Clause 28 (sigh) to the list of clauses that need to be updated. Add bit 6.5 to 28.2.4.1.5 Auto-Negotiation Expansion Register.

Add Clause 37 to the list of clauses that need to be updated. Add bit 6.5 to 37.2.5.1.5 AN expansion register.

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.3** *P* **26** *L* **45** # **116**

Daines, Kevin World Wide Packets

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

Fill in missing information.

Mux:MAC_UNITDATA.request

44
This counter
is incremented when a ?????.request primitive is generated within the OAM sublayer.;

SuggestedRemedy

Change "...when a ?????.request primitive is generated..." to "...when a Mux:MA_UNITDATA.request primitive is generated..."

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.4** *P* **27** *L* **6** # **117**

Daines, Kevin World Wide Packets

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

The criteria for determining a valid OAMPDU is incomplete.

This counter is incremented on reception of a valid frame with a lengthOrType field value equal to the reserved Type for Slow_Protocols_Type as specified in Annex 43B.;

SuggestedRemedy

Change second sentence BEHAVIOUR section to:

"This counter is incremented on reception of a valid frame with (1) a destinationField equal to the reserved multicast address for Slow_Protocols specified in Table 43B-1, (2) lengthOrType field value equal to the reserved Type for Slow_Protocols as specified in Table 43B-2, (3) a Slow_Protocols subtype value equal to the subtype reserved for OAM as specified in Table 43B-3.;"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.5** *P* **27** *L* **18** # **118**

Daines, Kevin World Wide Packets

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

The BEHAVIOUR section is incorrect.

SuggestedRemedy

Change BEHAVIOUR section to:

"A count of OAMPDUs received that contain an OAM code from Table 55-1 that are not supported by the device. This counter is incremented on reception of a valid frame with (1) destinationField equal to the reserved multicast address for Slow_Protocols specified in Table 43B-1, (2) lengthOrType field value equal to the reserved Type for Slow_Protocols as specified in Table 43B-2, (3) a Slow_Protocols subtype value equal to the subtype reserved for OAM as specified in Table 43B-3, (4) an OAM code for a function that is not supported by the device.;"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.6** *P* **27** *L* **30** # **119**

Daines, Kevin World Wide Packets

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

The BEHAVIOUR section is incorrect.

SuggestedRemedy

Change BEHAVIOUR section to:

"A count of OAM Ping Request PDUs passed to the OAM subordinate sublayer for transmission that contain the Ping Request code specified in Table 55-1. This counter is incremented when a Mux:MA_UNITDATA.request primitive is generated within the OAM sublayer with an OAM code indicating Ping Request operation.;"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.7** *P* **27** *L* **48** # **120**

Daines, Kevin World Wide Packets

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

The BEHAVIOUR section is incorrect.

SuggestedRemedy

Change BEHAVIOUR section to:

"A count of OAMPDUs received that contain the Ping Response code specified in Table 55-1. This counter is incremented on reception of a valid frame, with (1) destinationField equal to the reserved multicast address for Slow_Protocols specified in Table 43B-1, (2) lengthOrType field value equal to the reserved Type for Slow_Protocols as specified in Table 43B-2, (3) a Slow_Protocols subtype value equal to the subtype reserved for OAM as specified in Table 43B-3, (4) the OAM code equals the Ping Response code.;"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.11.1.1.8** *P* **27** *L* **54** # **121**

Daines, Kevin World Wide Packets

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

The other OAMPDU codes are missing and should be added to new sections beginning with 30.11.1.1.8

SuggestedRemedy

Add:

aOAMStatusTx, aOAMStatusRx, aOAMKeepAliveTx, aOAMKeepAliveRx, aOAMEventNotificationTx, aOAMEventNotificationRx, aOAMLoopbackTx, aOAMLoopbackRx, aOAMVariableRequestTx, aOAMVariableRequestRx, aOAMVariableResponseTx, aOAMVariableResponseRx

using the pattern found in 30.11.1.1.6 and 30.11.1.1.7

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.3.2.1.3** *P* **20** *L* **13** # **530**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Agree that this statement must be modified but disagree that only Copper PHYs may be subject of the change

SuggestedRemedy

This attribute will need update when all of the PHYs have been finalized.

Proposed Response *Response Status* **O**

Cl **30A** *SC* **30.3.1.1.31** *P* *L* # **5**

Marris, Arthur — Cadence Design Syste

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

There needs to be a managed object to indicate whether a MAC configured for half-duplex operation can transmit and receive simultaneously. This is necessary for the MAC-PHY rate-matching receive process.

SuggestedRemedy

Add a third entry to the sequence for aMACCapabilities:-

half duplex with simultaneous receive and transmit Capable of transmitting and receiving simultaneously when configured for half duplex mode.

Proposed Response *Response Status* **O**

Cl **36** *SC* *P* *L* # **383**

Bhatt, Vipul — (Not Applicable)

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

The suggested text is a beginning point. Over future revisions of the draft, this section can be further refined.

In order to make the best selection of Optical PMD burst mode parameters (laser turn on/off and receiver recovery times), we need to know how long the PMA will take to synchronize in the presence of an incoming burst. The purpose of this comment is to insert a placeholder for future work. The use of plesiochronous links is not excluded, but for now, the performance in the presence of synchronous links is specified.

The value suggested (800 bit times) is a bit more aggressive than what was indicated in my note dated 8/23/2002 to EFM reflector. I believe there is room to permit this aggressiveness, and in order to keep system efficiency reasonably high, the pain will have to be shared equally between PMA and PMD.

The use of COM_DET as an indicator of lock is necessary because there is no mandatory signal defined in Clause 36 that reflects the state of having acquired a lock. This should serve for now as an interim solution.

SuggestedRemedy

Insert subclause 36.3.9, title "Burst Mode Specifications". Add text as follows:

"In the presence of received data pattern as defined in subclause 56.x.y.z, COM_DET shall assert in less than 800 bit times, when PMA_TX_CLK frequency is equal to twice the PMA_RX_CLK frequency. "

Proposed Response *Response Status* **O**

Cl **45** *SC* *P* *L* # **353**

Brown, Benjamin — AMCC

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

Why are there any register changes to Clause 45? These are registers for 10GE. All 100M and 1G registers are in Clause 22.

SuggestedRemedy

Move new registers to Clause 22.

Proposed Response *Response Status* **O**

Cl **45** *SC* *P* *L* # **157**

Simon, Scott — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D**

Registers need to be added for PHY counters such as corrected FEC errors, uncorrected FEC errors, etc

SuggestedRemedy

The editor should add such counters.

Proposed Response *Response Status* **O**

Cl **45** *SC* *P* *L* # **653**

O'Mahony, Barry — Intel Corp.

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

The Copper PHYs all have a large set of management objects that must be controlled. Clause 45 registers are needed to implement these.

SuggestedRemedy

Develop new registers for Clause 45 corresponding to existing management objects for 10PASS-TS, 2PASS-TL, 2PASS-TS DSL PMDs

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.1** *P* **33** *L* **44** # **67**

Turner, Ed — Lattice Semiconductor

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

The convention adopted in 100BASE-T2 and 1000BASE-T was to use the terminology 'master' and 'slave'. EFM should be consistent to this terminology.

SuggestedRemedy

Globally replace throughout the clause the term 'LT' with 'master' and 'NT' with 'slave'. Editorialise around each replacement as necessary to correct grammar.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.2.1** *P* **35** *L* **20** # **648**

Barrass, Hugh — Cisco Systems

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

The PMD available register may be writeable for NT devices in order that the capabilities can be limited prior to loop aggregation discovery.

SuggestedRemedy

Change Table 45.3 R/W column to show that LT devices are RO, NT devices are RW with a footnote.

Add footnote:

This register may optionally be writeable for NT devices. In the case where PMIs may be aggregated to multiple MIIs the availability must be limited such that no PMI may be mapped to multiple MIIs prior to enabling the links.
In this case, the reset state of the PMD_available_register must reflect the capabilites of the device, the management entity must reset appropriate bits to meet the restriction described.

If the NT device is not capable of aggregating PMIs to multiple MIIs then the PMD_available_register may be read only.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.3.1.1** *P* **37** *L* **53** # **89**

Turner, Ed — Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.3.1.2** *P* **38** *L* **25** # **90**

Turner, Ed — Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.3.1.4** *P* **38** *L* **46** # **69**

Turner, Ed — Lattice Semiconductor

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

The text does not fully describe the necessary behavior of the counter.

SuggestedRemedy

A good text to describe counter behavior that was adopted for 802.3ae is : "The <counter_name> counter is a <number_of_bits> bit counter that contains the number of <things_to_count>. These bits shall be reset to all zeroes when the <counter_name> counter is read by the management function or upon execution of the MMD reset. These bits shall be held at all ones in the case of overflow."
Apply this text to the counter here, and any other counters in the clause.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1** *P* *L* # **158**

Simon, Scott — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D**

The registers that control link parameters should have upper and lower bounds assigned to them. The exact bounds should be discussed by the TF.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1** *P* *L* # **155**
Simon, Scott Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D**

We need registers so that the PHY can report its perceived RX Power and Avg. SNR for each RX band.

SuggestedRemedy

The editor for clause 45 should write such registers

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1.1** *P* **30** *L* **54** # **91**
Turner, Ed Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1.1** *P* **39** *L* **22** # **87**
Turner, Ed Lattice Semiconductor

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

Avoid the word 'should'. Writing to a bit 'shall' activate or deactivate the parameter.

SuggestedRemedy

Replace 'should' with 'shall'.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1.2** *P* **40** *L* **46** # **92**
Turner, Ed Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.4.1.3** *P* **41** *L* **42** # **93**
Turner, Ed Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.5** *P* **46** *L* # **655**
O'Mahony, Barry Intel Corp.

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

This is an inappropriate level of detail in which to control a DMT system. The entities above the MDIO simply do not have sufficient knowledge to exercise this level of control. For example, it has no way of knowing that a bridge tap creates a notch at a certain frequency, or that the single-frequency interferer a tone index i is slowly drifting over to index i+2.

In a sense, this level of control is equivalent to having the management entity specifying the equalizer and precoder tap values in a single-carrier system. It would probably lead to the same result; link failure in a large percentage of cases on real loops.

Note also that, in most implementations, individual tones cannot arbitrarily be assigned to the US or DS direction.

The PMD control attributes should be used to control behavior externally visible at the interfaces to the PMD; e.g., bit rate of US/DS, latency, overall transmit PSD, etc.

SuggestedRemedy

Base the attributes on those already defined in the appropriate DSL MIB. Those attributes are capable of being controlled by an external-to-PMD management entity.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.5.1.3** *P* **47** *L* **18** # **94**
Turner, Ed Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.5.1.4** *P* **47** *L* **46** # **88**
Turner, Ed — Lattice Semiconductor

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

Missing bit definition text.

SuggestedRemedy

Insert subsections that describe the behavior of each bit (as you did in 45.2.1.1)

Proposed Response *Response Status* **O**

Cl **54** *SC* **54.1** *P* **52** *L* **20** # **704**
Jonathan Thatcher — World Wide Packets

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

Missing 2 Mb/s link segments

SuggestedRemedy

Add 2 Mb/s link segment

Proposed Response *Response Status* **O**

Cl **54** *SC* **Figure 54-1** *P* **52** *L* **25** # **133**
Daines, Kevin — World Wide Packets

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

OAM is listed in the acronym definition section of the figure but not in the layer diagram.

SuggestedRemedy

Add OAM sublayer, which is required for EFM networks, between LLC and MAC Control sublayers.

Proposed Response *Response Status* **O**

Cl **54** *SC* **Figure 54-2** *P* **53** *L* **27** # **134**
Daines, Kevin — World Wide Packets

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

OAM is listed in the acronym definition section of the figure but not in the layer diagram.

SuggestedRemedy

Add OAM sublayer, which is required for EFM networks, between LLC and MAC Control sublayers.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.3** *P* **58** *L* **3738** # **190**
Onishi, Kazumi — Oki Electric Industry C

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

On PON architecture, if an ONU detects receiving signal failure, the ONU should stop transmitting to prevent upward signals collision caused by its local time inaccuracy. For the above reason, PON system does not support unidirectional operation which direction is from ONU to OLT.

SuggestedRemedy

2) Subscriber access physical layer devices, defined in Clause 59, 60 and 61 should support unidirectional operation to allow OAM remote fault indication during fault conditions. Subscriber access physical layer devices, defined in Clause 58 should support unidirectional operation in the drectoin from OLT to ONU that allows OAM remote fault indication from OLT during fault conditions.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.3** *P* **58** *L* **51** # **40**
MARTIN, DAVID — NORTEL NETWORKS

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

Refers to "A general communications mechanism". Where is the "general communications mechanism" defined in clause 55? Is this a reference to the Variable Request / Response capability? Or is it a reference to the Vendor Specific codes?

SuggestedRemedy

In the appropriate sub-clause add some wording like "this can be used as a general communications mechanism".

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.4** *P* **59** *L* **3** # **532**
Richard Brand — Nortel Networks

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

add "protection switching" to the functions

SuggestedRemedy

to now read: Management functions not pertaining to a single link such as protection switching, station management and subscriber management are not covered by this clause.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.4** *P* **59** *L* **3** # **26**
MARTIN, DAVID NORTEL NETWORKS

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

This might be the appropriate place to have a disclaimer regarding link protection / restoration.

SuggestedRemedy

Change "Management functions not pertaining to a single link such as station management" => "Management functions not pertaining to a single link, such as protection switching, station management,"

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.5** *P* **59** *L* **24** # **713**
Jonathan Thatcher World Wide Packets

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

Use of word "(OPTIONAL)" in OAM sublayer in Figure 55-1 is confusing. Similarly, use of word optional on line 13 under 55.1.5 has same problem.

SuggestedRemedy

Add a footnote to "OAM" In the footnote, indicate that this is required for (add list of port types) and optional for all others.
On line 13 change "an optional sublayer" to "a sublayer" or elaborate fully when it is required...

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.5** *P* **5960** *L* **13** # **146**
Ken, Murakami Mitsubishi Electric

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

The current positioning of OAM is strange. The OAM frames are identified using DA and Type fields. These fields are terminated within MAC layer. Therefore, OAM should be located immediately above MAC layer.

SuggestedRemedy

OAM should be one of the MAC Control functionalities like OMP and PAUSE.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.5, Fig.55-2** *P* **60** *L* **1** # **43**
MARTIN, DAVID NORTEL NETWORKS

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

There should be an interface to STA shown on the Fig.55-2 OAM Control block.

SuggestedRemedy

Add a bidirectional arrow on either the left or right side of the Fig.55-2 OAM Control block going to STA.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.1.6.4** *P* **60** *L* **50** # **41**
MARTIN, DAVID NORTEL NETWORKS

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

Warns that "Similarly, MAC Client frames originating in the local device may be lost if they are not properly buffered." Why should MAC Client frames from the source end of a link in loopback be affected?

SuggestedRemedy

Clarify under what conditions MAC Client frames at the source end of a link in loopback might be lost.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.1(g)** *P* **62** *L* **4** # **409**
Arnold, Brian Cisco Systems

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

The text of item (g) reads "OAMPDUs are restricted to a single link." So as to clarify that this refers to the must-not-be-forwarded restriction of OAMPDUs, and not to any applicability of OAMPDUs on PHY-layer aggregated links, this should be reworded.

SuggestedRemedy

Reword item (g) as follows:

"OAMPDUs traverse a single link and must not be forwarded."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.3** *P* **62** *L* **33** # **42**

MARTIN, DAVID NORTEL NETWORKS

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

A general question that should be answered in this section somewhere: How are OAMPDUs guaranteed to be sent when they are required?

SuggestedRemedy

Sketch the Fig.55-4 state machine and / or the related text to ensure that an OAMPDU will be transmitted even when there is a wire rate flow from the MAC Client. Need help from someone skilled in the art (like Ben - without mentioning surnames) to do this.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.4.1.2** *P* **64** *L* **47** # **684**

Squire, Matt Hatteras Networks

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

lb variable not used in diagram

SuggestedRemedy

need to update diagram for loopback state.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.5** *P* **66** *L* **22** # **27**

MARTIN, DAVID NORTEL NETWORKS

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

There needs to be some introductory explanation of the function of the OAM Control block, prior to diving into the state diagram.

SuggestedRemedy

Add "The OAM Control block is the source and sink of the OAMPDUs defined in sub-clause 55.3. STA requests and responses for OAM sublayer services interface via the OAM Control block."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.5** *P* **66** *L* **22** # **537**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

SuggestedRemedy

Add "The OAM Control block is the source and sink of the OAMPDUs defined in sub-clause 55.3. STA requests / responses for OAM sublayer services interface via the OAM Control block."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.5, Fig.55-6** *P* **67** *L* **12** # **45**

MARTIN, DAVID NORTEL NETWORKS

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

The Fig.55-6 state diagram should be expanded to include the triggers for NTT.

SuggestedRemedy

Expand the Fig.55-6 state diagram to include the triggers for NTT (e.g. Keep Alive timer expired, Ping Response to send, Event Notification PDU to send). Need help from someone skilled in the art (like Ben - without mentioning surnames) to do this.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.5.1.1** *P* **66** *L* **25** # **365**

Brown, Benjamin AMCC

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

In other clauses, there is a single section for Constants, another for Variables, etc., and these sections apply to multiple state machines.

SuggestedRemedy

Reorganize this section to combine all the separate Constants, Variables, etc., sections then put all the state machines after.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.2.5.1.4, Fig.55-6** *P* **67** *L* **12** # **44**

MARTIN, DAVID NORTEL NETWORKS

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

It isn't clear how a request from (or response to) STA to the OAM Control block fits into the Fig.55-6 state machine.

SuggestedRemedy

Ensure that the Fig.55-6 state machine has an interface for requests / response to STA. Need help from someone skilled in the art (like Ben - without mentioning surnames) to do this.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2** *P* **68** *L* **20** # **123**

Daines, Kevin World Wide Packets

Comment Type **TR** *Comment Status* **D**

The restriction on the minimum size frame seems unneeded. If a device needs to send a Dying Gasp message, it should be able to send just the minimum 64 octet frame.

SuggestedRemedy

Change 128 to 64. Note: Annex 43B already supports this size. See 43B.2 (c).

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **14** # **542**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Add verbage

SuggestedRemedy

To read: "The specification of the specific faults comprising the Local Link Fault, Remote Link Fault, Dying Gasp, and Alarm Indication flags is beyond the scope of this standard.' primarily due to the multiple Physical layers possible.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **14** # **30**

MARTIN, DAVID NORTEL NETWORKS

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

It's my understanding that since there are a suite of possible PHY types, specifying the extact PHY fault triggers rolled into the Flag indications is not in the clause 55 gameplan. That should be stated.

SuggestedRemedy

Add "The specification of the specific faults comprising the Local Link Fault, Remote Link Fault, Dying Gasp, and Alarm Indication flags is beyond the scope of this standard."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **16** # **367**

Brown, Benjamin AMCC

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

More guidance is necessary on the causes of Local and Remote Link Faults.

SuggestedRemedy

I don't have ideas for this guidance but I'd be happy to participate in a discussion on this topic.

There appears to be more wording on many of these bits in 55.3.4.1. Perhaps there could be a reference to that section here.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **2** # **28**

MARTIN, DAVID NORTEL NETWORKS

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

Could use some clarifying text regarding the potential source of the fault and the fact that the fault may preclude successful transmission of the OAMPDU.

SuggestedRemedy

Change "in the local device" => "in the local device transmit direction in any of the subordinate sublayers (e.g. MAC control, MAC, Physical). Depending on the nature of the fault, the OAMPDU may or may not successfully transit those sublayers to the link."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **2** # **538**

Richard Brand — Nortel Networks

Comment Type **TR** *Comment Status* **D**

Add verbage

SuggestedRemedy

"in the local device transmit direction in any of the subordinate sublayers (e.g. MAC control, MAC, Physical). Depending on the nature of the fault, the OAMPDU may or may not successfully transit those sublayers to the link."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **5** # **540**

Richard Brand — Nortel Networks

Comment Type **TR** *Comment Status* **D**

Add words

SuggestedRemedy

To read "has been detected remotely in the receive direction of the subordinate sublayers (e.g. MAC control, MAC, Physical)."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **5** # **29**

MARTIN, DAVID — NORTEL NETWORKS

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

Could use some clarifying text on the potential location of the fault.

SuggestedRemedy

Change "has been detected remotely." => "has been detected remotely in the receive direction of the subordinate sublayers (e.g. MAC control, MAC, Physical)."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1** *P* **69** *L* **7** # **686**

Squire, Matt — Hatteras Networks

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

The loopback flag is unclear. How is it used? More detail needs to be provided somewhere. The flag seems to conflict with the Loopback PDU of section 55.3.3.4. Also, the alarm flag is confusing as well. Under what circumstances is it set and cleared? Is there a MIB variable to which it is tied?

SuggestedRemedy

Need to clarify loopback operation and alarm flag operation. No good short suggestion.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1(a)** *P* **69** *L* **1** # **411**

Arnold, Brian — Cisco Systems

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

The meaning of Local Link Fault (LLF) in the Flags field could be clearer. Suggested replacement or additional text below.

SuggestedRemedy

Replace the current text:

"This flag indicates that a link fault has been detected in the local device."

with the following:

"This flag indicates the local device's transmit path is impaired."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.2.1(b)** *P* **69** *L* **4** # **412**

Arnold, Brian — Cisco Systems

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

The meaning of Remote Link Fault (RLF) in the Flags field could be clearer. Suggested replacement or additional text below.

SuggestedRemedy

Replace the current text:

"This flag indicates that a link fault has been detected remotely."

with the following:

"This flag indicates the local device is experiencing a receive path error."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **70** *L* # **543**

Richard Brand — Nortel Networks

Comment Type **TR** *Comment Status* **D**

Change paragraph

SuggestedRemedy

The OAM Status PDU is a misnomer, and also has three classes of information mixed together: state, configuration, and capability. This PDU should be split/renamed into three PDUs as follows:

'OAM State PDU' [0x00]
Retain the Local_State field where:
D7 = 'In Service' which is true when '1', false when '0', set by STA
D6 = 'In Loopback' which is logically equal to the Loopback flag indication

'OAM Configuration PDU' [0x01]
Retain the Local_OAMPDU_Configuration field as is.
Retain the Local_Loopback_Configuration field but with bit D7 as undefined.
Retain the Local_Extension field as is.

