

CI 00 SC 0 P110 L 6 # 1552  
Lynskey, Eric Teknovus

Comment Type E Comment Status X

Mailto links still present for some cross references.

- 1 page 10 line 17
- 1.4.95 page 12 line 28
- 30 page 13 line 18
- 45 page 16 line 19
- 56 page 27 line 18
- 66 page 37 line 18
- 66.4.2.1 page 38 line 41
- 66.4.2.2 page 39 line 3
- 66.4.2.3 page 29 line 13
- 66.5.4.5 page 40 9 locations
- 67 page 41 line 6
- 91 page 42 line 9
- 92 page 85 line 25
- 92.1.1 page 86 line 46 two locations
- 92.1.3 page 91 line 5
- 92.1.3 page 91 line 11
- 92.1.5 page 91 line 47
- 92.1.6 page 91 line 53
- 92.1.6 page 92 line 1
- 92.1.6.1.4 page 93 line 10
- 92.1.6.2.1 page 95 line 5
- 92.1.6.2.2 page 95 line 16
- 92.1.6.2.3 page 95 line 38
- 92.1.6.2.3.3 page 96 line 43
- 92.2.2.1.2 page 100 line 37
- 92.2.2.1.3 page 101 line 18
- 92.2.2.2 page 103 line 51
- 92.2.2.3 page 104 line 3
- 92.2.2.4.1 page 103 line 35
- 92.2.2.5.2 page 110 line 6
- 92.2.2.6 page 111 line 47
- 92.2.3.2.1 page 117 line 12
- 92.2.3.3.3 page 121 line 41
- 92.2.3.3.4 page 122 line 24
- 92.2.3.3.4 page 122 line 25
- 92.2.3.4 page 123 line 6
- 92.2.3.4 page 123 line 7
- 92.2.3.4.2 page 123 line 39
- 92.2.3.5 page 124 line 44
- 92.2.3.6 page 124 line 49
- 92.2.3.7 page 125 line 13
- 92.2.3.7 page 125 line 14
- 92.2.3.7.3 page 126 line 40
- 92.3 page 127 Table 92-5 five locations

- 92.3.1.2 page 129 line 6
- 92.4.4.9 page 134 line 27
- 92A page 135 line 19
- 93 page 142 line 6
- 93.3.2.3 page 165 line 27
- 93.3.3.2 page 170 line 51

SuggestedRemedy

Remove all mailto links from the document. Make all cross references to other subclauses within the draft functional.

Proposed Response Response Status O

CI 45 SC 45.2.1.88.2 P23 L 27 # 1560  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

Missing reference to FEC decoder subclause.

SuggestedRemedy

Replace with 92.2.3.3.

Proposed Response Response Status O

CI 45 SC 45.2.1.89.2 P24 L 1 # 1561  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

The two references in this subclause need to be updated.

SuggestedRemedy

Replace 45.3.2.84.2 with 45.2.1.88.2.  
Replace 74.8.3 with 92.2.3.3.

Proposed Response Response Status O

Cl 45 SC 45.2.1.90 P24 L13 # 1562  
 Lynskey, Eric Teknovus  
 Comment Type T Comment Status X  
 Reference to Clause 74.  
 SuggestedRemedy  
 Remove the sentence.  
 Proposed Response Response Status O

Cl 45 SC 45.2.1.91 P24 L35 # 1563  
 Lynskey, Eric Teknovus  
 Comment Type T Comment Status X  
 Reference to Clause 74.  
 SuggestedRemedy  
 Remove the sentence.  
 Proposed Response Response Status O