'OAM Capability PDU' [0x02]
Retain the Local_OAM_Configuration field but renamed as Local_OAM_Capability with
D7 = 'US' as currently defined
D6 = 'LS' as currently defined in bit D7 of the Local_Loopback_Configuration field.

The Far End fields should be split in the same manner.

Figures 55-9, 55-10, 55-11, 55-13 should be revised accordingly.

It is suggested that the other OAMPDU codes be incremented by 2.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **70** *L* **12** # **2**

Seyoun LIM — SAMSUNG ElECTRO

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

"The OAM status PDU is used to send OAM state information to the far-end device."

The OAM status PDU(v1.0) is combined with Local Status(v0.9) and Far-end Status(v0.9). It should be corrected.

SuggestedRemedy

It would be corrected that "The OAM status PDU is used to send local and far-end OAM state information".

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **70** *L* **12** # **31**

MARTIN, DAVID — NORTEL NETWORKS

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

General comment on the contents of the OAM Status PDU. The OAM Status PDU is first a misnomer, and second has three classes of information mixed together: state, configuration, and capability. Those classes of information are in general handled by different processes. Having the information in the same PDU requires each process to parse what it's after. To eliminate or at least simplify that step, the OAM Status PDU should be split / renamed into three PDUs as described below.

SuggestedRemedy

The OAM Status PDU should be split / renamed into three PDUs as described below:

OAM State PDU [0x00]
TLV_type = Local_State
Local_State_Length = 0x14
Retain the Local_State field where:
D7 = 'In Service' which is true when '1', false when '0', set by STA
D6 = 'In Loopback' which is logically equal to the Loopback flag indication
D5-D0 = undefined as currently captured
The following 12 octets are set to 'local_state_placeholder'.
The Far End fields should be arranged similarly.

OAM Configuration PDU [0x01]
TLV_type = Local_Configuration
Local_Configuration_Length = 0x14
Retain the Local_OAMPDU_Configuration field as is.
Retain the Local_Loopback_Configuration field with:
D7 = undefined
D6-D0 = Loopback_Timeout as currently captured.
Retain the Local_Extension field as is.
Set the Local_State and Local_OAM_Configuration fields to
'local_configuration_placeholder'
The Far End fields should be arranged similarly.

OAM Capability PDU [0x02]
TLV_type = Local_Capability
Local_Capability_Length = 0x14
Retain the Local_OAM_Configuration field but renamed as Local_OAM_Capability with:
D7 = 'US' as currently defined
D6 = 'LS' as currently defined in bit D7 of the Local_Loopback_Configuration field
D5-D0 = undefined as currently captured.
Set the Local_State and Local_OAMPDU_Configuration and
Local_Loopback_Configuration and Local_Extension fields to 'local_capability_placeholder'
The Far End fields should be arranged similarly.

Figures 55-9, 55-10, 55-11, 55-13 should be revised accordingly.

It is suggested that the other OAMPDU codes be incremented by 2.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **70-74** *L* # **167**

Seyoun LIM SAMSUNG ElECTRO

Comment Type **TR** *Comment Status* **D**

In clause 55, OAM needs to the mechanism to discovery each other OAM capability.
If OLT/ONU have got the different OAM function, they cannot exchange their OAM information and interperte the information from others because OLT/ONU support different OAM function.therefore, the OAM capability discovery mechanism is important to exchange OAM information efficiently.
Through OAM capability discovery, OLT/ONU can set up the OAM function to allow both(OLT/ONU) to support.

SuggestedRemedy

I proposed "OAM capability discovery mechanism" based on 3 way handshaking

1. Definition of three type messages for OAM capability discovery
one. Initiate_OAM_Discovery : this message with OAM capability of OLT is sent from OLT to ONU to initiate OAM capability discovery
two. Report_OAM_Discovery : this message is sent from ONU to OLT to report OAM capability of ONU.
three.Complete_OAM_Discovery : this message is sent from OLT to ONU to complete OAM capability discovery.

2. Additional Field to indicate each message
- the New field is "Capability Discovery state(2 bits)" at Local/Far_End_state to distinguish each message mentioned above to discovery OAM capability

3. Necessary new timer for reliability : Discovery_timer(discovery_time)
- This timer controls the reception window in OLT/ONU
:An OLT sets Discovery_timer(Discovery_time) as soon as an OLT sends ¡°Initiate_OAM_Discovery¡± to an ONU. ¡°Report_OAM_Discovery¡± is expected to arrive at OLT before Discovery_timer is expired.
However, an OLT decides to retransmit ¡°Initiate_OAM_Discovery¡± if Discovery_timer is expired before Report_OAM_Discovery arrival.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **72** *L* **28** # **136**

Daines, Kevin World Wide Packets

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

Text incorrectly states Local_Configuration field is two octets in length. Should be four.

SuggestedRemedy

Change "two" to "four".

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **72** *L* **47** # **371**

Brown, Benjamin AMCC

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

Is a Passive Mode device allowed to transmit a Loopback Control OAMPDU

SuggestedRemedy

Add Loopback Control to the list of disallowed OAMPDUs for Passive Mode devices.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **73** *L* **21** # **32**

MARTIN, DAVID NORTEL NETWORKS

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

Should specify the value range for the Loopback_Timeout.

SuggestedRemedy

Change "value in seconds." => "value in seconds (range from 0-128 seconds)."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **73** *L* **21** # **544**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Add verbage

SuggestedRemedy

To read: " value in seconds (range from 0-128 seconds)."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **73** *L* **22** # **375**

Brown, Benjamin AMCC

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

What is the quantum for the Loopbac Timeout field?

SuggestedRemedy

Create a loopback timeout quantum value for the values in this field.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **73** *L* **44** # **71**

Turner, Ed — Lattice Semiconductor

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

No need for the text '.. to claim compliance with Version 1 of this protocol.' since there is a 'shall' statement at the start of the sentence.

SuggestedRemedy

Delete the text highlighted above so that the sentence reads : 'They shall be ignored on receipt and shall be transmitted as zeroes.'
You could also delete the second shall to save a PICS entry.
Also apply this modification to point p) on the next page (p74, line 3).

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **74** *L* **15** # **132**

Daines, Kevin — World Wide Packets

Comment Type **TR** *Comment Status* **D**

Negotiation/Capability Discovery mechanism not incorporated into D1.0. Presentation will be given in OAM Track in New Orleans.

SuggestedRemedy

Adopt presentation and incorporate into D1.1.

Resolves Editor's Note on page 74, line 15 and second half of Editor's Note on page 83, line 6.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.1** *P* **74** *L* **5** # **377**

Brown, Benjamin — AMCC

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

Add a "When Sent" section

SuggestedRemedy

Indicate that the OAM Status PDU is only sent during negotiation

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.2** *P* **74** *L* **1823** # **378**

Brown, Benjamin — AMCC

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

Keep Alive isn't necessary

SuggestedRemedy

Remove this OAMPDU

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.2 and 56.3.4** *P* **74 and 122** *L* # **166**

Jin Kim — Samsung

Comment Type **TR** *Comment Status* **D**

It is important to provide the fairness between user stations.
The current REPORT message only reports total queue size in ONU, and which can not guarantee the fairness.

One way of doing this is ONU provides to OLT how many user stations are currently active.

SuggestedRemedy

There are two possibile ways.
1) Use 2 bytes in the current MPCP REPORT message for the ONU¡¯s active user station number.
2) Use 2 bytes in the current OAM Keep Alive message for the ONU¡¯s active user station number.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.3** *P* **74** *L* **30** # **379**

Brown, Benjamin — AMCC

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

Add a "When Sent" section

SuggestedRemedy

Indicate that the Event Notification PDU is sent only outside of negotiation and whenever a bit in the flags field changes state (including entering and leaving loopback mode)

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **48** # **546**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Add verbage

SuggestedRemedy

To read: "a 0 is encoded. A zero encoding signifies the local device wishes to enable far-end loopback mode until a subsequent Loopback Control PDU with LME=0 is sent to disable it."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **48** # **33**

MARTIN, DAVID NORTEL NETWORKS

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

The text further down in lines 52-54 would be better located following item 2).

SuggestedRemedy

Change "a 0 is encoded." => "a 0 is encoded. A zero encoding signifies the local device wishes to enable far-end loopback mode until a subsequent Loopback Control PDU with LME=0 is sent to disable it."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **50** # **708**

Jonathan Thatcher World Wide Packets

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

There is no indication whether OAM frames should be sent to the OAM Control block while in loopback. Neither is there any clear indication in Figure 55-5 what happens to incoming frames when in loopback. Ditto other state diagrams.
Similarly, it is not clear if the remote side can transmit OAMPDUs while in loopback.

SuggestedRemedy

Fix.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **51** # **547**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Delete text "A non-zero encoding signifies the duration of the loopback. A zero encoding signifies the local device wishes to enable far-end loopback mode until a subsequent Loopback Control PDU is sent to disable it."

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **51** # **709**

Jonathan Thatcher World Wide Packets

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

It is not likely that all loopback tests can be accomplished before loopback timeout occurs. Example, if someone wanted to validate a 10-12 BER, this would take on the order of 15 minutes, not 8 seconds.

SuggestedRemedy

Either:
1. Modify to allow refresh of the loopback timeout during the course of the loopback. Verify that this does not cause problems with the parser and state machines (recommended) or,
2. Increase the number of bits supporting the timeout value or,
3. Increase the interval.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.4** *P* **74** *L* **51** # **34**

MARTIN, DAVID NORTEL NETWORKS

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

This text is now redundant given my previous comment.

SuggestedRemedy

Delete the following text: "A non-zero encoding signifies the duration of the loopback. A zero encoding signifies the local device wishes to enable far-end loopback mode until a subsequent Loopback Control PDU is sent to disable it."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **15** # **548**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Change verbage

SuggestedRemedy

To read: "upon reception of a Ping request PDU."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **15** # **126**
Daines, Kevin World Wide Packets

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

Passive and active mode need to be defined. Note: passive and active mode was chosen over individual enables for each OAMPDU.

SuggestedRemedy

Define active and passive mode. Resolves portion of Editor's Note found on page 70, line 6.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **15** # **35**
MARTIN, DAVID NORTEL NETWORKS

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

Need to maintain consistent naming convention for the OAMPDUs.

SuggestedRemedy

Change "upon reception of a Generate Ping PDU." => "upon reception of a Ping Request PDU."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **15** # **125**
Daines, Kevin World Wide Packets

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

Passive mode seems wrong here.

SuggestedRemedy

Change to active mode.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **16** # **549**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Change verbage

SuggestedRemedy

To read: "must be in active mode to transmit."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.5** *P* **75** *L* **16** # **36**
MARTIN, DAVID NORTEL NETWORKS

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

Must be in Active Mode to generate a Ping Request PDU.

SuggestedRemedy

Change "must be in passive mode to transmit" => "must be in active mode to transmit"

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.6** *P* **75** *L* **21** # **37**
MARTIN, DAVID NORTEL NETWORKS

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

Should ensure it's clear which end responds with a Ping Response PDU.

SuggestedRemedy

Change "The far-end shall transmit" => "An end station shall transmit"

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.6** *P* **75** *L* **21** # **550**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Change verbage

SuggestedRemedy

To read: "The local end shall transmit."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.6** *P* **75** *L* **23** # **382**

Brown, Benjamin AMCC

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

If the data field's match, won't the lengths match?

SuggestedRemedy

change "data field and length shall" to "data field shall"

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.3.7** *P* **75** *L* **24** # **137**

Daines, Kevin World Wide Packets

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

Device must be in active mode to source Variable Request PDUs.

SuggestedRemedy

Add passive mode to description, similar to 55.3.3.5 (once fixed :)

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4** *P* **75** *L* **43** # **142**

Daines, Kevin World Wide Packets

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

Text loosely defines the required response time for replying to a Variable Request. However, it implies the response is required to be the next frame/packet by saying the next available transmission cycle. Note that the definition for a Variable Response, 55.3.3.8, does not even mention a response time.

SuggestedRemedy

Add response time to 55.3.3.8

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4** *P* **75** *L* **52** # **551**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Change verbage

SuggestedRemedy

To read: "An asynchronous event message shall use the Event Notification PDU, defined in 55.3.3.3, when no other OAMPDU is being sourced. If another OAMPDU is currently being sourced, then only the Flags Field indications are available."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4** *P* **75** *L* **53** # **38**

MARTIN, DAVID NORTEL NETWORKS

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

It isn't clear that the Flag indications are to be set regardless of which OAMPDU is in the transmit pipeline. Only if the transmit pipe is currently empty can the Event Notification PDU be sent (and with more details in its data field).
The last portion of the sentence regarding the Alarm Indication Flag is redundant.

SuggestedRemedy

Change "An asynchronous event message shall use the Event Notification PDU, defined in 55.3.3.3, and, when no other corresponding Flag applies, must raise the Alarm Indication Flag defined in 55.3.4.1." => "An asynchronous event message shall use the Event Notification PDU, defined in 55.3.3.3, when no other OAMPDU is being sourced. If another OAMPDU is currently being sourced, then only the Flags Field indications are available."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4** *P* **75** *L* **54** # **96**

Turner, Ed Lattice Semiconductor

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

Section 13.1 of the IEEE style guide prohibits the use of the word 'must' for mandatory behavior.

SuggestedRemedy

In this case, there is a 'shall' at the start of the sentence so you can delete 'must'. In other cases you may have to replace 'must' with 'shall'.
Section 55.3.4.1 has multiple instances of 'must' that need treatment. Delete or replace any other occurances of 'must' throughout this clause.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.1** *P* **76** *L* **34** # **140**

Daines, Kevin — World Wide Packets

Comment Type **TR** *Comment Status* **D**

Error Rate as currently constituted conveys code violations only. What about bit errors that don't cause code violations but still cause CRC errors? Is the intent to capture errored-seconds regardless of data rate?

SuggestedRemedy

Revisit the ER definition. Consider changing it to include CRC errors.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.1** *P* **76** *L* **6** # **552**

Richard Brand — Nortel Networks

Comment Type **TR** *Comment Status* **D**

Delete entire subsection and move lines 26-42 to follow p.69, line 14.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.1** *P* **76** *L* **6** # **687**

Arnold, Brian — Cisco Systems

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

There perhaps ought to be a new section (55.3.4.2?) to discuss events and alarms in the context of PHY-layer loop aggregated links, as with copper. Certain of the alarms and events, namely LLF, RLF, and AI (possibly relevant to all of TE, ER, PV, VSA, and VS), contain incomplete information when passed across an aggregated link. For instance, if an OAM sublayer receives an OAMPDU with the RLF flag or an RLF event, over a non-aggregated (single) link, there is enough information for the receiving OAM sublayer to act upon, if action is desired. If it happens to be a link with four aggregated pairs (for instance), the OAM sublayer won't necessarily know which pair(s) the RLF pertains to, and OAM then cannot complete the scope of OAM as in "...quickly determine the location of failing links or fault conditions." from 55.1.1.

SuggestedRemedy

There are at least a couple of choices to remedy: specify the additional required content of OAMPDUs when one of these events is triggered over a PHY-layer aggregated link, or specify the additional information to be subsequently queried by an OAM sublayer receiving one of these events over a PHY-layer aggregated link.

In either case, the information carried in OAMPDUs ought to be closely coordinated with the Copper STF's proposed PHY-layer loop aggregation techniques.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.1** *P* **76** *L* **6** # **39**

MARTIN, DAVID — NORTEL NETWORKS

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

This entire section is redundant (lines 6-43). The Flag indications are described in 55.3.2.1. Any more detail on them should be in that sub-clause.

SuggestedRemedy

Delete the sub-section portion from line 6 through to line 26 to the end of the sentence "while the condition persists." Move the remainder of the sub-section from line 26 beginning with "It is recommended that" through to line 42 and put it following p.69, line 14.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.1(d)** *P* **76** *L* **24** # **408**

Arnold, Brian — Cisco Systems

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

The text mentions the purpose of the Alarm Indication event for conditions where no Flag applies. It may also be the case that more than one Flag applies to the current condition. The OAMPDU with the Alarm Indication event may then be used to contain the supplemental event information as described later in the text. The supplemental information can then be used to sort out any ambiguity.

SuggestedRemedy

Two choices:

a) insert the word "single" in the phrase "...condition to which no Flag applies.", so that it reads "...condition to which no single Flag applies."

- or -

b) rephrase the same sentence fragment thusly: "...condition to which no Flag applies or to which multiple Flags apply."

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.3.4.a** *P* **75** *L* **48** # **707**

Jonathan Thatcher World Wide Packets

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

It is not at all clear what "immediately communicate" means. It needs to be decided if a "dying gasp" in particular has precedent over a frame currently being sent out the port.

SuggestedRemedy

Detail intent. Either:
1. Immediately following the packet/frame currently being sent, or
2. Terminate the packet/frame currently being sent and ship the event.

Also make it clear if any OAMPDUs previously scheduled should be delayed until after the even notification or modified to update the flags, etc.

Proposed Response *Response Status* **O**

Cl **55** *SC* **55.5.2.2** *P* **85** *L* **24** # **131**

Daines, Kevin World Wide Packets

Comment Type **TR** *Comment Status* **D**

PICS not completed for D1.0.

SuggestedRemedy

Complete for D1.1

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55.2** *P* **60** *L* **1** # **680**

Squire, Matt Hatteras Networks

Comment Type **TR** *Comment Status* **D**

Since we have a requirement for an "oam channel", we probably need a new MAC primative that higher layers can use to send data in the OAM channel.

SuggestedRemedy

Create a new OAM primative for data sent over the OAM channel.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55.6** *P* **67** *L* # **685**

Squire, Matt Hatteras Networks

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

I don't understand the figure. What's INSPECT? Whats NTT?

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-10, 55.3.3.1(c** *P* **72** *L* **1** # **410**

Arnold, Brian Cisco Systems

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

The text seems to indicate that one bit maps to one state, and that no more than one bit would be asserted at any time. This creates a hard limit of 8 unique states (not counting all ones and all zeros), and can cause ambiguity if more than one bit is accidentally set or perceived as being set.

SuggestedRemedy

Alter the representation of state, using unique numeric values for unique states, instead of bit fields.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-18** *P* **79** *L* **47** # **422**

Daines, Kevin World Wide Packets

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

Data field range should reflect minimum to maximum range (64-1518 octets.

SuggestedRemedy

Change "105-1495" to "41-1495". Repeat for Figures 55-19, 55-20 and 55-21.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-2** *P* **60** *L* # **165**

Jin Kim Samsung

Comment Type **TR** *Comment Status* **D**

Due to location of OAM layer and the primitive it uses, there are two general issues.
1) When PAUSE is received, OAM can not be transmitted.
2) MPCP can not support the unidirectional operation.

SuggestedRemedy

In my opinion, EPON and OAM STF need to discuss about whether EPON will support the unidirectional operation and PAUSE operation.

If EPON decides to support them, then one way of resolving both issues is using a different primitive from MA_DATA fro OAM.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-2** *P* **60** *L* **26** # **143**

Daines, Kevin World Wide Packets

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

From Stephen Haddock:
"In the 802.3ae modifications to clause 2 we added the "frame check sequence" field to the MA_DATA definition and also provided information on how to map the MA_DATA service primitive to the MA_UNITDATA and M_UNITDATA service primitives used in the 802.1 standards.

If my recollection is accurate, Figure 43-2 should use MA_DATA and we just missed it during the balloting process."

SuggestedRemedy

Change "MA_UNITDATA" to "MA_DATA" 4x

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-3** *P* **61** *L* # **361**

Brown, Benjamin AMCC

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

start and end points of dotted lines are vague

SuggestedRemedy

These lines should both start and end at the MAC Client block

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-4** *P* **64** *L* # **363**

Brown, Benjamin AMCC

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

What happens to client frames during loopback? This state machine makes it look like they are ignored. Do they back up in the MAC client?

SuggestedRemedy

Modify the state machine to show they are discarded or add some words to the state machine description to say they back up in the MAC Client.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-5** *P* **66** *L* # **364**

Brown, Benjamin AMCC

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

Loopback packets are sent to the OAM Control block not to the MAC Client.

SuggestedRemedy

Change transition from PARSE to PASS TO OAM CONTROL from
OAMPDU
to
OAMPDU + oam_lb=TRUE

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-8** *P* **69** *L* # **368**

Brown, Benjamin AMCC

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

It is not described how this 2-octet field is transmitted. 55.3.1 talks about numbers and addresses. These descriptions worked for LACP as all of their multi-octet fields were carried as unsigned integers. This doesn't work for us as we have multi-octet flag fields.

SuggestedRemedy

Modify 55.3.1 to describe transmission order of fields such as this.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-8** *P* **69** *L* **20** # **124**
Daines, Kevin World Wide Packets

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

Figures plus text could be better represented with a bit table.

SuggestedRemedy

Change Figure 55-8, 55-10, 55-11, 55-12, 55-13, 55-14, 55-15 and the associated textual descriptions with bit tables patterned after Table 22-7.

Proposed Response *Response Status* **O**

Cl **55** *SC* **Figure 55-9** *P* **71** *L* # **370**
Brown, Benjamin AMCC

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

Local/Far_End_OAMPDU_Configuration is 4 octets, not 2

SuggestedRemedy

Change Local/Far_End_Status Length values from 0x14 to 0x16
Change table to show that these fields are 4 octets in length.

Change text in bullet b at the bottom of the page:
replace "20 (0x14)" with "22 (0x16)"

Also fix editorial error:
replace "(in octets of this" with "(in octets) of this"

Also, fix bullet e on page 72:
replace "is two octets" with "is four octets"

Proposed Response *Response Status* **O**

Cl **55** *SC* **Table 55-1** *P* **69** *L* # **369**
Brown, Benjamin AMCC

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

I thought the Keep Alive OAMPDU was gone

SuggestedRemedy

Remove Keep Alive OAMPDU

Proposed Response *Response Status* **O**

Cl **55** *SC* **Table 55-2** *P* **78** *L* **18** # **138**
Daines, Kevin World Wide Packets

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

Reserved field is 7 bits wide and should span 0x07-0x07F.

SuggestedRemedy

Change "3F" to "7F".

Proposed Response *Response Status* **O**

Cl **56** *SC* *P* *L* # **728**
Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

The LLID assigned by the OLT needs to be 15 bits to leave one bit for the mode of operation. Otherwise we need an additional bit in the entire specification. This bit has not been considered any where, neither in clause 56 or clause 57.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* *P* *L* # **724**
Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

This comment will be a recompilation of cites that need to be modified and they are related to the layering description/decision.

SuggestedRemedy

line 33, page 91: I don't undertand why the multiplexer needs to distiguish where the frame was generated. I assume it is related to outside control which will change.

lines 46-48 p 91 needs to go out.
line 7-8 p 92

All OMP interfaces disappear.

p.115 line 18, The Txallow variable controls PDU forwarding in then transmit as well as the control path. Right now it indicates data path only.

Proposed Response *Response Status* **O**

Cl **56** *SC* *P* **103** *L* # **727**

Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

line 12 p103: As currently defined, it seems that each LLID has a different MAC and the ONU requires as many MAC addresses as LLIDs has. This should not be a requirement. We are still trying to decide how many LLIDs, but if there is more than one it should not be needed a different MAC address for each one. Why is it needed?

p. 104, line 1: The capability _vector approach introduces an interoperability issue. Since state diagrams are defined based on this information, it needs to be specified what the fields are.

section 2.5.1.3: do we need to the level of detail of how states are allocated? If so, we also need the functional description to describe the protocol message exchange. This is so detail that is very difficult to debug the specification.

In this section, the parameters in the service interface need to be match with clause 2.

line 25, p 106 why the indication needs to go to layer management?

line 9, p106, I do not understand teh need of this message. Why does the ONU need to request a discovery window? is this to the OLT? how can it do it?

I have a lot of questions in trying to understand the state diagrams on pages 108-110. It is difficult to put in words. I would like to get some help from the editor to follow them and discuss my questions.

I do not know why the slave needs to state diagrams.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* *P* **109** *L* # **729**

Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

The contention resolution includes both mechanisms. This has not been decided yet.

The contention resolution is defining a random delay in quanta units. I think these units are not the same as the duration of hte transmission of the registration packet.

I believe the analysis was made like based on teh fact that the registration process with this random delay it becomes like an slotted system. Looking at the specification now I think it is not.

SuggestedRemedy

So I want to discuss this with Onn again because I think the analysis does not match well with this specification.

In any case I think the two mechanisms are not warrant. But if the group decides to get both, I want to clarify this issue for the specification.

And aside effect of this mechanism is the idle sequence field in register formats. I would recommend using just BEB and avoiding the parameter.

Proposed Response *Response Status* **O**

Cl **56** *SC* **1.1** *P* **88** *L* # **719**

Sala, Dolors Broadcom

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

I think it is important to highlight the following function of the mechanism. It is part of the baseline although right now it is missing in the draft. How to add it is described in separate comments.

m) General emulation filtering at the ONU to support P2PE, single copy broadcast and shared emulation.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **1.3** *P* **90** *L* # **721**

Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

I think figure 56-2 should be eliminated. The blocks described are not existent. The parser/multiplexers blocks as described in here a exactly the same functionality defined in MAC control. This is the parsing of the frame. We should not redefine it. We just want to add functions to MAC control.

these blocks also introduce artificial internal interfaces. We should define the functions as the MAC clause, and PAUSE has with specific parameters.

So if the picture is not shown as currently in the MAC control layer, it will avoid this division.

The basic idea of using MAC control as the basic protocol for MPCP is not to have to redefine the parsing.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **2** *P* *L* # **722**

Sala, Dolors Broadcom

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

FIg 56-3 needs to be updated wiht the correct layering. I would recommend to merge to define MPCP as a MAC control layer calling all MAC control functions. Since the multiplexing layer was no introduced yet in here. I think the easier is to just consider the MPCP in a single layer, and this layer is a redefinition of MAC control to support multiple clients. In the layering discussion this is the option that merges mac control and multiplexing layer in one.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **2.2** *P* **92** *L* **30** # **725**

Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

laser control signal cannot go through layer management.

SuggestedRemedy

It has to be similar to the "transmitting" variable in the MAC clause. management is too slow for this function.

Proposed Response *Response Status* **O**

Cl **56** *SC* **2.3, and 2.4** *P* *L* # **723**

Sala, Dolors Broadcom

Comment Type **TR** *Comment Status* **D**

I think these two sections should be eliminated they have too much overlap wiht the MAC control definition. And for example explain the gating function separate up to transmit ready.

Where is the variable TxAllowed modified?

The service interface specification (ex page 99) still needs to be matched with the standard clause two.

In this section the subtype is the opcode in mac control, isn't?

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **2.7** *P* *L* # **730**

Sala, Dolors Broadcom

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

why we cannot assume that the grants arrive in order at the ONU?
This incurs unncessary processing at teh ONU. And anyway, the OLT must guarantee that they do not overlap so there is no extra cost at the OLT to send them in order to a given ONU.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **3** *P* *L* # **731**

Sala, Dolors — Broadcom

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

the encapsulation of grants in gates is not very efficient.

I think we should consider being able to do
1.- put discovery grants, and normal grants in a single gate.
we need to move the field discovery line 19, p. 120 to a field for a grant. this can be just a bit.
2.- put several grants to different ONUs in a gate (if wanted). It will be rare that the scheduler schedules so much in the future where it can send two grants to the same ONU (unless they go to different LLID).
3.- put several grants to same ONU but different LLID in the same gate.
these two options require the same modification. Add the LLID as a field specified in the grant.

fig 56-20 It seems there is interest in packaging several requests in a report (to represent several queue boundaries). We should allow this. Again, it only requires to add an LLID and possibly a number of reports field.

table 56-4: if the number of LLIDs to register is sent as a parameter I do not undertand why several steps of registration is needed.

The LLIDs/bit mode should be better specified in the formats. For example assigned ports line 51, page 125

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **56** *P* *L* # **672**

Diab, Wael William — Cisco Systems

Comment Type **TR** *Comment Status* **D**

There is no mention on the constraint for the local time stamping. I believe that there is an inherent assumption that the delay throuh the MAC & Phy is relatively constant. This needs to be explicitly stated in the draft.

SuggestedRemedy

Please add a timing constraint for the time stamping mechanism to eliminate any variability through the MAC and Phy. For instance, a min and max time between processing to trnsmition.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.1** *P* **88** *L* **40** # **515**

Bemmel, Vincent — Alloptic

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

The objective to support multiple LLID per physical ONU does not add any value and in contrary introduces many technical flaws.
At the ONU, the LLID should represent nothing more than the ONU_ID.

A presentation will be submitted for discussion.

SuggestedRemedy

Replace:

b) Support multiple LLID per physical ONU

With:

b) Support a single LLID per physical ONU

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.3** *P* **90** *L* **39** # **701**

Jonathan Thatcher — World Wide Packets

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

Overloading block diagram makes for less print, but makes the distinction between the RX and TX; and between the ONU and OLT confusing.

SuggestedRemedy

Recommend splitting this block diagram up to make Rx/Tx and associated parser/multiplexer clear (example Figure 55-2). Also show ONU and OLT separately and thereby clear up Report and Gate Processing

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.6.3** *P* **6** *L* **44** # **347**

Tom Mathey Independent

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

Text that restricts use of MAC Control PAUSE or Flow Control when OAM sublayer is present can be removed by modification of MAC Control PAUSE State Diagram for transmit, Fig. 31B-1.

SuggestedRemedy

To the two blocks named "SEND DATA FRAME" and "SEND CONTROL FRAME", add a third block named "SEND OAM FRAME".

Define present transition from block "TRANSMIT READY" to block "SEND CONTROL FRAME" as Control.

Define present tranistion from block "TRANSMIT READY" to block "SEND DATA FRAME" as not Control * Data.

Define new transition from existing block "TRANSMIT READY" to new block "SEND OAM FRAME" as OAM. Logic terms for OAM are: MA_DATA.request(DA, SA, type = 0x88-09, subtype = OAM = 0x03)

Enhance present transition from block "TRANSMIT READY" to block "SEND CONTROL FRAME" as not OAM * Control.

Enhance present transition from block "TRANSMIT READY" to block "SEND DATA FRAME" as not OAM * not Control * Data.

Modify transitions from block "PAUSED" to existing and new blocks in a similar manner.

Comments are welcome as other methods are possible, such as no new block and modify equation for enty into block "SEND DATA FRAME".

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2** *P* **91** *L* **37** # **700**

Jonathan Thatcher World Wide Packets

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

Terms "Register," "Registration" and "Discovery" are used inconsistently.

SuggestedRemedy

Recommend use of "Registration" only.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.3** *P* **92** *L* **37** # **699**

Jonathan Thatcher World Wide Packets

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

Why would parsing in the Tx direction be required?

SuggestedRemedy

Fix or clarify.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.3.1.2** *P* **93** *L* **41** # **698**

Jonathan Thatcher World Wide Packets

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

Consider this a ER. It is common in 802.3 to set variables to values that have meaning. "true" and "false" are not as good as "on" and "off", respectively

SuggestedRemedy

Global change to LaserControl

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.3.1.6** *P* **95** *L* **13** # **697**

Jonathan Thatcher World Wide Packets

Comment Type **TR** *Comment Status* **D**

Logic needs to be completely specified. For example, to the left of the "PARSE" block there must be Length_Type == MAC Control and !(subtype in (GATE,REPORT,...

Better to explicitly describe the logic than use "else."

SuggestedRemedy

Scrub and fix all state diagrams

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.2** *P* **102** *L* **24** # **168**

Ikeda, Kiyoshi Matsushita Communic

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

wrong : DEFAULT VALUE : 00-09-89-68(10 miliseconds)

SuggestedRemedy

correct: DEFAULT VALUE : 00-00-00-0A(10 times)

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **105** *L* **42** # **516**

Bemmel, Vincent Alloptic

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

Registration should not have to deal with the number of user ports on the ONU, and should be called only once for an ONU.

SuggestedRemedy

Modify line 42 from:
MA_CONTROL.request(registration, number_of_ports)
to:
MA_CONTROL.request(registration)

Remove lines 43-45:
"This primitive may be called multiple times in order to register additional ports. The registration process requests the network a number of ports as specified in the number_of_ports parameter."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **106** *L* # **665**

Diab, Wael William Cisco Systems

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

Define the parameters that OMP.request() message takes

SuggestedRemedy

Pls. add definitions for the key parameters used in the state machine

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **106** *L* **1** # **524**

Bemmel, Vincent Alloptic

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

MPCP should not request deregistration of ports

SuggestedRemedy

Remove the definition of MA_CONTROL.request(deregister)

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **106** *L* **24** # **517**

Bemmel, Vincent Alloptic

Comment Type **TR** *Comment Status* **D**

Not clear how the SA_list is used in line 24:

"MA_CONTROL.indicate(in_progress, SA_list)
The service indication issued by the Discovery Process to notify the client and Layer Management that the registration process is in progress.
A list of source MAC addresses associated with the devices attempting to register are provided in the SA_list parameter. "

Isn't this one ONU at a time?

SuggestedRemedy

Please Clarify.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **106** *L* **29** # **518**

Bemmel, Vincent Alloptic

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

Registration should deal with a single LLID only

SuggestedRemedy

Proposed text:

MA_CONTROL.indication(accepted, SA, ID, capability, acknowledged_capability, RTT)
The service indication issued by the Discovery Process to notify the client and Layer Management that the registration process has completed.
The MAC address of the recipricating MAC (ONU address at the OLT, and OLT address at the ONU) is passed in the parameter SA. The LLID allocated to the ONU is passed in the parameter ID. The parameter capability holds the 64 bit vector published by the far end, as well as the 64 bit vector (acknowledged_capability) returned by the far end after the registration completion.
The measured round trip time to/from the ONU is returned in the parameter RTT. RTT is stated in time_quanta units. This parameter holds a valid value only when the invoking Discovery Process is in the OLT (i.e. Master = true).

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **107** *L* # **664**

Diab, Wael William Cisco Systems

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

Define the parameters that OMP.indication() takes

SuggestedRemedy

Add definitions for key parameters in the message such as the flags

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.5** *P* **108** *L* **17** # **519**

Bemmel, Vincent Alloptic

Comment Type **TR** *Comment Status* **D**

Not clear what SA_list represents. Shouldn't this be done one SA at a time?

SuggestedRemedy

Change:
MA_CONTROL.indicate(in_progress, SA_list)

To:
MA_CONTROL.indicate(in_progress, SA)

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.5.1.6** *P* **110** *L* **14** # **520**

Bemmel, Vincent Alloptic

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

MPCP should not be burdened with dynamic add/remove of multiple LLIDs/ONU

SuggestedRemedy

Remove destruct_flag and IDs fron OMP.indication(). Remove destruct_flag from ZERO STATE 2 and ARRIVING REGISTER 2

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.6** *P* **111** *L* **5** # **523**

Bemmel, Vincent Alloptic

Comment Type **TR** *Comment Status* **D**

The followig statement is not clear...

"The layer will, however, generate report messages autonomously on a periodic fashion, in order to maintain minimal rate OMP message flow, as a network sanity check."

This mechanism is not very clear, since TDMA is inherently scheduled.

SuggestedRemedy

Rephrase/clarify this statement.

Why not use the FORCE_REPORT flag mechanism in periodic GATEs (see also figure 56-15 on page 113)

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.6.1.5** *P* **112** *L* **3145** # **674**

Yoshihara, Osamu NTT

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

Modify MA_CONTROL.request() and MA_CONTROL.indication() to accomodate multiple threshold reports.
(I will submit a presentation)

SuggestedRemedy

Change "MA_CONTROL.request(report,valid[8],status[8])" to
"MA_CONTROL.request(report,report_list)".
Add the following statement in Line34,
"The list of queue status reports issued by ONU are passsed in the parameter "report_list" .
A queue status report has two members, valid[8] and status[8]."

Change "MA_CONTROL.indication(report,valid[8],status[8]) to
"MA_CONTROL.indication(report,report_list)"
Add the following statement in Line42,
"The list of queue status reports issued by ONU are passsed in the parameter report_list. A queue status report has two members, valid[8] and status[8]."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.6.1.6** *P* **113** *L* **11** # **188**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

In 'PERIODIC TRANSMISSION' state should there not be a check if variable 'register == true'? So that no report is sent untill registration is complete or if the ONU has been deregistered.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.7.1.2** *P* **115** *L* **12** # **668**

Diab, Wael William — Cisco Systems

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

The statement "LaserControl is always true for the OLT" is accurate during operation, however, the OLT should be allowed to shut-down the laser if the port is not in use.

SuggestedRemedy

Reword to "LaserControl is always true for the OLT during operation"

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.7.1.2** *P* **115** *L* **41** # **669**

Diab, Wael William — Cisco Systems

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

Laser_on_time: The phrase "This value is typically hard coded or sensed through the MDIO interface by higher layers and then set." is too constraining to implementations.

SuggestedRemedy

"This value is typically hard coded or sensed by higher layers and then set."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.2.7.1.2** *P* **116** *L* **5** # **670**

Diab, Wael William — Cisco Systems

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

Laser off time: "This value is typically hard coded or sensed through the MDIO interface by higher layers and then set." is again constraining.

SuggestedRemedy

"This value is typically hard coded or sensed by higher layers and then set."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.25.1.3** *P* **104** *L* **38** # **525**

Bemmel, Vincent — Alloptic

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

The standard should not have special functions to register LLIDs subsequent to registration in the discovery process.

SuggestedRemedy

Remove the definition of the allocate_id() function lines 38-46

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.3.1** *P* **120** *L* **16** # **694**

Jonathan Thatcher — World Wide Packets

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

Under what condition would you send 0 grants? Why send a Gate without a grant? Is the reserved space being used for something that isn't documented?

SuggestedRemedy

?

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.3.1** *P* **120** *L* **35** # **695**

Jonathan Thatcher — World Wide Packets

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

Consider this an ER. Change all references to nanosecond increments to bit times for consistency with remaining document.

SuggestedRemedy

See comment

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.3.1 (Gate descripti** *P* **120-121** *L* # **199**

Hidekazu Miyoshi Sumitomo Electric Ind

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

Under the Gate/Report message mechanism defined in draft 1.0, bandwidth assignment loss (sometimes called ³unused slot remainder²) may occur. This is a significant problem to achieve higher utilization. Several mechanisms have been proposed. These are, however, not sufficient for DBAs to achieve higher utilization under certain conditions. That is, a more flexible and prospective mechanism is needed. We propose a new MPCP mechanism by extending the format of the Gate message to distribute ³upper bound² to each ONU. The rationale behind our proposed mechanism is that upper bound should be transferred from OLT to ONU in order to alleviate unbalanced-traffic conditions. In the proposed mechanism, the OLT manages upper bound, and the upper bound is distributed to ONUs via the gate message. Each ONU requests the maximum MAC boundary within the upper bound.

SuggestedRemedy

We propose a new Gate message format in order to convey upper bound information. Two alternatives are proposed.

(Proposal 1)
One bit of the upper bound bit field, which represents the existence of the bound field (also newly proposed), is added in the number of grants field. The bound field consists of two sub-fields, bound bitmap (8 bits) and bound #0, #1, #2, #3, #4, #5, #6, and #7 (16bits each). Bound bitmap indicates the presence of each bound field. Each bound field represents upper bound, and bound #i is associated with queue #i in an ONU.

(Proposal 2)
The basic idea is the same as alternative 1. The major difference is that the meaning of Grant start time (only for grant 2, 3, and 4) is changed. The start time represents time difference from the previous start time, and now each size is reduced to 24 bits. In this proposal, if more than two grants are issued in one Gate message, these grants must be ordered in start time.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.4.1** *P* **122** *L* **42** # **673**

Yoshihara, Osamu NTT

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

Allow REPORT format to hold multiple sets of bitmap and queue reports to report various frame boudnaries. These information will be helpful for elaborate scheduling concept. (I will submit a presentation)

SuggestedRemedy

Add the following statement,
"(c) The granulality of Queue #n report is 2 octets."
"(d) A Report frame may hold multiple sets of Report bitmap and Queue #n to report various frame boundaries as an option. "

Change the statement from "7 to 39" to "0 to 39" in Line 46.
Change the Queue#n Report fields from 0/4 octets to 0/2 octets in Figure 56-20 in page 123.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.5.1** *P* **124** *L* **14** # **521**

Bemmel, Vincent Alloptic

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

"Subsequent request" and "Destruction" requests are not applicable

SuggestedRemedy

Remove from Table 56-4:

line 14:
"2 = Subsequent registration. This is an attempt to register additional LLIDs."

line 16:
"3 = Destruction. This is a request to destroy the port and free the LLID. Subsequently, the MAC is destroyed."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.5.1.d** *P* **124** *L* **21** # **692**

Jonathan Thatcher World Wide Packets

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

ER again. "Turn on time" sounds to similar to "start time".

SuggestedRemedy

Change "Turn on time" to "Turn on delay" and "Turn off time" to "Turn off delay" It will reduce the confusion factor.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.6.1** *P* **125** *L* **51** # **691**
Jonathan Thatcher World Wide Packets

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

ER again. "Assigned Ports" might be more clear if it were names "# Assigned Ports" or "No. Assigned Ports" or such.

SuggestedRemedy

See comment

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.6.1** *P* **126** *L* **13** # **689**
Jonathan Thatcher World Wide Packets

Comment Type **TR** *Comment Status* **D**

There are a number of references to a phantom "higher-layer-entity" within the clause.

SuggestedRemedy

Unmask the phantom. Describe, reference, or otherwise expose this "entity."

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.6.1** *P* **126** *L* **8** # **522**
Bemmel, Vincent Alloptic

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

"Destruct" does not apply since no dynamic LLID add/remove after registration should be supported

SuggestedRemedy

Remove from table 56-6 line 8:

2 Destruct. This is a request to destroy the port and free the LLID. Subsequently, the MAC is destroyed.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.6.1.f++** *P* **126** *L* **25** # **690**
Jonathan Thatcher World Wide Packets

Comment Type **TR** *Comment Status* **D**

Description of "Assigned Ports List" (per Figure 56-22) is missing.
Also, suggest dropping the "s" off of "Ports" everywhere.

SuggestedRemedy

Add description

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.3.7.1** *P* **128** *L* **33** # **688**
Jonathan Thatcher World Wide Packets

Comment Type **TR** *Comment Status* **D**

Validation of correct registration is an appropriate goal of the registration process. Registration data sent in the "Registration PDU" should be returned in the "Registration Ack" PDU.

Note, the frequency of registration should not be sufficient to impact overall performance. Saving a few bytes is not worth not being able to validate correct reception.

SuggestedRemedy

Add Capability vector, Assigned port list, etc.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.4** *P* **124** *L* **15** # **693**
Jonathan Thatcher World Wide Packets

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

ER again. Let's "deregister" the MAC & Port rather than destroy it.
Also in Table 56-4 and Table 56-5...

SuggestedRemedy

See comment

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-5** *P* **95** *L* # **657**

Diab, Wael William — Cisco Systems

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

Parse conditions are ambiguous.

SuggestedRemedy

Conditions rewritten as:
(Length_Type == MAC Control) and (subtype NOT in {GATE, REPORT, REGISTER, REGISTER_REQ, REGISTER_ACK})

(Length_Type == MAC Control) and (subtype in {GATE, REPORT, REGISTER, REGISTER_REQ, REGISTER_ACK})

(Length_Type != MAC Control)

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* # **182**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

OMP indication REGISTER_ACK can arrive in the 'INSIDE REGISTER WINDOW' state before timeout of 'register_window_size'. This is missing.