Cl 45 SC 45.2.3.29 P25 L27 # 1564  
 Lynskey, Eric Teknovus  
 Comment Type T Comment Status X  
 There is some missing description of the BER monitor behavior. Back in 3av\_0801\_mandin\_2.pdf, the idea was to set the hi\_ber flag in the 10GBASE-R and 10GBASE-T status register. If we still want to do that, then we need to add and show the modified register definition. The other option would be to create a new register only for PR and PRX. Since we've added register 3.74, it may make sense to put this functionality here and update the Clause 92 text as appropriate. Also, 10GBASE-R and 10GBASE-T have another register that represents a latched version of the high BER flag. We need to decide if we want this functionality, too.  
 SuggestedRemedy  
 Create new 10GBASE-PR and 10/1GBASE-PRX BER Monitor Status register modeled after 10GBASE-R status and 10GBASE-R status 2 registers.  
 Proposed Response Response Status O

Cl 45 SC 45.2.3.29 P25 L32 # 1553  
 Lynskey, Eric Teknovus  
 Comment Type E Comment Status X  
 Cross reference refers to subclause that doesn't exist.  
 SuggestedRemedy  
 Replace with 92.2.3.4 and provide linked cross reference so it will update and be correct if subclause numbering changes.  
 Proposed Response Response Status O

Cl 91 SC 91.1.2.3 P90 L32 # 1546  
 Lynskey, Eric Teknovus  
 Comment Type E Comment Status X  
 Figure 92-4 has corrupted speed labels for MACs.  
 SuggestedRemedy  
 Replace speeds with the following (left to right):  
 1G-1G, 1G-1G, 10G-1G, 10G-1G, 10G-10G, 10G-10G  
 OR  
 1 Gb/s, 1 Gb/s, 10/1 Gb/s, 10/1 Gb/s, 10 Gb/s, 10 Gb/s  
 Proposed Response Response Status O

Cl 91 SC 91.4.1 P54 L15 # 1524  
 Hamano, Hiroshi Fujitsu Labs.  
 Comment Type E Comment Status X  
 In Figure 91-5, the hatching pattern is not always well printed, depending on the printer. Figure 91-6 (P 59, L 9), and Figure 91-8 (P 64, L 7, L19) have the same problem.  
 SuggestedRemedy  
 Try some other hatching patterns.  
 Proposed Response Response Status O

CI 91 SC 91.5 P57 L14 # 1536  
Hajduczenia, Marek Nokia Siemens Networ

Comment Type E Comment Status X

The note says "The specifications for OMA have been derived from extinction ratio of 9 dB and average launch power", while ER for ONUs is set at 6 dB. This way the note is not correct. Correct the contents of the note as proposed.

SuggestedRemedy

Change "of 9 dB" to "of 6 dB"

Proposed Response Response Status O

CI 91 SC 91.5 P57 L14 # 1528  
Hamano, Hiroshi Fujitsu Labs.

Comment Type T Comment Status X

In the NOTE, the expression "extinction ratio of 9dB" still remains for ONU PMDs. But the ONU extinction ratio is not always 9dB, actually 6dB for ONU transmitter.

SuggestedRemedy

Delete "of 9dB" from the text.  
This becomes identical to the NOTE for OLT in SC 91.4 (P 53, L 13).

Proposed Response Response Status O

CI 91 SC 91.5.1 P57 L53 # 1523  
Hamano, Hiroshi Fujitsu Labs.

Comment Type E Comment Status X

In Footnote C, word preciseness should be cared. Not only "laser source", but the total "transmitter" affects TDP value. Power can be relaxed not by "the same amount" as the TDP, but "the same decrement" as the TDP. What should be indicated here is "the more tightened TDP, the more relaxed power."

SuggestedRemedy

Change "laser source" to "transmitter".  
Change "the same amount" to "the same decrement".  
And Footnote C will be as follows;  
If a transmitter has a lower TDP, the minimum transmitter launch OMA (OMAMin) and average minimum launch power (AVPmin) may be relaxed by the same decrement as the TDP.

Proposed Response Response Status O

CI 91 SC 91.5.1 P59 L14 # 1526  
Hamano, Hiroshi Fujitsu Labs.