SuggestedRemedy

Arrival of REGISTER_ACK in the 'INSIDE REGISTER WINDOW' state, should trigger a state change to 'COMPLETE DISCOVERY'

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* # **185**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

State 'CHECK DESTRUCT ID' can appear before 'INDICATE DEREGISTER', otherwise it might lead to unnecessary indication.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* # **666**

Diab, Wael William — Cisco Systems

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

In Figure 56-11—Discovery Processing Master State Diagram, the behaviour of receiving a REGISTER_REQ inside and outside the REGISTER WINDOW appears to be identicle

SuggestedRemedy

Discard REGISTER_REQ that are received outside the window.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* **25** # **181**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

ONU_timer[SA] can expire in the 'INSIDE REGISTER WINDOW' state.

SuggestedRemedy

On expiry of 'ONU_timer' in state 'INSIDE REGISTER WINDOW', state can change to IDLE state.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* **30** # **183**

Bharati, Barnali — Wipro Technologies

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

If (destruct_flag) is true in 'CHECK DESTRUCTOR' state, OLT needs to send OMP.request (subtype=REGISTER, destruct_flag=true) and also needs to call free_state (MAC) to free the 'state' of that ONU. This is missing

SuggestedRemedy

Rather than going back to 'IDLE' from CHECK DESTRUCT ID, it can transit to 'REGISTER'

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* **35** # **184**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

If OTL ever receives an OMP.indication (subtype=REGISTER_REQ, destruct_flag=true, SA=broadcast_ID), OLT need not call END function. As this would require a reset of the state machine.

SuggestedRemedy

OLT can just ignore the indication and transit to 'IDLE' state.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-11** *P* **108** *L* **45** # **180**

Bharati, Barnali — Wipro Technologies

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

Call to remove_timer (ONU_timer[SA]) after receiving OMP.indication (REGISTER_ACK) is missing. The timer is started at line 45.

SuggestedRemedy

remove_timer (ONU_timer[SA]) can be added in 'COMPLETE DISCOVERY' state.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-13** *P* **110** *L* **15** # **187**

Bharati, Barnali — Wipro Technologies

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

Upon reception of OMP.indication (subtype=REGISTER, destruct_flag=true), transition from 'ARRIVING REGISTER 2' to 'DEREGISTER' state is triggered (see: 2 true). This will send another REGISTER_REQ with destruct_flag set to true, instead of an REGISTER_ACK.

SuggestedRemedy

May create a new state 'DEREGISTER_ACK' and actions in this new states are:
1) OMP.request (SA, DA, subtype=REGISTER_ACK, destruct_flag = true)
2) registered = flase

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-13** *P* **110** *L* **3145** # **186**

Bharati, Barnali — Wipro Technologies

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

Actions in both 'ACK' and 'SUBSEQUENT ACK' states are same.

SuggestedRemedy

There is no need for two different states. State 'SUBSEQUENT ACK' can be removed.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-19** *P* **121** *L* **16** # **3**

Tomita, shuzo — NTT

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

There is different GATE MPCPDU frame format.
In plenaly(May,2002),"DA/SA/.../Flag/#Start time/#Length/...".
But in Draft 1.0,"DA/SA/.../Flag/#Length/#Start time/..."

I think that plenaly's(May,2002) GATE MPCPDU frame is better.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-3** *P* **91** *L* # **395**

Kramer, Glen — Teknovus

Comment Type **TR** *Comment Status* **D**

The layring diagram on Figure 56-3 does not match the baseline layering diagram (see http://grouper.ieee.org/groups/802/3/efm/baseline/haran-sala_p2mp_1_0702.pdf).

During additional discussion via conference calls the above model was further refined (see "P2MP layering diagram refinement" presentation).

SuggestedRemedy

Modify Figure 56-3 to match layering diagram of model #4 in the accompanying "P2MP layering diagram refinement" presentation.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-5** *P* **95** *L* **14** # **174**

Bharati, Barnali — Wipro Technologies

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

In the 'PARSE' state, 3 transition conditions are specified.
1) Length_Type == MAC Control
2) (Length_Type == MAC Control) and (subtype in {GATE, REPORT, REGISTER, REGISTER_REQ, REGISTER_ACK})
3) else

This first condition 'Length_Type == MAC Control' is incomplete.

SuggestedRemedy

Instead of just 'Length_Type == MAC Control' It should be (Length_Type == MAC Control) and !(subtype in{GATE,REPORT,REGISTER,REGISTER_REQ, REGISTER_ACK})

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-6** *P* **96** *L* **8** # **175**

Bharati, Barnali — Wipro Technologies

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

Condition to enter 'LASER ON' state from 'WAIT' sate is 'LaserControl == true or Master == true'.
Since 'LaserControl' and 'Master' is always true for the OLT, checking only if LaserControl == true is sufficient.

SuggestedRemedy

Instead of 'LaserControl == true or Master == true', it could be 'LaserControl == true' only.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure 56-8** *P* **100** *L* **11** # **177**

Bharati, Barnali — Wipro Technologies

Comment Type **TR** *Comment Status* **D**

In state 'OMP TIMEOUT', the condition 'if not (Master and me == broadcast_ID)' would force OLT to go to ERROR state in case only one ONU was present and this ONU has sent a REGISTER_ACK with destroy flag set. So no more messages would come from the ONU. This would result in timeout of omp_timer and OLT would transit to EROOR STATE. Not desirable (I presume, variable 'me' would have proper MAC address)

SuggestedRemedy

Could 'me == broadcast_ID' be removed from the condition?

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure56-12** *P* **109** *L* **12** # **169**

Ikeda, Kiyoshi — Matsushita Communic

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

wrong : Backoff = max(max_deferal, Backoff+1)

SuggestedRemedy

correct : Backoff = min(max_deferal, Backoff+1)

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure56-15** *P* **113** *L* **9** # **149**

Ken, Murakami — Mitsubishi Electric

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

In the current specification, RTT calculation is performed only when the OLT receives the REGISTER_REQ message. The RTT calculation is also necessary in Report processing. The REPORT message is issued at the cycle of periodic_timer at least. The clock ppm difference between OLT and ONU is tuned using this cyclic REPORT messages.

SuggestedRemedy

The RTT calculation process is indicated in REGISTER state in Discovery processing. This process should be added as a process of OMP.indication event in Report processing.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure56-2** *P* **90** *L* **3** # **147**

Ken, Murakami — Mitsubishi Electric

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

The operation of PAUSE function and the interaction of PAUSE with MPCP and OAM need more study. If the PAUSE function specified in Annex 31B is applied in P2MP without modification, some problems will be caused. For example, when pause is enabled to a certain ONU in the downstream, not only data frames but also control frames to this ONU cannot be sent. As a result, data frames from this ONU cannot be sent in the upstream since grants are not allocated during pause period. Therefore, some modifications to the current PAUSE function specified in Annex 31B are necessary. Though the concept of PAUSE can be left in the draft, the operation of PAUSE needs more study.

SuggestedRemedy

The following note should be added immedicately below Figure 56-2.
(note) The operation of PAUSE specified in Annex 31B needs more study.

Proposed Response *Response Status* **O**

Cl **56** *SC* **Figure56-5** *P* **95** *L* **3** # **148**

Ken, Murakami — Mitsubishi Electric

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

The branch condition to PAUSE is not enough. In addition to Length_Type, subtype should be considered.

SuggestedRemedy

The branch condition to PAUSE should be (Length_Type == MAC Control) and (subtype == PAUSE).

Proposed Response *Response Status* **O**

Cl **56** *SC* **Table 56-2** *P* **120** *L* **29** # **102**

Haran, Onn — Passave

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

The definition of "Force Report" is not clear.

In the case when more than one grant exists inside GATE message, then it is uncertain to which of these grants "Force Report" relates.

SuggestedRemedy

Define "Force Report" as a vector with the size of 4 bits. Each bit will relate to a specific grant.

Proposed Response *Response Status* **O**

Cl **57** *SC* **2.2** *P* **140** *L* # **717**

Sala, Dolors — Broadcom

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

I have two commetns on the state diagrams:

The none flag for the xxx_PLS variables require to reserve a value of the LLID. This value cannot be a valid value for LLID assignment. We should try to find a description that avoids this.

In figure 56-2 I do not have clear how it works. So I may comments may be on misinterpretation. I would like more explanation. But my current comments are.

The error state seems to trigger when Transmit_PLS != j but this is the initial case. So it seems it always gives error.

Also, the error tracking should result in abort of the current frame transmission and error indication to layer management and possibly to MAC to discard the rest of the frame. We need to discuss and evaluate this case.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **57** *SC* **52** *P* **136** *L* # **716**

Sala, Dolors — Broadcom

Comment Type **TR** *Comment Status* **D**

This clause should support a general filtering based on LLID and mode bit (see baseline sala_3_05_2.pdf page 10). The current description only supports P2PE filtering.

This is reflected in lines 12 41 in page 137, lines 10, 31 in page 138, line 38 in page 139, Figures 56-1, Fig 56-2

SuggestedRemedy

The "j" mapping (the filtering in particular) is a more complicated function. See the baseline page indicated.

I think this amount of duplication with clause 35 could be avoided if the single to multiple interfaces is described as a separate step. This would allow to highlight better the differences too.

One way to describe this is to keep all GMII-RS interface as is in clause 35
Hence subclause 57.2.1 would directly point to the corresponding subclause 35. And add an extra step to do the final mapping of a single PLS_CARRIER to multiple PLS_CARRIER[j] according to the function. This will also allow to reduce the figures 56-1 and 56-2 to focus on the mapping only.

Otherwise the mapping function needs to be added in all the lines where j is described and the figures updated.

Proposed Response *Response Status* **O**

Cl **57** *SC* **57.2.4.2.1** *P* **figure 56-1** *L* # **162**

Jaeyeon Song — Samsung Electronics

Comment Type **TR** *Comment Status* **D**

In table 56-1 "preamble definition" tell us the 2 bytes of preamble is allocated to LLID.
In baseline we agreed the LLID consist of a mode- bit and PHY_ID fields. The mode-bit represents the two mode, broadcast and unicast, not multicast.
In EPON, no protocol of supporting multicast traffic exists. But, multicast traffic will be in the EPON, and we should distinguish multicast traffic from broadcast.

SuggestedRemedy

We should define multicast LLID. In addition, multicast LLID don't have to be allocated through the auto-discovery process. It remains in high layer protocol. we just define the hook of supporting multicast traffic.

The possible solution is : Using the multicast address in MAC, we can make the multicast LLID by hash function or direct mapping. It is simple, no burden to MAC and RS layer filtering is possible like other LLIDs.

I will prepare presentation about it.

Proposed Response *Response Status* **O**

Cl **57** *SC* **57.2.4.2.1** *P* **figure 56-1** *L* # **161**

Jaeyeon Song — Samsung Electronics

Comment Type **TR** *Comment Status* **D**

In table 56-1 "preamble definition" tell us the 2 bytes of preamble is allocated to LLID.
In baseline we agreed the LLID consist of a mode- bit and PHY_ID fields. The mode-bit represents the two mode, broadcast and unicast, not multicast.
In EPON, no protocol of supporting multicast traffic exists. But, multicast traffic will be in the EPON, and we should distinguish multicast traffic from broadcast.

SuggestedRemedy

We should define multicast LLID. In addition, multicast LLID don't have to be allocated through the auto-discovery process. It remains in high layer protocol. we just define the hook of supporting multicast traffic.
The possible solution is : Using the multicast address in MAC, we can make the multicast LLID by hash function or direct mapping. It is simple, no burden to MAC, and RS layer filtering is possible like other LLIDs.
I will prepare presentation about it.

Proposed Response *Response Status* **O**

Cl **58** *SC* *P* **151** *L* **11** # **384**

Bhatt, Vipul (Not Applicable)

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

Please refer to Editor's Note: "Clause 58.7 on page 168 and Clause 58.8 on page 169, (worst case power budget and link penalty tables) will be removed prior to publication."

I think it will be wise to keep those tables. They act as a quick reference, an executive summary of a link's design. For those trying to understand PMD specification tables, the link budget tables provide a quick application example, which helps promote understanding. If there is any discrepancy between link model spreadsheet and these tables, we can either remove the discrepancy or use suitable words to highlight how to resolve it. Overall, the benefit of keeping those informative tables is more than the cost.

SuggestedRemedy

Delete the note.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58** *P* **151** *L* # **335**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The timing parameters cannot be decided in isolation. We need to take the PMA and PCS into account, as well as upper layers. There is no point in flogging the electronics for high "efficiency" in bits delivered per nominal bit: a PON is a distributed switching system with severe latency challenges and like any such switching fabric would be expected to carry a substantial bandwidth overhead. Cost-efficiency, in bits delivered per dollar, is far more relevant.

SuggestedRemedy

Create a timing analysis which spans the full layer stack, "logic", "electronics" and "optics" before choosing timing parameters. Consider being flexible with the head end receiver timing parameters; after all, it controls the timing of the bursts it receives, so can take account its own capabilities.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58** *P* **151** *L* # **323**

Dawe, Piers Agilent

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

Note several comments against clause 60, about how to specify fiber, nomenclature, and such, which may apply to the other optics clauses.

SuggestedRemedy

per comment

Proposed Response *Response Status* **O**

Cl **58** *SC* **58** *P* **187** *L* # **278**

Dawe, Piers Agilent

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

"Transmitter type Longwave Laser": Use of lasers, or a particular type, is an implementation choice, not a requirement of the standard. Later in a receiver table it is even less appropriate.

SuggestedRemedy

Search and eliminate the lines "Transmitter type Longwave Laser": in at least eight tables.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.11.12** *P* **173** *L* # **65**

Khermosh, Lior Passave

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

Add testing to PON timing specifications - measuring ONU trasnmitter laser on and off. Measuring OLT receiver locking time.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.16** *P* **178** *L* # **66**

Khermosh, Lior Passave

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

Is it necessary to add specifications for Fiber round trip delay?
Is it necessary to add specification for variation of n with temperature?

SuggestedRemedy

Define parameters for abselute RTT (max) for the link, variations due to temperature.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.2.4** *P* **184** *L* **7** # **333**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Signal detect: it's universal at present in continuous-mode receivers (point to point) but the everyday signal detect approach in clause 38 won't be fast enough to detect individual bursts in a head end burst mode receiver. Further, if EFM is to aspire to a first mile in a consumer market, every pin and mW needs to be scrutinised and possibly jettisoned, especially in the continuous-mode CPE receiver. See GR-253 for how PMD signal detect need not be mandatory. The standard does not have enough reason for demanding that the function be implemented in the PMD (although implementers may choose to use it), nor that the signal detect status be reported in duplicate, though a physical pin and through a management interface. Signal detect is not the primary way of detecting breaking links; these are detected by noting a "run of zeroes" (coding violation). However, an optional signal detect may be useful in near-term mid-price equipment and even for confirming cabling failures between the head end and the splitter in a PON. In the suggested remedy I have assumed that 1000BASE-PX will use Clause 45 MDIO.
Also it's nice if signal detect operates below sensitivity.
I wonder if clause 36 is compatible with PON operation. If the bursts cause SD chatter, will this foul up the PCS?

SuggestedRemedy

Check that 36 as modified is compatible with the following. I think the state machine Figure 36–9 and 36.2.5.1.4 (signal_detectCHANGE) will work with (a conceptual, non-existent, cheap) SD hard wired to OK.
Check that clause 36 is compatible with PON operation. If the bursts cause SD chatter, will this foul up the PCS?
Suggested text for 59.2.4:
The signal detect function is traditionally implemented in the transceiver, although it may be implemented elsewhere, e.g. in association with the PMA, or not implemented. If implemented within the PMD, the PMD Signal Detect status shall be reported either or both of two ways. The PMD Signal Detect function may report to the PMD service interface, using the message PMD_SIGNAL.indicate(SIGNAL_DETECT) which is signaled continuously. PMD_SIGNAL.indicate is intended to be an indicator of optical signal presence. Or the status may be reported via the management interface. If the MDIO interface is implemented, the value of SIGNAL_DETECT may contribute to the latching link status register bit 1.2 described in 22.2.4.2.13.

If implemented, the value of the SIGNAL_DETECT parameter shall be generated according to the conditions defined in Table 60-1. If signal detect is not implemented, the value of the SIGNAL_DETECT parameter conveyed to the upper layers and management functions shall be "OK". The PMD receiver is not required to verify whether a compliant signal is being received. This standard imposes no response time requirements on the generation of the
SIGNAL_DETECT parameter. It is preferable for the signal detect thresholds to be below the rated sensitivity of the receiver; they must be below the Receiver sensitivity (max) in this standard.

As an unavoidable consequence of the requirements for the setting of the SIGNAL_DETECT parameter, implementations must provide adequate margin between the input optical power level at which the SIGNAL_DETECT parameter is set to OK, and the inherent noise level of the PMD due to cross talk, power supply noise, etc.

Various implementations of the Signal Detect function are permitted by this standard, including implementations that generate the SIGNAL_DETECT parameter values in response to the amplitude of the modulation of the optical signal and implementations that respond to the average optical power of the modulated optical signal. Full Ethernet implementations which do not use a PMD signal detect, or which do not use any signal detect, must avoid noise, chatter or crosstalk creating a bogus signal with the characteristics of a real signal, which is not otherwise identified as bogus.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.2.4.1.1 & 58.2.4.2.1** *P* **154155** *L* # **58**

Khermosh, Lior Passave

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

SD timing required:
Is SD state at the OLT changing between ONUs - What is the level of SD during guard band?

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3** *P* *L* # **527**

McCammon, Kent SBC Technology Reso

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

Specification of the laser transmitter tolerance to reflection from the fiber network.

SuggestedRemedy

Add a specification for tolerance to reflections to each transmitter, Type A and Type B for OLT and ONU. Existing PON standards ITU_T G.983.1 contain values for tolerance to transmitter incident light power of -15 dB such that high level of reflections are tolerated without penalty.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3.1, 58.5.1,** *P* **157, 163.** *L* **in tables.** # **56**

Frank Effenberger Quantum Bridge Com

Comment Type **TR** *Comment Status* **D**

The downstream laser line widths of 1 nm RMS are too large. Also, the use of RMS specification for single longitudinal mode lasers is inappropriate.

SuggestedRemedy

The downstream laser line widths should be defined by their 20 dB width, and that width should be 1 nm. A footnote should be added to state: "The line width of the SLM laser is expected to be less than 1 nm."

The specific changes are:
Page 157: Change 'RMS spectral width' to 'Spectral width at -20dB points'
Page 157: Add note to changed text "The line width of the SLM laser is expected to be less than 1 nm."

Page 163: Change 'RMS spectral width' to 'Spectral width at -20dB points'
Page 163: Add note to changed text "The line width of the SLM laser is expected to be less than 1 nm."

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3.2, 58.4.1, 58.5.2, 5** *P* **158, 160, 16** *L* **in tables.** # **54**

Frank Effenberger Quantum Bridge Com

Comment Type **TR** *Comment Status* **D**

The upstream power budgets place too heavy a burden on the OLT receiver sensitivity. As they stand, it will be very difficult to construct type B OLT receivers.

SuggestedRemedy

The upstream power levels should be increased by 1 dB overall.

The specific changes are:
1000Base-PX-ONT-A maximum receive power changed to -2 dBm (page 158)
1000Base-PX-ONT-A receive sensitivity changed to -25 dBm (page 158)
1000Base-PX-ONU-A average launch power (min) to -2 dBm (page 160)
1000Base-PX-ONU-A average launch power (max) to +3 dBm (page 160)

1000Base-PX-ONT-B maximum receive power changed to -7 dBm (page 164)
1000Base-PX-ONT-B receive sensitivity changed to -28 dBm (page 164)
1000Base-PX-ONU-B average launch power (min) to -2 dBm (page 166)
1000Base-PX-ONU-B average launch power (max) to +3 dBm (page 166)

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3.2** *P* **158** *L* **4** # **732**

Dawe, Piers Agilent

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

The sentence "The sampling instant is defined to occur at the eye center." could be applied to the testing of an individual untimed optical transceiver but since clause 38 was written we have moved towards specifying the whole system: a "black box" with ports and interfaces. We can specify what we like but the equipment will sample where it likes, and if its choice affects sensitivity, that's part of what we are assuring. Compare clauses 52 and 53.

SuggestedRemedy

Delete this sentence, here and in 58.4.2, 58.5.2 and 58.6.2.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3.2, 58.4.1, 58.5.2, 5** *P* **158, 160, 16** *L* **in tables.** # **57**

Frank Effenberger Quantum Bridge Com

Comment Type **TR** *Comment Status* **D**

The burst mode timing targets are indeed practical. The editor's notes should be removed, and the values made normative.

SuggestedRemedy

Remove the editor's notes regarding the burst mode timing values.

The specific changes are:
1000Base-PX-OLT-A T_Optical_recovery_time notes removed(page 158)
1000Base-PX-ONU-A T_On and T-Off notes removed(page 160)

1000Base-PX-OLT-B T_Optical_recovery_time notes removed(page 164)
1000Base-PX-ONU-B T_On and T-Off notes removed(page 166)

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3-6** *P* **157167** *L* # **736**

Dawe, Piers Agilent

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

The stringent fast Tx risetime and limited Rx bandwidth requirements in clause 38 are to protect against the effects of ringy Tx signals exacerbated by modal dispersion in MMF. 1000BASE-PX doesn't use MMF so these specs can be relaxed significantly. I'll try to run the numbers before the meeting, but probably the risetime implied by the mask is sufficient.

SuggestedRemedy

Delete rise/fall time spec in four tables. Consider a relaxed Receive electrical 3 dB upper cutoff frequency spec in four tables.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.3-6** *P* **15767** *L* # **334**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Four reasons why the minimum extinction ratio should be lowered:
the present high value is a burden to meet over a wider temperature range,
it is contrary to the requirements of high speed and low dispersion penalty,
a burst mode transmitter has more important design challenges so we should relax this one, and,
in a "system level" specification, at least on the continuous mode head end it should be measurable in "mission mode" (remote fault indication? idle? polling for outstations?) rather than the K28.7 data pattern (125 MHz square wave), so the apparent reading will be lower.

SuggestedRemedy

6 dB (all four times)

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.4 & 58.6** *P* **159165** *L* # **59**

Khermosh, Lior Passave

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

What is the line controlling the laser switching? How is it imported from higher layers (MPCP)?

SuggestedRemedy

Use TX_disable/enable line or maybe special 10 bit word

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.4.1** *P* **160** *L* **20** # **340**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Spectral specification in table 58-10 is at present not quite adequate to guard against mode partition noise and may be too tight for minimum cost over a very extended temperature range.

SuggestedRemedy

See my comment against clause 59 to use a combination of maxima of |epsilon_max| where epsilon = Dispersion.length.spectral width.Baud with TDP assurance.

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.9, 58.10** *P* **170171** *L* # **62**

Khermosh, Lior Passave

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

Is the system assumed to be synchronous or pleosynchronous (or both?).
Jitter and reciever timing specifications would be different for each case.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **58** *SC* **58.9, 58.10** *P* **170171** *L* **3** # **61**

Khermosh, Lior Passave

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

Although the jitter specifications are not yet specified:
Does the 637KHz high frequency jitter imply on the CDR loop BW. In that case it may be inconsistent with the fast locking specified in the former sub-sections.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **58** *SC* **Table 58-10,58-16** *P* **160166** *L* **3538** # **63**

Khermosh, Lior Passave

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

Does T-on include the time required for the fault detector loop to stabelize or can this loop work in longer cycles.

Clarification: Is Ton similar in ONU type A (FP) and ONU type B (DFB)?

SuggestedRemedy

Increase Ton to include all parameters

Proposed Response *Response Status* **O**

Cl **58** *SC* **Table 58-6** *P* **156** *L* **26** # **287**

Dawe, Piers Agilent

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

"Minimum range (meters), x to 10000" will attract the style police.

SuggestedRemedy

Minimum range
(x or 0.5 m) to 10 km (in four tables)

Proposed Response *Response Status* **O**

Cl **58** *SC* **Table 58-8, 58-14** *P* **158164** *L* **1819** # **64**

Khermosh, Lior Passave

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

Average receive power (max) at OLT type A is -3dbm and at OLT type B is -8dbm.
This may cause problems when designing a PON system since we might have difficulties in combining for the same OLT near and far ONUs together.

SuggestedRemedy

Need to choose one number for both.
If numbers remain the same need to change the testing spec at section 58.11 for type B.

Proposed Response *Response Status* **O**

Cl **58** *SC* **Table 58-8, 58-14** *P* **158164** *L* **3334** # **60**

Khermosh, Lior Passave

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

What are the optical link and data conditions assumed for this timing specifications?
Is there any specific sequence on line assumed?
Is synchronization assumed to be starting from noise level or from another existing optical signal level (laser on time and laser off of the former ONU ovelapping)?
As ONUs may overlap in on and off time what is the SNR to start counting the locking time?

SuggestedRemedy

Increase timing to accomadate any data sequence on line and synchronization from worse case conditions.

Proposed Response *Response Status* **O**

Cl **58** *SC* **Table58-7,Table58-10,T** *P* **1571601631** *L* **20** # **173**

KAKUNO, YUTAKA Sumitomo Electric Ind

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

RMS spectral width is the expression of the characteristics of the multi longitudinal mode laser.
For single mode longitudinal laser -20dB spectral width and side mode suppression ratio are usually used instead of RMS width.
Considering the values of this parameter in the tables, only ONU Type A can adopt multi longitudinal mode laser.
And the other three type of transmitters uses single longitudinal mode laser.

To make the specifications clear, the definition for spectral width should be separated by the two types of lasers.

SuggestedRemedy

Please see the attatched table file.
The file name is Spectralwidth.pdf (aka kakuno_c1_0902.pdf).

Proposed Response *Response Status* **O**

Cl **59** *SC* *P* **181** *L* **8** # **385**
Bhatt, Vipul (Not Applicable)

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

Please refer to Editor's Note: "Keep Clauses 59.6 and 59.7 (worst case power budget and link penalty tables) for now, remove them prior ro final publication."

I think it will be wise to keep those tables. They act as a quick reference, an executive summary of a link's design. For those trying to understand PMD specification tables, the link budget tables provide a quick application example, which helps promote understanding. If there is any discrepancy between link model spreadsheet and these tables, we can either remove the discrepancy or use suitable words to highlight how to resolve it. Overall, the benefit of keeping those informative tables is more than the cost.

SuggestedRemedy

Delete the note.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59** *P* **181** *L* # **324**
Dawe, Piers Agilent

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

Note several comments against clause 60, about how to specify fiber, nomenclature, and such, which may apply to the other optics clauses.

SuggestedRemedy

per comment

Proposed Response *Response Status* **O**

Cl **59** *SC* **59** *P* **187** *L* # **277**
Dawe, Piers Agilent

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

"Transmitter type Longwave Laser": Use of lasers, or a particular type, is an implementation choice, not a requirement of the standard. Later in a receiver table it is even less appropriate.

SuggestedRemedy

Search and eliminate the lines "Transmitter type Longwave Laser": in at least six tables.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.1** *P* **182** *L* # **556**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Much text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.1.4** *P* **182** *L* # **603**
Tatum, Jim Honeywell

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

59.1.4 should be edited to match clause 38

SuggestedRemedy

Use Clause 38.1.1 as the basis for the PMD service interface

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.10** *P* **199** *L* # **627**
Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

Text and descriptions needed for test methodology

SuggestedRemedy

Use 38.6.5 as the basis for 59.10.7
Use 38.6.6 as the basis for 59.10.8
Use 38.6.7 as the basis for 59.10.9
Use 38.6.8 as the basis for 59.10.10
Use 38.6.9 as the basis for 59.10.11
Use 38.6.10 as the basis for 59.101.12 (If MMF used)
Use 38.6.11 as the basis for 59.10.13
Include reciever upper 3dB bandwidth limits using 38.6.12 as basis for new clause 59.10.14

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.10 & .11 & .12** *P* **199** *L* # **573**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.10.3** *P* **199** *L* **18** # **328**
Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The pattern for extinction ratio conformance could be:
1. a special pattern for extinction ratio conformance (as 100BASE-LX, but not readily available to the end user so a poor choice for a system level spec),
2. the test pattern used for e.g. eye margin and sensitivity testing (the short continuous random test pattern defined in 36A.5: convenient to combine with eye margin measurement but not conveniently accessible in service), or
3. the pattern a station naturally emits when not receiving an optical input (accessible in service).
My choice is for (3). What is that pattern? is it idles with a low concentration of OAM frames? or is it far end fault indication, with or without the OAM frames? Or is it some auto-negotiation signal? What exactly is the (majority) bit stream on the line? With the 8B/10B code it may not matter much.

SuggestedRemedy

Find out what a 1000BASE-LX/EX optical port (will) emit(s) when no optical input. Use that for extinction ratio tests (and for mean power, if we have to be specific).

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.10.4** *P* **199** *L* # **626**
Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

Decide on using OMA or extinction ratio

SuggestedRemedy

recommned using ER, which is what the system companies want to be specified.

Add or remove text to 59.10.5 as appropriate from resolution. Use Clause 52 as baseline for OMA deescription if kept.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.10.4 & .5** *P* **199** *L* # **572**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.11** *P* **201** *L* # **575**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.13** *P* **200** *L* # **574**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.14.1** *P* **204** *L* **17** # **577**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Channel insertion loss values missing

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** SC **59.14.2** P **204** L **34 & 39** # **578**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Channel insertion loss values missing

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** SC **59.15.2** P L # **631**
Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**
Incomplete text

SuggestedRemedy
Use 38.11.2 as the basis for the cluase.

Proposed Response *Response Status* **O**

Cl **59** SC **59.15.2.1 & .3** P **205** L # **579**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** SC **59.16.2 & .3 & .4** P **207** L # **581**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** SC **59.16.4.5 & .6 & .7** P **208** L # **582**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Text needed

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** SC **59.2.1** P **183** L **10** # **605**
Tatum, Jim Honeywell

Comment Type **T** *Comment Status* **D**
x and y are not real numbers

SuggestedRemedy
replace with x=0.5 and y=2

Proposed Response *Response Status* **O**

Cl **59** SC **59.2.1** P **183** L **13** # **557**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Tests xx.yy needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.2.4** *P* **184** *L* **7** # **331**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Signal detect: it's universal at present but if EFM is to aspire to a first mile in a consumer market, every pin and mW needs to be scrutinised and possibly jettisoned. See GR-253 for how PMD signal detect need not be mandatory. The standard does not have enough reason for demanding that the function be implemented in the PMD (although implementers may choose to insist on it), nor that the signal detect status be reported in duplicate, though a physical pin and through a management interface. Signal detect is not the primary way of detecting breaking links; these are detected by noting a "run of zeroes" (coding violation).
Also it's nice if signal detect operates below sensitivity.

SuggestedRemedy

Check that 36 as modified is compatible with the following. I think the state machine Figure 36–9 and 36.2.5.1.4 (signal_detectCHANGE) will work with (a conceptual, non-existent, cheap) SD hard wired to OK.
Suggested text for 59.2.4:
The signal detect function is traditionally implemented in the transceiver, although it may be implemented elsewhere, e.g. in association with the PMA, or not implemented. If implemented within the PMD, the PMD Signal Detect status shall be reported either or both of two ways. The PMD Signal Detect function may report to the PMD service interface, using the message PMD_SIGNAL.indicate(SIGNAL_DETECT) which is signaled continuously. PMD_SIGNAL.indicate is intended to be an indicator of optical signal presence. Or the status may be reported via the management interface. If the MDIO interface is implemented, the value of SIGNAL_DETECT may contribute to the latching link status register bit 1.2 described in 22.2.4.2.13.

If implemented, the value of the SIGNAL_DETECT parameter shall be generated according to the conditions defined in Table 60-1. If signal detect is not implemented, the value of the SIGNAL_DETECT parameter conveyed to the upper layers and management functions shall be "OK". The PMD receiver is not required to verify whether a compliant signal is being received. This standard imposes no response time requirements on the generation of the
SIGNAL_DETECT parameter. It is preferable for the signal detect thresholds to be below the rated sensitivity of the receiver; they must be below the Receiver sensitivity (max) in this standard.

As an unavoidable consequence of the requirements for the setting of the SIGNAL_DETECT parameter, implementations must provide adequate margin between the input optical power level at which the SIGNAL_DETECT parameter is set to OK, and the inherent noise level of the PMD due to cross talk, power supply noise, etc.

Various implementations of the Signal Detect function are permitted by this standard, including implementations that generate the SIGNAL_DETECT parameter values in response to the amplitude of the modulation of the optical signal and implementations that respond to the average optical power of the modulated optical signal. Full Ethernet implementations which do not use a PMD signal detect, or which do not use any signal detect, must avoid noise, chatter or crosstalk creating a bogus signal with the characteristics of a real signal, which is not otherwise identified as bogus.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.2.4.1** *P* **184** *L* # **608**

Tatum, Jim Honeywell

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

tables 59-1, 59-2,59-3 are redundant

in third box down on left hand side, the <= is incorrect

SuggestedRemedy

Converge tables 59-1, 59-2,59-3

replace <= with >=

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3** *P* **186** *L* **4** # **558**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Tests xx.yy needs efinition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3.1** *P* **187** *L* **4** # **559**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Eye measurement zz needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3.1** *P* **187** *L* **40** # **561**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

patch cord XXX needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3.1** *P* **187** *L* **6** # **560**

Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

patch cord YY needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3.2** *P* **188** *L* **4** # **733**

Dawe, Piers Agilent

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

The sentence "The sampling instant is defined to occur at the eye center." could be applied to the testing of an individual untimed optical transceiver but since clause 38 was written we have moved towards specifying the whole system: a "black box" with ports and interfaces. We can specify what we like but the equipment will sample where it likes, and if its choice affects sensitivity, that's part of what we are assuring. Compare clauses 52 and 53.

SuggestedRemedy

Delete this sentence, here and in 59.4.2 and 59.5.2.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3-5** *P* **187** *L* **21** # **339**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Spectral specification in table 59-8 is at present inadequate to guard against gross mode partition noise, and in table 59-11 is too tight for minimum cost. We agreed to introduce something like Fibre Channel's triple trade off. Here's my proposal, which is, overall, simpler and more robust, and designed not to trap the industry into a particular temperature range. I will illustrate it in New Orleans.
Tighten the max RMS spectral width a little to 3.5 nm. This is not enough in itself.
Define a maximum |epsilon_max| where epsilon = Dispersion.length.spectral width.Baud, of 0.168. This "must meet" limit represents an optimistic view of MPN, and is not enough in itself.
Define a second maximum |epsilon_max|, of 0.115. This is the value chosen by ITU-T in G.957, and is thought unlikely to cause more than 2 dB dispersion penalty.
Graph or tabulate what these limits mean on a (wavelength, spectral width) map, knowing the SMF spec, the 10 km reach and the 1.25 GBd line rate.
Use TDP (transmitter and dispersion penalty) methodology for assurance, particularly for implementations which fall between the two |epsilon_max| limits (likely scenario for extended temperature range parts).
Simplify the jitter test requirements where duplication with TDP is identified.
Check we are not desperate for optical budget; unless we are, don't allow the transmit power minimum to vary with transmitter spectral properties.

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.3-5** *P* **18793** *L* # **326**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Three reasons why the minimum extinction ratio should be lowered: the present high value is a burden to meet over a wider temperature range, it is contrary to the requirements of high speed and low dispersion penalty, and in a "system level" specification it should be measurable in service (remote fault indication? idle?) rather than the K28.7 data pattern (125 MHz square wave), so the apparent reading will be lower.

SuggestedRemedy

6 dB (all three times)

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.4** *P* **189** *L* **4** # **562**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
specification xx.yy needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.4** *P* **190** *L* **4** # **563**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
eye measurement ZZ needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.4** *P* **1914** *L* # **735**
Dawe, Piers Agilent

Comment Type **T** *Comment Status* **D**
The stringent fast Tx risetime and limited Rx bandwidth requirements in clause 38 are to protect against the effects of ringy Tx signals exacerbated by modal dispersion in MMF. 1000BASE-BX doesn't use MMF so these specs can be relaxed significantly. I'll try to run the numbers before the meeting, but probably the risetime implied by the mask is sufficient.

SuggestedRemedy
Delete rise/fall time spec in tables 59-8, 59-11. Consider relaxing the Receive electrical 3 dB upper cutoff frequency spec in tables 59-9,12.

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.4.2** *P* **191** *L* **4** # **564**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
measurement techniques ZZ need to be defined

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.5** *P* **182** *L* **4** # **565**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
specifications described in xx.yy needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.5.1** *P* **193** *L* **4** # **566**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
eye measurement ZZ needs definition

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.6** *P* **196** *L* **table 59-1** # **567**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Incomplete values

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.7** *P* **196** *L* **Table 59-1** # **568**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**
Incomplete values

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **59.8** *P* **197** *L* **Table 59.1** # **569**
Richard Brand Nortel Networks

Comment Type **TR** *Comment Status* **D**

Incomplete values

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **59** *SC* **ALL** *P* *L* # **616**
Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

Is MMF included in specification?

SuggestedRemedy

Include refernces for using MMF on all variants (Bidi included)

Proposed Response *Response Status* **O**

Cl **59** *SC* **Table 59-16** *P* *L* # **624**
Tatum, Jim Honeywell

Comment Type **TR** *Comment Status* **D**

TP1 and TP4 are not valid

SuggestedRemedy

Remove reference to TP1 and TP4

Proposed Response *Response Status* **O**

Cl **59** *SC* **Table 59-5,8,11** *P* **18793** *L* # **337**
Dawe, Piers Agilent

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

To ease network maintenance on a mixed 100/1000 Ethernet /OC-3 network, the OFF transmit powers (and hence the signal detect limits) in the standard may be aligned. The average launch power of OFF transmitter (max) should be the same as the FAIL Signal detect value in clause 60. Apparently this is no problem; disabled transmitters don't seem to leak light.

SuggestedRemedy

-50 or -45 dBm to match clause 60.

Proposed Response *Response Status* **O**

Cl **60** *SC* *P* *L* # **342**
Dawe, Piers Agilent

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

Would we do better to specify end-to-end channel attenuation rather than length and dB/km?

SuggestedRemedy

Discuss!

Proposed Response *Response Status* **O**

Cl **60** *SC* *P* **209** *L* **15** # **254**
Dawe, Piers Agilent

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

Update 1.4.15 definition of 100BASE-X. (This comment is entered against clauses 1 and 60.)

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **60** *SC* *P* **209** *L* **8** # **386**
Bhatt, Vipul (Not Applicable)

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

Please refer to Editor's Note: "Keep Clauses 60.6 and 60.7 (worst-case power budget and link penalty tables) for now, remove them prior to final publication."

I think it will be wise to keep those tables. They act as a quick reference, an executive summary of a link's design. For those trying to understand PMD specification tables, the link budget tables provide a quick application example, which helps promote understanding. If there is any discrepancy between link model spreadsheet and these tables, we can either remove the discrepancy or use suitable words to highlight how to resolve it. Overall, the benefit of keeping those informative tables is more than the cost.

SuggestedRemedy

Delete the note.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60** *P* **209** *L* **2** # **252**
Dawe, Piers Agilent

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

"Laser" should not be in the title. Use of lasers is an implementation choice, not a requirement of the standard.

SuggestedRemedy

Replace "Longwave Laser" with "Long Wavelength", three times here and in 60.16.4.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60** *P* **212** *L* **26** # **276**
Dawe, Piers Agilent

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

"Transmitter type Longwave Laser": Use of lasers, or a particular type, is an implementation choice, not a requirement of the standard. Later in a receiver table it is even less appropriate.

SuggestedRemedy

Search and eliminate the lines "Transmitter type Longwave Laser": in at least six tables.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.1** *P* **209** *L* **37** # **256**
Dawe, Piers Agilent

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

No point mentioning MDI here: the term hasn't been introduced in this clause and our definition of it is not significant in terms of an overview. Clause 52 does without it.

SuggestedRemedy

Delete "(including MDI)".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.1** *P* **209** *L* **39** # **260**
Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Management Interface is not mandatory. See Cl. 52 and 22 or 45.

SuggestedRemedy

Add "optionally" and "may be" viz: "and optionally integrated with the management functions which may be accessible"

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.1** *P* **209** *L* **41** # **261**
Dawe, Piers Agilent

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

Which Management Interface yy? Choice is 22, 45, create a new one, SFP, ... 22 is not used on 100M optics modules, and we don't really want to create a new one. Clause 45?

SuggestedRemedy

Clause 45?

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.1.1** *P* **210** *L* **1** # **264**
Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

10^-12 BER can't really be necessary, being one (detected) error in two hours. It would be expensive to test for and remarkably hard to extrapolate reliably, though in practice (without the guarantee in the standard) it will be met cost-effectively. I understand the underlying technical reason for demanding very low BERs is to avoid TCP running slow when it sees dropped packets. 10^-10 or 10^-11 seems enough. Other 100Mb/s PHYs use on the order of 10^-10.

SuggestedRemedy

Consider a more traditional BER limit for all 100M PHYs.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.1.1** *P* **210** *L* **1** # **263**
Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Add more words "in normal service.". Later on we can show that the baseline wander pattern is a sufficiently rare occurrence that in tests with it we can test to a worse BER than the service BER.

SuggestedRemedy

Add more words "in normal service.".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10** *P* **219** *L* **31** # **300**
Dawe, Piers Agilent

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

Anything wrong with a shorter SMF patch cord for optical tests? If there is, need to explain.

SuggestedRemedy

Change 2 to 0.5.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.1** *P* **219** *L* **35** # **301**
Dawe, Piers Agilent

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

Need to explain that the BLW pattern is more brutal than normal service.

SuggestedRemedy

Add text: "Transmit eye mask and sensitivity are to be assured against the test pattern defined in 60.10.1.1. This represents an extremely untypical pattern. The BER in service can be expected to be more than 100? 1000? times lower than with the test pattern.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.12** *P* **222** *L* **1** # **308**
Dawe, Piers Agilent

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

Need to describe TDP measurement. This may mean that we don't need so many jitter measurement sections. TDP sensitivity measurements should be done with an AC coupled receiver and with a CDR. AC coupling somewhere above 1.4 kHz to experience the BLW. As it turns out, the dispersion penalty can be made really small at this line rate.

SuggestedRemedy

Start with Clause 52. In text, mention that implementers may be able to avoid testing with dispersion by showing that the spectral properties of their transmitters cannot create significant penalty.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.4** *P* **220** *L* **34** # **327**
Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The pattern for extinction ratio conformance could be:
1. a special pattern for extinction ratio conformance (no point),
2. the test pattern used for e.g. eye margin and sensitivity testing (convenient to combine with eye margin measurement but not conveniently accessible in service), or
3. the pattern a station naturally emits when not receiving an optical input (accessible in service).
My choice is for (3). The question remains, what is that pattern? is it idles with a low concentration of OAM frames? or is it far end fault indication, with or without the OAM frames? If the latter, what exactly is the (majority) bit stream on the line?

SuggestedRemedy

Find out what a 100BASE-X optical port (will) emit(s) when no optical input. Use that for extinction ratio tests (and for mean power, if we have to be specific).

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.7** *P* **220** *L* **50** # **305**
Dawe, Piers Agilent

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

RIN_12_OMA preferred

SuggestedRemedy

Refer to clause 52, with frequencies and rates as appropriate.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.8** *P* **220** *L* **37** # **306**
Dawe, Piers Agilent

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

XX kHz. This is the jitter corner mentioned previously

SuggestedRemedy

20 kHz

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.8** *P* **221** *L* **39** # **341**

Dawe, Piers Agilent

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

We have forgotten to say that the test should be carried out with a lower low frequency cut than the pattern frequency of 1.38 kHz. A DC coupled receiver is fine, and DCAs typically are DC coupled, so there's no problem.

SuggestedRemedy

Add sentence: "The frequency response of the measurement instrument (e.g. oscilloscope) should extend substantially lower than the test pattern repetition frequency. A DC coupled instrument is convenient."

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.10.9** *P* **220** *L* **44** # **307**

Dawe, Piers Agilent

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

Need text. Use the worst case test pattern. With this line code, errors will be caused mainly in association with baseline wander; the BER in test will be worse than in service by a few orders of magnitude, depending how frequently a really BLW-heavy sequence is experienced in normal service. This is probably less than 1% of the time. Would anyone like to calculate it? Or try an experiment on a Fast Ethernet link?

SuggestedRemedy

Start with Clause 52. Use the test pattern, which exercises BLW. Seek to modify the test pattern so that it acts as our jitter test pattern at the same time. Use BER limit in test of 10^-9 (TBC).

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.13** *P* **224** *L* **1** # **314**

Dawe, Piers Agilent

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

Simplifying and completing.

SuggestedRemedy

Delete the subheadings 60.14.1-2 and the two associated sentences. use one multi-column table like in clauses 38 and 52. Use separate columns for upstream and downstream. Check that we have introduced those terms. Replace "10000 m" with "10 km", "1520" with "1550". Channel insertion losses are 6 or 7 dB TBD at 1310, 6 dB at 1550 nm.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2** *P* **225** *L* **5** # **317**

Dawe, Piers Agilent

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

G.652 allows 0.5 dB/km at low bit rates; we copied its specification for OC-192 which is overkill here. Other minor changes and completions.

SuggestedRemedy

Change 1520 to 1550. Ask the fiber experts how to describe SMF for 1550 nm use.
Unless advised otherwise:
Remove the "0.4* or" and both footnotes.
Insert 1550 attenuation, 0.4.
Change "Dispersion slope" to "Dispersion slope at zero dispersion wavelength".
Straddle the two dispersion entries to cover both wavelengths.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2.1** *P* **225** *L* **19** # **318**

Dawe, Piers Agilent

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

Filling a gap, simplification by making nominal wavelength equal specification wavelength.

SuggestedRemedy

Allocation for connection and splices: change XX to 2.
Change 1520 to 1550.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2.1** *P* **225** *L* **19** # **598**

Nguyen, Trung National Semiconduct

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

Insertion loss for connectors and splices

SuggestedRemedy

2.0dB total

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2.1** *P* **225** *L* **24** # **246**

Jönsson, Ulf — Ericsson AB

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

Adopt a value of 26 dB for the return loss of single-mode connections in order to be consistent with 1000BASE-LX.

SuggestedRemedy

The return loss for single-mode connections shall be greater than 26 dB.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2.2** *P* **225** *L* **22** # **319**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **D**

Using current industry-standard nomenclature and generalising to allow optical switches etc. I think -26 dB is the right number, which I think comes from a campus wiring spec while the connector spec is -27. All this at 1G, not sure if it changes for 100M.

SuggestedRemedy

Change "Connection return loss" to "Maximum discrete reflectance".

Change text to "The Maximum discrete reflectance shall be less than –26 dB."

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.15.2.2** *P* **225** *L* **24** # **599**

Nguyen, Trung — National Semiconduct

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

Return loss for a connection. To avoid having to specify special polish or angled connectors, a low value should be set.

SuggestedRemedy

Should be > 30dB min

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.1** *P* **210** *L* **24** # **267**

Dawe, Piers — Agilent

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

"of a type consistent with the link type connected to the transmitter." is a left over from a dual purpose MMF/SMF PMD. There's only one fibre type here.

SuggestedRemedy

"of single mode fiber."

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.1** *P* **210** *L* **24** # **266**

Dawe, Piers — Agilent

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

x and y. y is 5m. x could be 0.5 m (the minimum reach) or 2m, as used elsewhere in the clause.

SuggestedRemedy

0.5m, 5m

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.1** *P* **210** *L* **29** # **237**

Jönsson, Ulf — Ericsson AB

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

Add a picure showing the 100BASE-X block diagram including the test points TP1, TP2, TP3, and TP4.

SuggestedRemedy

Adopt Figure 38-1, 1000BASE-X block diagram.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.4** *P* **210** *L* **48** # **269**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Signal detect: it's universal at present but if EFM is to aspire to a first mile in a consumer market, every pin and mW needs to be scrutinised and possibly jettisoned. See GR-253 for how PMD signal detect need not be mandatory. The standard does not have enough reason for demanding that the function be implemented in the PMD (although implementers may choose to insist on it), nor that the signal detect status be reported in duplicate, though a physical pin and through a management interface. Signal detect is not the primary way of detecting breaking links; these are detected by noting a "run of zeroes" (coding violation).
Also it's nice if signal detect operates below sensitivity.

SuggestedRemedy

Check that 24 as modified is compatible with the following.
Suggested text for 60.2.4:
The signal detect function is traditionally implemented in the transceiver, although it may be implemented elsewhere, e.g. in association with the PMA, or not implemented. If implemented within the PMD, the PMD Signal Detect status shall be reported either or both of two ways. The PMD Signal Detect function may report to the PMD service interface, using the message PMD_SIGNAL.indicate(SIGNAL_DETECT) which is signaled continuously. PMD_SIGNAL.indicate is intended to be an indicator of optical signal presence. Or the status may be reported via the management interface. If the MDIO interface is implemented, PMD_global_signal_detect (1.10.0) is (may be?) continuously set to the value of SIGNAL_DETECT as described in 45.2.1.9.5.

If implemented, the value of the SIGNAL_DETECT parameter shall be generated according to the conditions defined in Table 59-1. If signal detect is not implemented, the value of the SIGNAL_DETECT parameter conveyed to the upper layers and management functions shall be "OK". The PMD receiver is not required to verify whether a compliant signal is being received. This standard imposes no response time requirements on the generation of the SIGNAL_DETECT parameter. It is preferable for the signal detect thresholds to be below the rated sensitivity of the receiver; they must be below the Receiver sensitivity (max) in this standard.

As an unavoidable consequence of the requirements for the setting of the SIGNAL_DETECT parameter, implementations must provide adequate margin between the input optical power level at which the SIGNAL_DETECT parameter is set to OK, and the inherent noise level of the PMD due to cross talk, power supply noise, etc.

Various implementations of the Signal Detect function are permitted by this standard, including implementations that generate the SIGNAL_DETECT parameter values in response to the amplitude of the modulation of the optical signal and implementations that respond to the average optical power of the modulated optical signal. Full Ethernet implementations which do not use a PMD signal detect, or which do not use any signal detect, must avoid noise, chatter or crosstalk creating a bogus signal with the characteristics of a real signal, which is not otherwise identified as bogus.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.4** *P* **210** *L* **51** # **309**

Dawe, Piers Agilent

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

Backwards inequality. Clarify which sensitivity.

SuggestedRemedy

"Input_optical_power >=" Use the proper Greater than or equal to symbol, ALT-0179, per "List of special symbols", page vi.

Replace "Receive sensitivity" with "Receiver sensitivity (max) in Table 60-6, Table 60-9 or Table 60-12".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.4** *P* **210** *L* **51** # **270**

Dawe, Piers Agilent

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

The three PMDs have similar sensitivities so unless some new information comes up they can share the same table. -45 dBm is de facto standard, though a lower value would be consistent with it and would be more forward looking, allowing longer reach implementations.

SuggestedRemedy

Delete the three subclauses like
"60.2.4.1 100BASE-LX signal detect functions
The Signal Detect value definitions for the 100BASE-LX PMD are shown in Table 60-1", put Table 60-1 in 60.2.4, delete tables 60-2,3.

Replace -XX dBm with "-50 dBm average power".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.2.4.1** *P* **211** *L* **25** # **589**

Nguyen, Trung National Semiconduct

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

Table 60-1 Input optical power for FAIL condition not determined.
Same for Tables 60-2 and 60-3

SuggestedRemedy

Should set to <= -30dBm for all three tables

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3.1** *P* **212** *L* **38** # **591**

Nguyen, Trung — National Semiconduct

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

No value for Avg launch power of Off Transmitter (max). Should use same value as Signal Detect limit, if for no other reason.

SuggestedRemedy

Add "-30dBm".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3.1** *P* **212** *L* **38** # **243**

Jönsson, Ulf — Ericsson AB

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

Adopt a value of -45 dBm for "Average power of OFF transmitter (max)" which is the same value as suggested for signal detect = FAIL. This is similar to how this value has been specified for 1000BASE-LX.

Some might argue that we could as well pick a lower value but I've checked that at least one FDDI transceiver specifies -45 dBm and I cannot see any reason to exclude any existing or future components.

SuggestedRemedy

Average power of OFF transmitter (max) = -45 dBm

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3.1** *P* **212** *L* **40** # **592**

Nguyen, Trung — National Semiconduct

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

Is there a reason why the Min Extinction Ratio value of 6dB cannot be reduced to a lower value? I cannot remember how we ended up with 6dB , but I'm sure there was discussions about having this lower. Is it because we wanted the present limit on the Launch OMA min figure ? Maybe somewhere between 6dB and 3dB e.g. 4.5dB may be acceptable.

SuggestedRemedy

Reduce ER to Min to 3dB.
Then Launch OMA min (line 43) and Receive OMA min in Table 60-6, needs to be changed to 0.0211 mW (-16.76dBm) also.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3.2** *P* **212** *L* **52** # **734**

Dawe, Piers — Agilent

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

The sentence "The sampling instant is defined to occur at the eye center." could be applied to the testing of an individual untimed optical transceiver but since clause 38 was written we have moved towards specifying the whole system: a "black box" with ports and interfaces. We can specify what we like but the equipment will sample where it likes, and if its choice affects sensitivity, that's part of what we are assuring. Compare clauses 52 and 53.

SuggestedRemedy

Delete this sentence, here and in 60.4.2 and 60.5.2.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3.2** *P* **213** *L* **22** # **594**

Nguyen, Trung — National Semiconduct

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

Add value receiver for 3dB cut-off freq. max in Table 60-6

SuggestedRemedy

Max of 150MHz

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3-5** *P* **212** *L* **28** # **280**

Dawe, Piers — Agilent

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

We think we mean +/-100 ppm but in 24.2.3.4 there seems to be a mention of +/-50 ppm.

SuggestedRemedy

Reconcile. May wish to change the old stuff.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3-5** *P* **2126** *L* # **321**

Dawe, Piers Agilent

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

The table is the best place to state the transmitter's Optical Return Loss Tolerance. Do we need a Transmitter Reflectance spec?

SuggestedRemedy

Insert into transmitter tables, Optical Return Loss Tolerance (max), 12, dB.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3-5** *P* **2137** *L* # **320**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Using nomenclature from clause 52 which was discussed at length and I think is compatible with current industry-standard nomenclature. One reason for the change was that under their previous names the readers could not understand what the transmitter's Optical Return Loss Tolerance and
Transmitter Reflectance were about.

SuggestedRemedy

Change "Return loss, 12" to "Receiver Reflectance (max), -12".

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.3-5** *P* **2137** *L* # **325**

Dawe, Piers Agilent

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

Do we need a stressed sensitivity spec? It was used in gigabit and 10 gigabit because signals impaired by MMF, chromatic dispersion and technical difficulty were to be used. The test procedure was quite onerous for state-of-the-art optics. Here, can we expect that the transmitter eye will be of a higher standard? Or will the procedure be less onerous (more cost effective) because the line rate is much slower than the state of the art? We have already recognised the big stressor which is the line code.

SuggestedRemedy

For discussion!

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.4** *P* **213** *L* # **289**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

At present we are copying TS-1000 for power levels but saying the objective is 10 km while TS-1000 does 15 km. These statements are contradictory: a standard cannot demand things it doesn't need, or if it demands them it must put them to use. In the following comments I show how spec values which are compatible with TS-1000, but less onerous, can deliver our present 10 km objective, with a spec power budget reduced from 16 dB to 9 dB (1550 band) and 9 or 10 dB (1310 band). Part of the reduction is a sleight of hand: we are defining a worst-pattern sensitivity. Alternatively we could choose another reach in the range 10 to 15 km.

SuggestedRemedy

Use spec values for a 10 km link which are compatible but less onerous than TS-1000.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.4-5** *P* **214** *L* **24** # **290**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The Extinction ratio (min) of 9 dB here appears to be a mistake: TS-1000 has the traditional SONET value of 8.2 dB. However, the SONET value is higher than is truly cost effective even for a typical line code. With the high baseline wander in our 4B/5B code, a much lower value is appropriate.

SuggestedRemedy

6 dB, in Tables 60-8 and 60-11

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.4-6** *P* **2137** *L* # **310**

Dawe, Piers Agilent

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

Receive electrical 3 dB upper cutoff frequency (max) is to guard against split pulses fooling a high bandwidth receivers. The significant causes of pulse splitting are modal dispersion in multimode fibre (not applicable here) and strong laser resonance in band. In practice the latter does not seem to be a concern at 125 MBd. I see three options:
Keep this spec item but set the limit high enough for future multi-rate implementations: say 750 MHz.
Remove this spec item and demand a mask assurance with -n% margin, without the standard filter,
Relax. Just remove this spec item.
The issues are the same for all three PMDs so the solution should be the same.

SuggestedRemedy

Remove this spec item? Three times.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.6-7** *P* **217** *L* **23** # **296**

Dawe, Piers Agilent

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

These subclauses are to be removed before final publication.
The channel insertion loss assumption at 1310 nm is 2 dB connectors + 10 km * {0.5 or 0.4 dB/km}, making 6 or 7 dB. For 1550 nm it's 6 dB. The power budgets are 9 and 10 dB to suit.
Either way, we should not say "worst-case": quoting power budgets at extreme wavelengths causes endless confusion. Also, the budget in question is due partly to the terminals and partly to the channel (link), so calling it a "link power budget" is confusing.

SuggestedRemedy

Replace "The worst-case" with "An illustrative". Delete "link" from subclause title, line 25, 33 and 38, add "to be removed before final publication". Insert 6 or 7 for Channel insertion loss in tables 60-13. If necessary, split table 60-14's "10 µm SMF" column (bad title anyway) into two columns; insert 6, and 6 or 7. In table 60-14, replace "16" with "9" and {9 or 10} depending on decisions on 100BASE-BX power levels. In both tables, replace "10000 m" with "10 km". In both tables, replace "Unallocated" with "Reserved". Later on we will decide what to do with it: allow it to be used as attenuation or kept as part of the Allocation for penalties.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.8** *P* **217** *L* **50** # **595**

Nguyen, Trung National Semiconduct

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

High Freq jitter above 637Khz

SuggestedRemedy

Change to above 25KHz

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.8** *P* **217** *L* **50** # **298**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

Jitter above 637 kHz is wrong. We think that following clause 24(?) it should say 20 kHz.

SuggestedRemedy

20 kHz

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.8** *P* **218** *L* # **596**

Nguyen, Trung National Semiconduct

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

Use FDDI specs for jitter

SuggestedRemedy

Total Transmit Deterministic Jitter at TP2 = 1.6nS max (includes DCD jitter and DDJ)
Total Transmit Random Jitter at TP2 = 0.76nS max
Total Receive Deterministic Jitter at TP3 = 2.2 nS max
Total Receive Random Jitter at TP3 = 0.76nS max

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.8,9** *P* **217** *L* **51** # **299**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **D**

For a system level spec using SMF, there should not be normative jitter specs in this style. TP1 and TP4 are to be informative, and common to 100BASE-FX, 100BASE-LX, 100BASE-BX. TP2 and TP3 are better measured by TDP not by jitter bathtub.

SuggestedRemedy

Change title of 60.8 to "Jitter at TP1 and TP4 for 100BASE-LX and 100BASE-BX (informative)".
Replace "Implementations shall conform to the normative values highlighted in bold in Table 60-15 (see measurement procedure in 60.10). All other values are informative." with "The informative Table 60-15 shows jitter specifications used in FDDI which may be of interest to implementers." In table 60-15, add "(informative)" to the title, delete five rows, populate rows TP1 and TP4 with FDDI values.
Delete 60.9 with its table 60-16.

Proposed Response *Response Status* **O**

Cl **60** *SC* **60.9** *P* **219** *L* **3** # **55**

Bhatt, Vipul — (Not Applicable)

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

Jitter corner frequency of 637 KHz is too high for 100 Mb/s operation. Correct value will be more than 20 KHz, as hinted by subclause 24.2.3.4, and less than 64 KHz, as suggested by the thumb rule of data_rate/1667 used by Fibre Channel and Gigabit Ethernet. Industry practice seems to be in the range of 30 to 50 KHz. I suggest we pick a value that does better justice than the current 637 KHz, and in later drafts we can pin the value down more accurately.

SuggestedRemedy

Replace "above 637 KHz" with "above 64 KHz".

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-1** *P* **211** *L* **5** # **239**

Jönsson, Ulf — Ericsson AB

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

Adopt a value of <= -45 dBm for signal detect FAIL. This is the value for signal detect deassert typically used by current STM-1, OC-3 and 100M FDDI transceivers.

This value has been agreed upon in the 100M ad hoc group.

SuggestedRemedy

Input_optical_power <= -45 dBm

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-1** *P* **211** *L* **9** # **238**

Jönsson, Ulf — Ericsson AB

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

It is not clear what we mean by "compliant 100BASE-X signal input". This should preferrably be clarified in a footnote.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-12** *P* *L* # **144**

Seto, Koichiro — Hitachi Cable

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

it is better to have a footnote explaining why we adopt receive center wavelength of 1480-1600 rather than 1480-1580.

SuggestedRemedy

add a footnote such as
"Note x: Center wavelength range allowing wavelength up to 1600nm is defined to achieve backword compatibility with an existing bi-directional standard, TTC TS-1000. TS-1000 optionally allows the use of optics which center wavelength is 1500 to 1600nm."

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-12** *P* **217** *L* **20** # **294**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **D**

As well as the minimum transmit power being be reduced, the sensitivity can be relaxed from -30 dBm, for 10 km (part of the difference is because this standard will likely define a sensitivity with the stressful test pattern, and sensitivity is pattern dependent with 4B/5B). This allows more budget for the WDM components (hidden from the standard behind the MDI). This is still a "mean power parallelogram" mean power oriented spec but I have expressed the minimum power in OMA also, like 100BASE-LX. Because the link attenuation is expected to differ at 1310 and 1550 nm, either the transmit power or sensitivity should differ for the two 100BASE-BX PMDs. Here I suggest making the sensitivities differ.

SuggestedRemedy

Pave -26 dBm at 6 dB extinction ratio = -25.2 dB OMA or 3.00 uW.

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-12** *P* **218** *L* **2** # **51**

Mickelsson, Hans — Ericsson AB

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

The link power budget of 16 dB is a bit high. With such a high link budget the goal of low cost components will be though to meet. Consider a 10 km link (total 5 dB loss) toghether with some margins (3dB) and also some connector loss (2 dB) that will give a 10dB link budget that will be sufficient.

SuggestedRemedy

10 dB

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-18** *P* **224** *L* **6** # **250**

Jönsson, Ulf — Ericsson AB

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

I don't understand this table completely. How do I know that my channel insertion loss is EFM compliant if the fiber is shorter than 10 km? Wouldn't it be better to specify a maximum channel insertion loss and don't care about the distance?

SuggestedRemedy

Remove operating distance and specify maximum channel insertion loss.

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-19, Table 60-2** *P* **224** *L* **28** # **52**

Mickelsson, Hans — Ericsson AB

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

The use of 1520 nm as nominal wavelength doe not make any sense. Either it shall be changed to be in between 1480 and 1580 i.e. to the nominal value 1530. Or even better it should be changed to 1550 to be more compliant with existing measuring point for optical fibers. By using the latter a standard OTDR measurement set can be used.

SuggestedRemedy

Nominal Wavelength - Downstream 1550 nm

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-5** *P* **212** *L* **41** # **282**

Dawe, Piers — Agilent

Comment Type **TR** *Comment Status* **D**

Need a value for RIN (max). From the model, -110 dB/Hz gives a 0.3 dB penalty which seems OK.
dB(RIN12OMA) = dB(RIN12) + 2*dB(P_ExtinctionRatio). Thus we are at about RIN<~-115 dB/Hz. With a TDP spec, strictly, RIN is redundant but we might feel safer with a RIN spec. RIN should be replaced with RIN12OMA as in clause 52 (the "12" in subscript).

SuggestedRemedy

RIN12OMA, -110

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-5** *P* **212** *L* **41** # **244**

Jönsson, Ulf — Ericsson AB

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

Adopt a value of -110 dB/Hz for RIN (max). This value was agreed upon in the 100M ad hoc group.

Note: 100BASE-BX specifies RIN (max) = -120 dB/Hz. Is there any reason to why RIN for 100BASE-BX and 100BASE-LX cannot be the same?

SuggestedRemedy

RIN (max) = -110 dB/Hz

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-5,8,11** *P* **2126** *L* # **281**

Dawe, Piers — Agilent

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

Average launch power of OFF transmitter (max) should be the same as the FAIL Signal detect value earlier.

SuggestedRemedy

-50 or -45 dBm to match. I guess this can be the same in tables 60-8,11 also.

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-5,8,11** *P* **2126** *L* # **329**

Dawe, Piers Agilent

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

The eye mask should be the same for all three 100-BASE-X PMDs.

SuggestedRemedy

Double-check that the eye mask timing dimensions are consistent with FDDI's TP1,4 jitter specs. Copy mask coordinates from Table 60-5 to 60-8 and 60-11 (or better, combine the tables).

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-6** *P* **213** *L* **14** # **249**

Jönsson, Ulf Ericsson AB

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

The Receiver OMA (min) should be corrected from .0379 mW to .00379 mW.

SuggestedRemedy

Receiver OMA (min) = .00379 mW

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-6** *P* **213** *L* **14** # **284**

Dawe, Piers Agilent

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

OMA sensitivity is wrong: should be 0.00379 not 0.0379 mW. I think it's not good style to use such tiny numbers anyway. And, I think it helps the reader to see the OMA in dBm as well as mW.

SuggestedRemedy

Change to 3.79 uW. Add "-24.2 dBm"

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-8** *P* **214** *L* **20** # **292**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The minimum transmit power can be reduced from 14 dBm, and the sensitivity relaxed, for 10 km. This allows more budget for the WDM components (hidden from the standard behind the MDI). This is still a "mean power parallelogram" mean power oriented spec but I have expressed the minimum power in OMA also, like 100BASE-LX.

SuggestedRemedy

Pave -16 dBm at 6 dB extinction ratio = -15.2 dB OMA or 30.0 uW, in Tables 60-8 and 60-11.

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-8** *P* **214** *L* **26** # **291**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

The RIN (max) is tighter than needed; e.g. Gigabit Ethernet gets by with -117 (short wavelength) or -120 (long wavelength), and slower links can have higher RIN per Hz. From the model, RINOMA=-110 dB/Hz gives a 0.3 dB penalty which seems OK. dB(RIN12OMA) = dB(RIN12) + 2*dB(P_ExtinctionRatio). Thus we would be at about RIN<~-115 dB/Hz. With a TDP spec, strictly, RIN is redundant but we might feel safer with a RIN spec. RIN should be replaced with RIN12OMA as in clause 52 (the "12" in subscript).

SuggestedRemedy

RIN12OMA, -110 dB/Hz, in Tables 60-8 and 60-11

Proposed Response *Response Status* **O**

Cl **60** *SC* **Table 60-9** *P* **215** *L* **20** # **293**

Dawe, Piers Agilent

Comment Type **TR** *Comment Status* **D**

As well as the minimum transmit power being be reduced, the sensitivity can be relaxed from -30 dBm, for 10 km (part of the difference is because this standard will likely define a sensitivity with the stressful test pattern, and sensitivity is pattern dependent with 4B/5B). This allows more budget for the WDM components (hidden from the standard behind the MDI). This is still a "mean power parallelogram" mean power oriented spec but I have expressed the minimum power in OMA also, like 100BASE-LX. Because the link attenuation is expected to differ at 1310 and 1550 nm, either the transmit power or sensitivity should differ for the two 100BASE-BX PMDs. Here I suggest making the sensitivities differ.

SuggestedRemedy

Pave -25 dBm at 6 dB extinction ratio = -24.2 dB OMA or 3.79 uW.

Proposed Response *Response Status* **O**

Cl **61** *SC* **2.2** *P* *L* # **145**

Shah, Sunil — Voyan Technology

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

PHY loop aggregation function is essentially defined above the gamma interface. This implies that if a particular PHY operates on more than one copper pair, as in an HDSL-4 PHY or vectored PHY, it could still take advantage of the PHY loop aggregation function. In that case, a PHY loop does not necessarily mean one copper pair; it merely means one PHY interface at the TPS-TC interface even if it operates over multiple copper pairs.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1** *P* **230** *L* **12** # **419**

Wei, Dong — SBC Communications,

Comment Type **TR** *Comment Status* **D**

The usage of "only possible" is incorrect.

SuggestedRemedy

Replace "only possible" by "conventional".

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1** *P* **230** *L* **4-5** # **390**

Edward Beili — Actelis Networks

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

Current wording does not mention the “multi-pair” nature of Long range Ethernet over copper.

SuggestedRemedy

The medium specifications are aimed at users who want to deliver minimum of 2 Mb/s over single copper pair for at least the distance of 2700 meters, and 10 Mb/s over single copper pair for at least the distance of 750 meters, respectively. The medium specifications (for delivering Ethernet traffic for distances beyond 2700 meters, or rates higher than 2 Mbps and 10 Mbps respectively) are aimed to support transmission over multi copper-pairs.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1** *P* **230** *L* **9** # **418**

Wei, Dong — SBC Communications,

Comment Type **TR** *Comment Status* **D**

2BASE-TL et al. are systems rather than signals.

SuggestedRemedy

Replace "transmission of such signals over public loop plants" by "deployment of these systems in public access networks".

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1.2** *P* **230** *L* **34-35** # **391**

Edward Beili — Actelis Networks

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

Current wording specifies BER and SNR, which is a redundant specification. The SNR is not important as long as the communication channel achieves BER of 10E-7. The wording “with a 6dB noise margin at the PMA service interface.” should be omitted.

SuggestedRemedy

d) To provide a communication channel with a mean bit error rate of less than one in part in 10E7.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1.4.1** *P* **230** *L* **44** # **634**

Barrass, Hugh — Cisco Systems

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

This section should include a diagram showing the relationship of the 2 functions and one sublayer. Also the clock domains should be shown with a brief description of the rate matching mechanism (frame-based).

SuggestedRemedy

Insert text and diagram for subclause 61.1.4.1 from file Comment_hb_61.1.4.1.fm

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.1.4.1.1** *P* *L* **49** # **12**
Marris, Arthur Cadence Design Syste

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

Replace the word "mechanism" with "function"

SuggestedRemedy

Replace the word "mechanism" with "function"

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.1.3** *P* *L* **1** # **14**
Marris, Arthur Cadence Design Syste

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

State diagrams need to be supplied

SuggestedRemedy

I will supply a suggested remedy in a separate email.

See marris_c1_0902.pdf.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2** *P* **234** *L* **36** # **640**
Barrass, Hugh Cisco Systems

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

Item c) - "determines NumPHYs" is incomplete - this must be specified

SuggestedRemedy

Replace item c) with:

Determines NumPHYs, the number of PHYs that are currently functional, as the number of bits asserted in the logical AND of PMD_Aggregate_Register and Aggregation_Link_State_Register.

Aggregation_Link_State_Register will be defined in another comment.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2** *P* **234** *L* **40** # **641**
Barrass, Hugh Cisco Systems

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

This section does not deal with the case where NumPHYs = 1 - i.e. no aggregation is happening.

SuggestedRemedy

Item e), insert before the words "Adds a Loop Aggregation Function header"

"If NumPHYs is >1,"

Thus reading:

e) If NumPHYs is >1, adds a Loop Aggregation Function header ...

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2** *P* **234** *L* **43** # **103**
Beck, Michael Alcatel

Comment Type **TR** *Comment Status* **D**

The PTM-TC is not able to assert its ability to accept a LAF fragment from the LAF. The Tx_Enbl signal of the gamma-interface asserts ability to accept data on a per-byte basis. This is not compatible with the "no backpressure" requirement as described in function f.

SuggestedRemedy

Remove the "no backpressure" requirement (point f), and start transmitting data as soon as any of the PHYs asserts its ability to accept an octet.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2 - 61.2.2.6.5** *P* **233 - 240** *L* **All** # **393**
Edward Beili Actelis Networks

Comment Type **TR** *Comment Status* **D**

The Fragment structure described in fosmark_1_0302.pdf does not have means required to identify the beginning and end of each fragment.

SuggestedRemedy

To allow identification of the beginning and end of each fragment at the receiver side, additional header and trailer information is required. Note that this adds additional overhead.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2 - 61.2.2.6.5** *P* **233 - 240** *L* **All** # **392**

Edward Beili Actelis Networks

Comment Type **TR** *Comment Status* **D**

The EFM protocol encapsulation as well as the fragmentation and reassembly procedures described in fosmark_1_0302.pdf enable “point to point” transmission, but do not allow for “point to multi point” transmission. In order to allow transmission between a single Central Office node and many CPE nodes (each CPE is connected to the CO with few copper pairs), the CO as receiver has to distinguish between the links (link = CO to CPE multi-pair channel) in order to enable correct fragments to packets assembly.

SuggestedRemedy

It is required to add to the EFM header that contains the fields SeqNum, TotalFrag and FragNum another field LinkNum that contains the link number (5 bits to allow up to 32 links, equal to the maximum number of loops). Note that this adds additional overhead.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.2 - 61.2.2.6.5** *P* **233 - 240** *L* **All** # **389**

Edward Beili Actelis Networks

Comment Type **TR** *Comment Status* **D**

The method described for PHY Loop Aggregation has a few significant disadvantages in features that are required from an “Ethernet over copper” system.

Efficiency (loop utilization) and overhead - as can be seen in fosmark_1_0302.pdf (slide 12), the loop utilization is poor for packets in the size range of small to medium for every number of loops. In addition, the loop utilization is below what is presented in fosmark_1_0302.pdf (slide 12) due to (1) significant losses of residual BW caused by discrepancy between the aggregated loop BW, the Ethernet BW and the packet sizes and (2) additional header and trailer information that is required (and missing in fosmark_1_0302.pdf) in order to identify the beginning and end of the fragments.
Just think of the fact that loop utilization of 50% means twice the number of copper pairs for a given BW, or half the BW for a given number of copper pairs. Therefore loop utilization is a critical factor when evaluating aggregation methods.
Alternative PHY Loop Aggregation method can achieve overhead of 1% to 4% dependent on the packet size (= loop utilization of 99% to 96%) regardless the number of loops.

Resiliency and Ethernet throughput - TCP-IP throughput has strong and proven dependence on the channel BER and delay characteristics.
Nominal BER for an xDSL system is usually 10^-7. A single xDSL modem may suffer from excessive BER as a result of many phenomena characteristic to the Copper plant, including Impulse noise, Micro-interruptions, introduction of new wide-band services in the same binder (Alien NEXT), etc. These phenomena may be transient or steady-state and may further increase the BER. Therefore incorporating FEC into multi-pair DSL system is of vital importance for achieving high TCP-IP throughput and acceptable UDP stream quality.
The method described in 61.2.2.x is not built for adding “System FEC” (FEC that is added to the Ethernet packets stream as a whole, and not separately to each loop).
The alternative PHY Loop Aggregation method includes “System FEC” that adds 5% overhead (to a total of 6% - 10% overhead). Such “System FEC” allows minimum BER of 10E-12 for the Ethernet service.

SuggestedRemedy

The alternative method mentioned above will be presented and discussed in the coming EFM meetings, and shall be detailed here as a remedy afterwards.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.3** *P* **235** *L* **13** # **642**

Barrass, Hugh — Cisco Systems

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

There needs to be a definition of the maximum allowable latency skew between aggregated links. This will bound the size of buffers required for this function.

SuggestedRemedy

Insert paragraph:

The PMD control of aggregated links must ensure that the maximum latency difference between any two aggregated links correponds to no more than 64,000 bit times. This must be achieved by adjusting the bit rate, error correction and interleaving functions in the PMA/PMD of each link. Note that the burst noise protection offered by the error correction and interleaving functions is directly proportional to the latency, therefore it is logical that multiple aggregated links in the same environment should be optimized to have the similar latencies.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.4** *P* **236** *L* **21** # **643**

Barrass, Hugh — Cisco Systems

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

There needs to be mention of the registers and functions associated with them. Clause 45 gives most of the definition but more is required here.

The operation of these registers is described in the separate presentation.

SuggestedRemedy

Add a new subclause 61.2.2.4.3 PHY loop aggregation register functions

Clause 45 defines 2 registers which relate to the PHY loop aggregation function: PMD_Available_register and PMD_Aggregate_register. Additionally the remote_discovery_register and Aggregation_link_state_register must be implemented.

The PMD_Available_register is a read-only (for LT) register which indicates whether an aggregateable link is possible between this PCS and multiple PMD's. As a minimum, for a device that does not support aggregation, bit zero of this register must be set and all other bits clear. The position of bits indicating aggregateable PMD links correspond to the PMA/PMD sub-address defined in Clause 45.

For NT devices, the PMD_Available_register may optionally be writeable. The reset state of the register must reflect the capabilities of the device. The management entity (through Clause 45 access) may clear bits which are set to limit the mapping between MII and PMI for loop aggregation. For NT devices, links must not be enabled until the PMD_Available register has been set to limit the connectivity such that each PMI maps to one, and only one MII. Multiple PMI's per MII are allowed.

The PMD_Aggregate_register is defined in Clause 45. For LT devices, access to this register is through Clause 45 register read and write mechanisms. For NT devices the register may be read locally through Clause 45, reads and writes must be allowed from remote devices via the remote access signals passed across the gamma interface from the PMA (through the OC). The operation of the PMD_Aggregate_register for NT devices is defined as follows:

a) If the remote_discovery_register is clear then the PMD_aggregate_register must be cleared.
b) If write_PMD_Aggregation_reg is asserted, the contents of remote_write_data bit zero is written to PMD_Aggregation_register in the bit location corresponding to the PMA/PMD from which the request was received. Acknowledge_read_write is asserted for one octet clock cycle.
c) If read_PMD_Aggregation_reg is asserted, the contents of PMD_Aggregation_register are placed onto remote_read_data bus, bits 31 through 0. Unsupported bits are written as zero if the full width of PMD_Aggregation_register is not supported. Acknowledge_read_write is asserted for one octet clock cycle.

The remote_discovery_register must be implemented for NT devices. The remote_discovery_register may be read locally through Clause 45 register access mechanisms. The remote_access_register must support atomic write operations and reads from remote devices according via the remote access signals passed across the gamma interface from the PMA (through the OC). The operation of the remote_discovery_register

for NT devices is defined as follows:

a) If read_remote_discovery_reg is asserted, the contents of remote_discovery_register are placed onto remote_read_data bus. Acknowledge_read_write is asserted for one octet clock cycle.
b) If write_remote_discovery_reg is asserted, the action depends on the contents of remote_discovery_register:
If the remote_discovery_register is currently clear (no bits asserted), the contents of the remote_write_data bus are placed into the remote_discovery_register. The new contents of remote_discovery_register are placed on the remote_read_data bus. Acknowledge_read_write is asserted for one octet clock cycle.
Else if the remote_discovery_register is not currently clear (any bit asserted), no data is written. The old contents of remote_discovery_register are placed on the remote_read_data bus. NAcknowledge_read_write is asserted for one octet clock cycle.
If multiple write_remote_discovery_reg signals are asserted (from multiple gamma interfaces) they must be acted upon serially.
c) If clear_remote_discovery_reg is asserted, the remote_discovery_register is cleared. The new contents of remote_discovery_register are placed on the remote_read_data bus. Acknowledge_read_write is asserted for one octet clock cycle.
d) If the logical AND of the Aggregation_link_state_register and the PMD_Aggregate_register is clear then a timeout counter must be started. If this condition continues for 30 seconds (the timeout period) then the remote_discovery_register must be cleared.

Note that a single device may be implemented which has multiple MII interfaces and (therefore) multiple PCS instances. There must be one remote_disovery_register per PCS instance. The PMD_available register must be set prior to the enabling of links so that each PMA/PMD is linked to only one PCS. Access to the remote_discovery_register (read or write) must be restricted to PMA/PMD instances for which the corresponding PMD_available register bit is asserted.

The Aggregation_link_state_register is a pseudo-register corresponding to the PCS_link_state bits from each gamma interface in the appropriate bit positions according to the PMA/PMD from which the signal is received. Bits corresponding to unsupported aggregation connections are zero.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.4.1** *P* **236** *L* **13** # **646**

Barrass, Hugh Cisco Systems

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

There needs to be a method defined for passing the Loop Aggregation Function header (LAFH) across the gamma interface. In particular, there must be a means of identifying whether the LAFH is present (loops are being aggregated) or not (only a single loop is being used).

SuggestedRemedy

The definition for this should be in the section that defines the gamma interface, in this subclause the following paragraph should be added:

The mechanism for passing the LAF header across the gamma interface is defined in subclause 61.2.3.1.1

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.6.2** *P* **237** *L* **8** # **205**

Zion Shohet Infineon

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

change "10 bit unsigned" to "5 bit unsigned"

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.2.6.3** *P* **238** *L* **6** # **206**

Zion Shohet Infineon

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

"no timers are defined ...". This seems incorrect. Timers might be needed. See 61.2.2.3.1, page 235, line 53.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3** *P* **241** *L* **13-41** # **394**

Edward Beili — Actelis Networks

Comment Type **TR** *Comment Status* **D**

Figure 61-5 (Functional model of TC sublayer) does not describe OAM entity (CPU) access directly to the PMD layer (DSL modem layer). Such access is required in order to allow OAM entity communication between both sides of the link through the EOC channel of the DSL modems, before an Ethernet traffic link is established.

SuggestedRemedy

Add to Figure 61-5 (Functional model of TC sublayer) description of OAM entity access to the PMD layer. It can be stated that such access to the DSL modem EOC channel is required in order to allow OAM entity communication between both sides of the link.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1** *P* **241** *L* **54** # **649**

Barrass, Hugh — Cisco Systems

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

A signal is required to cross the gamma interface from the TC to the PMT to indicate that the link is active for the PMD loop aggregation function. The normal link state accessible through Clause 30 (or 45) would not be available quickly enough for this purpose.

SuggestedRemedy

Add paragraph:

An additional signal is required which would be represented in the referenced document section H.3.1.4.

signal: PCS_link_state
size: 1 bit
direction: TC -> PTM entity
description: control signal asserted when link is active and framing has synchronized according to the definition in subclause 61.2.3.2.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1** *P* **242** *L* **54** # **647**

Barrass, Hugh — Cisco Systems

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

There needs to be a method defined for passing the Loop Aggregation Function header (LAFH) across the gamma interface. In particular, there must be a means of identifying whether the LAFH is present (loops are being aggregated) or not (only a single loop is being used).

Additionally, section H.3.1.2 does not fully specify the SOP and EOP signalling.

SuggestedRemedy

Add paragraph:

The end of packet signals (Rx_EOP, Tx_EOP) are asserted for one octet clock cycle coincident with the last valid data octet of the packet (the final CRC byte).

The start of packet signals (Rx_EOP, Tx_EOP) are asserted for one octet clock cycle coincident with the first valid data octet of the packet (the first DA byte) unless a Loop Aggregation Function header is present.

If an LAF header is present, the 3 bytes of the LAF header are inserted before the first data byte of the packet. The start of packet signals (Rx_EOP, Tx_EOP) are asserted for 4 octet clock cycle coincident with the LAF header and the first valid data octet of the packet.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* # **652**

O'Mahony, Barry — Intel Corp.

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

Immunity to undetected frame errors is insufficient with the current 16-bit CRC as specified in the PTM-TC (see omahony_1_0502). ITU-T would prefer a stronger CRC here, rather than additional FEC indication (see latest liaison letter).

SuggestedRemedy

Specify a 32-bit CRC for the TPS-TC layer, in conjunction with ITU-T Q4/15. This needs to be different than the 802.3 CRC. Possibility is the CRC-32C used in iSCSI; see "iSCSI CRC/Checksum Considerations", IETF draft-sheinwald-iscsi-crc-02.txt.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* **49** # **635**

Barrass, Hugh — Cisco Systems

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

There is no mention here of the packet-based nature of the rate matching function.

It is important the assertion of the control signals Tx_Enbl and Rx_Enbl is controlled on a packet-by-packet basis.

SuggestedRemedy

Add paragraphs:

The TC shall assert Tx_Enbl when it has sufficient space for an entire (max length) frame to be transferred across the gamma interface at the net rate of the MII interface.

The TC shall assert Rx_Enbl when it has an entire frame ready to be transferred (or enough of the frame that it can guarantee that the entire frame will be ready for transfer) across the gamma interface at the net rate of the MII interface.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* **50** # **104**

Beck, Michael — Alcatel

Comment Type **TR** *Comment Status* **D**

It is stated that that the LAF shall continually assert the Tx_Avble signal. This will lead to transmission of garbage when there's no actual data to transmit.

SuggestedRemedy

The LAF shall assert Tx_Avble when it has LAF fragments to transmit, and de-assert Tx_Avble when there are no fragments to transmit. Tx_Avble must never be de-asserted during the transmission of a LAF fragment.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* **51** # **644**

Barrass, Hugh — Cisco Systems

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

The gamma interface needs to include signals for remote access to PHY loop aggregation function registers.

The access to these registers is achieved using g.994 messaging to access the remote PMA, which then generates the signals for this particular access.

SuggestedRemedy

Add paragraph:

Additional signals are required for OAM flow (which would be relevant to referenced document section H.3.1.4). These signals allow access from the TC to the PTM entity (PCS) for reading and writing PHY loop aggregation registers. The following definitions should be tabulated:

signal: write_remote_aggregation_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to write PMD_aggregation_register. Active (min) 1 octet clock cycle.

signal: write_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to write remote_discovery_register. Active (min) 1 octet clock cycle.

signal: clear_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to clear remote_discovery_register. Active (min) 1 octet clock cycle.

signal: read_remote_aggregation_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to read PMD_aggregation_register. Active (min) 1 octet clock cycle.

signal: read_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to read remote_discovery_register. Active (min) 1 octet clock cycle.

signal: remote_write_data_bus
size: 48 bit
direction: TC -> PTM entity
description: data bus for writing to PMD loop aggregation registers. Valid during octet clock

cycle when write control is asserted.

signal: remote_read_data_bus
size: 48 bit
direction: PTM entity -> TC
description: data bus for the results of a read or atomic write function. Valid during octet clock cycle when Acknowledge_read_write or NAcknowledge_read_write is asserted.

signal: Acknowledge_read_write
size: 1 bit
direction: PTM entity -> TC
description: control signal responding (positively) to read or write. Active 1 octet clock cycle.

signal: NAcknowledge_read_write
size: 1 bit
direction: PTM entity -> TC
description: control signal responding (negatively) to read or write. Active 1 octet clock cycle.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* **52** # **637**

Barrass, Hugh Cisco Systems

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

Referenced document mentions OAM flow but doesn't define it.

Detailed management flow is TBD, however there should be more detail at this stage.

SuggestedRemedy

Insert paragraph:

OAM information flow across the gamma interface will support access to the registers defined in Clause 45. Refer to Clause 45 for a complete description of access to TC, PMA and PMD registers from the MDIO interface.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.1** *P* **241** *L* **52** # **636**

Barrass, Hugh Cisco Systems

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

Referenced document section H.3.1.3 does not specify what happens if the control signals (Tx_Enbl & Rx_Enbl) are de-asserted during a packet transfer.

SuggestedRemedy

Two options - we care, or we don't care:

Option 1. Insert paragraphs

The TC must keep Tx_Enbl signal asserted until the last byte of the frame is transferred across the gamma interface. If Tx_Enbl remains asserted then another frame may be transferred across the gamma interface after the inter packet gap.

The TC must keep Rx_Enbl signal asserted until the last byte of the frame is transferred across the gamma interface. If Rx_Enbl is deasserted before the end of the frame then this must be treated as a receive abort.

Option 2. Insert paragraphs

The TC may deassert Tx_Enbl at any time after the frame has started to be transferred across the gamma interface. The Tx_Enbl signal has no effect until after the end of the frame. If Tx_Enbl is asserted after the end of the frame then another frame may be transferred (preserving the minimum inter packet gap).

The TC may deassert Rx_Enbl at any time after the frame has started to be transferred across the gamma interface. The Rx_Enbl signal has no effect until after the end of the frame. If Rx_Enbl is asserted after the end of the frame then another frame may be transferred (preserving the minimum inter packet gap).

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.2** *P* **242** *L* **3** # **638**

Barrass, Hugh Cisco Systems

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

Referenced document, section 7.1 mentions dual latency options. It should be noted that dual latency is not supported for EFM PHYs.

SuggestedRemedy

Insert paragraph:

All references to dual latency should be ignored. Dual latency is not supported by EFM PHYs.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.2** *P* **242** *L* **5** # **639**

Barrass, Hugh — Cisco Systems

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

This line states that detailed management flow information will be specified TBD.

More detail is required at this stage. I suggest that access to the local PMA/PMD is defined through Clause 45, remote access should be defined within Clause 62/63 within the OC/IB definitions.

SuggestedRemedy

Insert paragraphs:

Access to local and remote PMA and PMD parameters is defined in Clause 45. Refer to Clause 45 for mechanisms to access local and remote registers via the MDIO interface.

Refer to Clauses 62 and 63 for definitions of the g.994 messaging, Operation Channel (OC) and Indicator Bits (IB) mechanisms for accessing remote parameters.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.1.2** *P* **242** *L* **5** # **645**

Barrass, Hugh — Cisco Systems

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

The alpha/beta interface needs to include signals for remote access to PHY loop aggregation function registers.

The access to these registers is achieved using g.994 messaging to access the remote PMA, which then generates the signals for this particular access.

SuggestedRemedy

Add paragraph:

Additional signals are required for OAM flow (which would be relevant to referenced document section H.3.1.4). These signals allow access from the TC to the PTM entity (PCS) for reading and writing PHY loop aggregation registers. The following definitions should be tabulated:

signal: write_remote_aggregation_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to write PMD_aggregation_register. Active (min) 1 octet clock cycle.

signal: write_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to write remote_discovery_register. Active (min) 1 octet clock cycle.

signal: clear_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to clear remote_discovery_register. Active (min) 1 octet clock cycle.

signal: read_remote_aggregation_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to read PMD_aggregation_register. Active (min) 1 octet clock cycle.

signal: read_remote_discovery_reg
size: 1 bit
direction: TC -> PTM entity
description: control signal to read remote_discovery_register. Active (min) 1 octet clock cycle.

signal: remote_write_data_bus
size: 48 bit
direction: TC -> PTM entity
description: data bus for writing to PMD loop aggregation registers. Valid during octet clock

cycle when write control is asserted.

signal: remote_read_data_bus
size: 48 bit
direction: PTM entity -> TC
description: data bus for the results of a read or atomic write function. Valid during octet clock cycle when Acknowledge_read_write or NAcknowledge_read_write is asserted.

signal: Acknowledge_read_write
size: 1 bit
direction: PTM entity -> TC
description: control signal responding (positively) to read or write. Active 1 octet clock cycle.

signal: NAcknowledge_read_write
size: 1 bit
direction: PTM entity -> TC
description: control signal responding (negatively) to read or write. Active 1 octet clock cycle.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.2.3.2** *P* **242** *L* **9** # **650**

Barrass, Hugh Cisco Systems

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

As per the editor's note, the encapsulation has not been decided.

The encapsulation needs to be decided ASAP.

SuggestedRemedy

See presentation on encapsulation, a detailed proposal for 64b/66b.

Remove line 9, replace with details from presentation. Referenced document section H.4.1.3 ill be retained, all other sections replaced by new proposal.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.3** *P* **242** *L* # **160**

Simon, Scott Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D**

The mechanisms defined in G.994 for configuring the link parameters don't mesh with the mechanisms described the copper baseline (simon_1_03_02.pdf) and in Clause 45. These need to be reconciled.

SuggestedRemedy

I have submitted a presentation (simon_1_09_02.pdf) to discuss this and other issues. The TF should review the presentation and the editors to make the appropriate changes.

Overview text similar to the following should be added: In an EFM context, G.994 shall be used only for PHY identification and NT configuration. The handshake or negotiation features of g.994 are not supported. When a port is activated, the port shall enter G.994 mode. When G.994 startup has completed, the NT port will announce itself as an EFM Cu PHY (via a CLR message) to which the LT port will respond with a similar announcement (via a CL) message (this is referred to the "C" transaction in G.994). The NT shall then initate a "B" transaction by requesting to be configured (a MR message). The LT shall respond with a MS message that contains all of the link parameters for the NT. Having acknowleged receipt of the parameters, the NT sends an ACK message and enters the configured EFM Cu mode. When the LT receives the ACK, it shall enter the configured EFM Cu mode. At this point the link initialization functions for the appropriate EFM Cu mode (see Clause 62 or Clause 63) shall begin.

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.3** *P* **250** *L* # **656**

O'Mahony, Barry Intel Corp.

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

Additional parameters for 2BASE-TL/2PASS-TL and 10PASS-TS are needed to support aggregation discovery procedures in Clause 45.2.2.2

SuggestedRemedy

For both 2BASE-TL/2PASS-TL and 10PASS-TS define a Loop Aggregation SPAR(2) bit.

When set in a CLR message, this indicates an "aggregateable PHY". Associated with it are NPAR(3)s reporting the current value of the Loop Aggregation Discovery Register (LADR).

When set in a CLR message, this bit indicates that a modification of the LADR is requested. Associated with it are NPAR(3)s specifying the LADR value, and an NPAR(3) specified the requested action (either Set If Clear, or Clear if Same).

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.3.8.6.2** *P* **245** *L* **54** # **208**

Zion Shohet Infineon

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

The revision number should be determined when we finalize the EFM spec, not now.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **61** *SC* **61.3.9** *P* **280** *L* # **156**

Simon, Scott Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D**

The reference document does not specify what happens if the next expected step in a transaction does not occur. If the link partner is disabled or reset in the middle of the transaction, the behavior of G.994 is unspecified.

SuggestedRemedy

Add a timeout to each transaction step transition such that if the expected response does not arrive from the link partner, both sides will return to the startup phase.

Proposed Response *Response Status* **O**

Cl **61** *SC* **Table 11.30-** *P* **270** *L* # **651**

O'Mahony, Barry Intel Corp.

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

NPAR(3)s for 2PASS-TL very numberous and lengthy

SuggestedRemedy

These could be simplified by fixing variables such as NOMPSD, MAXNOMPSD, and MAXNOMATP at their default values for G.992.3 Annex J. Upstream PSD Masks could be referenced by one of the ten mask numbers (ADLU-32 through ADLU-64) rather than the detailed list of frequency indices and log_tssi levels

Proposed Response *Response Status* **O**

Cl **61A** *SC* *P* **282** *L* # **413**

Wei, Dong SBC Communications,

Comment Type **TR** *Comment Status* **D**

The insertion of Annex 61A into the draft was never approved by either the Task Force (TF) or the Copper sub-TF. It is inappropriate for the editor to input anything that is not approved by the TF into the draft. This is a serious problem and it should not occur again.

SuggestedRemedy

Delete the entire clause.

Proposed Response *Response Status* **O**

Cl **61A** *SC* *P* **282** *L* **1** # **441**

Vladimir Oksman Broadcom

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

Irrelevant material

SuggestedRemedy

Exclude this clause. The material of this clause is irrelevant for the future standard. This material was never discussed and there was no agreement to include it into the draft.

Proposed Response *Response Status* **O**

Cl **61A** *SC* **Entire Annex** *P* **282** *L* **1** # **506**

Cook, Charles Qwest

Comment Type **TR** *Comment Status* **D**

Annex 61A shall be completely removed for the following reasons:
- Annex 61A is based upon North American spectrum management requirement (draft T1.417 issue2) and may not be applicable to other regions;
- Annex A of draft T1.417 issue2, where the section "Spectral compatibility guideline" is from, provides a tool for the PSD definition in new technology development to check spectrum compatibility. And there is no need to include the partial portion of such tool in a final standard of a new technology. Additionally, there is much information needed to assure the proper use of Annex A of draft T1.417 issue2, partial quotation of draft T1.417 issue2 could potentially be misleading;
- The example in Annex 61A is irrelevant to the final IEEE 802.3ah standard and potentially misleading.

SuggestedRemedy

Completely remove Annex 61A and submit it as a contribution so that it can be deliberated by the committee. Only material that has been agreed upon should be included in drafts of the document.

Proposed Response *Response Status* **O**

Cl **62** *SC* **4.6** *P* **318** *L* **46** # **171**

Gustafsson, Jonas Ericsson

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

Annex 61A describes spectrum compatibility according to two specific band plans (sets of PSD templates). Only one of these are defined in the subclause 62.4.6 (text and tables of PSD - frequency samples).
The existing templates are collected from the section 61 of the ANSI standard T1.417. This document does not reflect the spectrum compatibility issues outside US. Hence, severely restrict the market potential of this standard.

SuggestedRemedy

It is recommended to add text and sets of PSD templates according to European requirements. Such information can be found in section 5.1.1 of ETSI TS 101 270-2 V1.1.1.

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.1.2** *P* **286** *L* **14** # **105**

Beck, Michael Alcatel

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

It is stated as an objective "to provide 10 Mb/s data rate at the MII". This contradicts the objective as stated in 61.1.2 "to provide 100 Mb/s data rate at the MII".

SuggestedRemedy

Change objective into "to provide 100 Mb/s data rate at the MII".

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.1.2** *P* **286** *L* **18** # **210**

Zion Shohet Infineon

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

"TP-2 cable" has not been determined.

SuggestedRemedy

ommit the words "TP-2"

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.1.2** *P* **286** *L* **20** # **106**

Beck, Michael Alcatel

Comment Type **TR** *Comment Status* **D**

Error rate is specified as a "mean ternary symbol error rate, at the PMA service interface". The PHYs proposed for 10PASS-TS do not use ternary symbols.

SuggestedRemedy

Change point c to: "To provide a communication channel with a mean bit error ratio, at the alpha/beta interface, of less than one part in 10^7 with 6 dB noise margin."

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.1.2** *P* **286** *L* **20, 21** # **444**

Vladimir Oksman Broadcom

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

There is no definition for “mean ternary symbol error rate” and for “noise margin” in the text.

SuggestedRemedy

Either add the definition or change to “….with performance characteristics as specified in clause TBD”.

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.3.2.2.2, 62.3.2.2.3, 6** *P* **299** *L* **N/A** # **455**

Vladimir Oksman Broadcom

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

Performance anomalies and defects specified by IB-1 to IB-13 in Table 62-7 to 62-9 are not defined.

SuggestedRemedy

Add section with relevant definitions to the appropriate clause.

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.3.2.2.3** *P* **300** *L* **10** # **453**

Vladimir Oksman Broadcom

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

There is no PCS #1 defined

SuggestedRemedy

Change “Far-end PCS #1…” to “Far-end PCS …”

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.5** *P* **307** *L* # **344**

Simon, Scott — Cisco Systems, Inc.

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

There is no reference to the MCM-VDSL VOC channel as defined in section 10.7. The EFM PHY will require an operations channel, so why not reference MCM-VDSL 10.7? The bitswapping function is crucial to the operation of the link.

SuggestedRemedy

Add
62.4.5.4.6 Reference section 10.7

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.5** *P* **307** *L* **37, 38** # **219**

Zion Shohet — Infineon

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

sections 13 and 14 of t1e1 are informative . we do not want now to add informative sections from other documents. we merely want to use existing std definitions. we surely can not use informative sections as normative ones in efm doc. Also, why use 8.625kHz tone spacing, while VDSL uses 4.3125kHz spacing?

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.5.2.2** *P* **310** *L* **12** # **456**

Vladimir Oksman — Broadcom

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

The values presented in Table 62-13 are relevant for North America only. That contradicts with the text in line 5 of the same page.

SuggestedRemedy

Add an explanation

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.5.6** *P* **312** *L* **44** # **108**

Beck, Michael — Alcatel

Comment Type **TR** *Comment Status* **D**

The information in this subclause is obsoleted by subclause 61.3.

SuggestedRemedy

Change into: "Clause 12 of MCM-VDSL is replaced with the following: The 10BASE-TS handshake procedure is based on ITU-T Recommendation G.994.1 (G.hs). It shall use the 4.3125 kHz signalling family and the duplex transmission mode. The handshake shall proceed as specified in 61.3."

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.6** *P* **317** *L* **46** # **508**

Frazier, Howard — Dominet Systems

Comment Type **TR** *Comment Status* **D**

The subclauses describing SCM must be rewritten using "incorporation by reference".

SuggestedRemedy

Rewrite SCM subclauses following the style used for the MCM subclauses.

Proposed Response *Response Status* **O**

Cl **62** *SC* **62.4.6.1.1, 62.4.6.1.2** *P* **318** *L* **3, 26** # **457**

Vladimir Oksman — Broadcom

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

These sections are relevant for North America only, but presented as a generic ones.

SuggestedRemedy

Add an explanation

Proposed Response *Response Status* **O**

Cl **62** *SC* **Figure 62-33** *P* **367** *L* **10** # **100**

Turner, Ed — Lattice Semiconductor

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

State diagram is not in 802.3 standard format.

SuggestedRemedy

Convert to 802.3 standard format.

Proposed Response *Response Status* **O**

Cl **62** *SC* **Figure 62-13** *P* **312** *L* **7** # **98**
Turner, Ed Lattice Semiconductor

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

State diagram is not in 802.3 standard format.

SuggestedRemedy

Convert to 802.3 standard format.

Proposed Response *Response Status* **O**

Cl **62** *SC* **Figure 62-31** *P* **357** *L* **10** # **99**
Turner, Ed Lattice Semiconductor

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

State diagram is not in 802.3 standard format.

SuggestedRemedy

Convert to 802.3 standard format.

Proposed Response *Response Status* **O**

Cl **62** *SC* **Figure 62-35** *P* **370** *L* **23** # **101**
Turner, Ed Lattice Semiconductor

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

State diagram is not in 802.3 standard format.

SuggestedRemedy

Convert to 802.3 standard format.

Proposed Response *Response Status* **O**

Cl **62** *SC* **Figure 62-8** *P* **301** *L* **34** # **97**
Turner, Ed Lattice Semiconductor

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

State diagram is not in 802.3 standard format.

SuggestedRemedy

Convert to 802.3 standard format.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1** *P* **376** *L* # **415**
Wei, Dong SBC Communications,

Comment Type **TR** *Comment Status* **D**

2BASE-TL is a much better PHY for the long-reach objective than 2PASS-TL due to the following reasons:
1) 2BASE-TL has a significantly better simulated rate/reach performance than 2PASS-TL for most noise models that are commonly used;
2) Lab/field testing and deployment have shown that the real-world performance of 2BASE-TL-type technologies (e.g., SHDSL, HDSL2/4) is very close to their simulated performance, and that of 2PASS-TL-type technologies (e.g., ADSL) is significantly below their simulated performance.
3) 2BASE-TL is a basis system in T1.417 and hence its deployment in the public access network is protected. 2PASS-TL does not have this advantage.
4) 2BASE-TL is a mature and proven technology, and 2PASS-TL is new and untested.
5) 2BASE-TL supports repeater mode, which is a common requirement for business applications. 2PASS-TL does not support repeater mode. Therefore, 2BASE-TL can be deployed on long loops and hence can achieve much broader market potential than 2PASS-TL.

SuggestedRemedy

Delete the entire subclause (from Page 376 to Page 541).

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1** *P* **376** *L* # **416**
Wei, Dong SBC Communications,

Comment Type **TR** *Comment Status* **D**

The PHY described in this subcluase is based on ADSL2 (G.992.3) Annex J. Since Annex J was developed primarily for some European countries where ADSL-over-ISDN is the dominant ADSL variant, G.992.3 does not specify the performance requirements of Annex J for North America. Therefore, Annex J is not suitable for deployment in the U.S. As a future ANSI standard, the P802.3ah draft should not adopt this PHY.

SuggestedRemedy

Delete the entire subclause (from Page 376 to Page 541).

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1** *P* **376** *L* # **414**

Wei, Dong SBC Communications,

Comment Type **TR** *Comment Status* **D**

The PHY described in this subcluase is based on ADSL2 (G.992.3). ADSL2 is not a standardized technology in the U.S. In fact, any standardized DSL technology in the U.S. must be based on an ANSI standard. There does not exist any ANSI standard on which ADSL2 is based. As a future ANSI standard, the P802.3ah draft should not adopt any non-standardized DSL technology in the U.S.

SuggestedRemedy

Delete the entire subclause (from Page 376 to Page 541).

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1** *P* **376** *L* **1** # **510**

Frazier, Howard Dominet Systems

Comment Type **TR** *Comment Status* **D**

The subclauses describing 2PASS-TL must be rewritten using "incorporation by reference".

SuggestedRemedy

Rewrite 2PASS-TL subclauses following the style used for the 2BASE-TL subclauses.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1.1.4.2** *P* **379** *L* **23** # **170**

Gustafsson, Jonas Ericsson

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

ADSL2 Annex J, defined by ITU-T SG15/Q4 describes the operation and allowed PSD masks allowing increased number of upstream subcarriers to be used. However, ADSL2 Annex J is allowed to operate both with overlapped and non-overlaped spectrum. An annex of the ETSI ADSL technical specification, ETSI TS 101 388 V1.3.1 Annex E, describes a similar mode of operation.
This is not what is stated in this subclause.

SuggestedRemedy

It is suggested to remove the text on Line 2-3 on page 379 and replace it with the following text:
"The PMD default mode of operation uses non-overlapped spectrum. Hence upstream and downstream subcarriers does not overlap. In addition it may optionally operate using overlapped spectrum. Hence upstream and downstream subcarriers overlap. PSD templates for overlapped and non-overlapped mode are described in subclause TBD".

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.1.2** *P* **376** *L* **47** # **109**

Beck, Michael Alcatel

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

It is stated as an objective to "Provide a minimum full duplex data rate service of 2 Mbps at the MII". This contradicts the objective as stated in 61.1.2 "to provide 100 Mb/s data rate at the MII".

SuggestedRemedy

Change objective into: "To provide 100 Mb/s data rate at the MII and a minimum of 2 Mb/s at the alpha/beta-interface".

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.2.2** *P* **542** *L* **30** # **424**

Artman, Doug Texas Instruments

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

The objective under f) doesn't really belong here. Bonding for long reach is being addressed in another clause and this clause should focus on the objectives for the PHY only.

SuggestedRemedy

Remove item f)

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.2.3** *P* **542** *L* **36** # **425**

Artman, Doug Texas Instruments

Comment Type **TR** *Comment Status* **D**

The following statement should be removed: "When the above specification is superseded by an approved revision, the revision shall apply." We should be referencing a single standard here, and not leaving the door wide open to any other follow-on standards that may come later. I believe 802.3 should create a definitive standard and reference a specific standard if it exists, but not set itself up to have its standards implicity modified by others.

SuggestedRemedy

Remove this sentence.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.2.4.2** *P* **543** *L* **4344** # **429**

Artman, Doug Texas Instruments

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

The statement "The PMD allows the optional use of a 4-wire mode and of repeaters to increase the reach or capacity of a copper link" should be modified to take out the 4-wire mode part. This feature should be adequately described in the bonding clause.

SuggestedRemedy

Change sentence to "The PMD allows the optional use of repeaters to increase the reach of a copper link."

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.3.1.2** *P* **544** *L* **3238** # **430**

Artman, Doug Texas Instruments

Comment Type **TR** *Comment Status* **D**

The agreement reach in 802.3ah was to reference G.shdsl as one of the potential long reach PHYs. This text is referring to "Enhanced SHDSL" or G.shdsl.bis which is a potential standard currently being discussed in other standards bodies. Although there are agreements in ITU-T to support higher data rates in G.shdsl.bis, there are no agreements on how this is to be accomplished. We should keep our reference to what was agreed to in EFM, G.shdsl, and potentially consider later revisions of G.shdsl in a subsequent revision of the EFM standard.

SuggestedRemedy

Remove the value of 81 and reference to subclause editor's note in lines 32 and 33, and remove the subclause editor's note in lines 34-38.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.3.1.3** *P* **544** *L* **4853** # **432**

Artman, Doug Texas Instruments

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

This section should be removed as it refers to bonding which is covered in another clause.

SuggestedRemedy

Remove this section.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.4.1.2** *P* **547548** *L* **52541** # **433**

Artman, Doug Texas Instruments

Comment Type **TR** *Comment Status* **D**

There are no agreements yet within ITU-T as to how to create an G.shdsl.bis, and we should remove all references to this. Previous agreements in 802.3ah were limited to G.shdsl.

SuggestedRemedy

Remove this note.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.4.1.3.3** *P* **548** *L* **2122** # **434**

Artman, Doug Texas Instruments

Comment Type **TR** *Comment Status* **D**

This note refers to a standard which does not yet exist and has no substantial technical agreements yet. We should remove this note and keep our references to G.shdsl.

SuggestedRemedy

Remove this note.

Proposed Response *Response Status* **O**

Cl **63** *SC* **63.4.8.1** *P* **553** *L* **1719** # **435**

Artman, Doug Texas Instruments

Comment Type **TR** *Comment Status* **D**

There have been no agreements within 802.3ah to include an enhanced version of SHDSL, and discussion in ITU-T has not yet reached the point where agreements on expanding the bandwidth of SHDSL have been made. We should remove this note and keep our references to G.shdsl (as agreed earlier).

SuggestedRemedy

Remove this note.

Proposed Response *Response Status* **O**