Comment Type E Comment Status X

In Figure 91-6, relaxed power level indication suffix seems incorrect in "Apostrophe" placement.

SuggestedRemedy

Change "AVP 'min" to "AVP' min".

Proposed Response Response Status O

CI 91 SC 91.6 P63 L1 # 1539  
Hajduczenia, Marek Nokia Siemens Networ

Comment Type E Comment Status X

Table 91-13 contains 3 erros which need to be fixed before moving forward:  
1. Allocation for penalties for PRX20 US is incorrect. It is 3, it should be 2 (26 - 24 = 2 dB)  
2. Minimum CHIL for PRX10 US is incorrect. It is 8 dB and should be 5 dB (see Table 60-9)  
2. Minimum CHIL for PRX20 US is incorrect. It is 8 dB and should be 10 dB (see Table 60-9)

SuggestedRemedy

Introduce the following changes into Table 91-13  
1. Allocation for penalties for PRX20 US is incorrect. It is 3, it should be 2 (26 - 24 = 2 dB)  
2. Minimum CHIL for PRX10 US is incorrect. It is 8 dB and should be 5 dB (see Table 60-9)  
2. Minimum CHIL for PRX20 US is incorrect. It is 8 dB and should be 10 dB (see Table 60-9)

Proposed Response Response Status O

CI 91 SC 91.6 P63 L16 # 1529  
Hamano, Hiroshi Fujitsu Labs.

Comment Type T Comment Status X

In Table 91-13, following values are incorrect for 1G upstream.  
"Channel insertion loss (min)" for PRX10 and PRX20 should be consistent with those in Table 91-1 (P 44, L 28) and also in Table 60-9 (802.3ah PX10 and PX20).  
"Allocation for penalties" for PRX20 should be the same as that in Table 60-9 (802.3ah PX20), and equal to "Available power budget" minus "Channel insertion loss (max)".

SuggestedRemedy

Change "Channel insertion loss (min)" for PRX10 US, from 8 dB to 5 dB.  
Change "Channel insertion loss (min)" for PRX20 US, from 8 dB to 10 dB.  
Change "Allocation for penalties" for PRX20 US, from 3 dB to 2 dB.

Proposed Response Response Status O

CI 91 SC 91.6.1 P63 L40 # 1538  
Hajduczenia, Marek Nokia Siemens Networ

Comment Type E Comment Status X

Incorrect Figure reference in "Figure 91-7 depicts the wavelength allocation plan for EPON and 10G-EPON systems, as discussed below.". Figure 91-7 is referenced while Figure 91-8 should be referenced

SuggestedRemedy

Change "Figure 91-7 depicts" to "Figure 91-8 depicts". Make sure hyperlink is fixed.

Proposed Response Response Status O

CI 91 SC 91.6.1 P63 L40 # 1525  
Hamano, Hiroshi Fujitsu Labs.

Comment Type E Comment Status X

Figure number reference is incorrect.  
That in Line 47 is also the same.

SuggestedRemedy

Change "Figure 91-7" to "Figure 91-8".

Proposed Response Response Status O

CI 91 SC 91.6.1 P64 L19 # 1530  
Hamano, Hiroshi Fujitsu Labs.

Comment Type T Comment Status X

In Figure 91-8, PRX10, PRX20, PRX30 upstream wavelength band illustration for 10G-EPON is missing.

SuggestedRemedy

See Supplement 3av\_0807\_hamano\_1.pdf.

Proposed Response Response Status O

CI 91 SC 91.7 P65 L7 # 1554  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

Figure 91-9 shows the upstream wavelength range as 1260nm - 1300nm. It should be 1260nm - 1360nm. The same range should be shown in both (a) and (b).

SuggestedRemedy

Replace 1300 with 1360.

Proposed Response Response Status O

CI 91 SC 91.9.9 P71 L15 # 1527  
Hamano, Hiroshi Fujitsu Labs.

Comment Type E Comment Status X

In Figure 91-13, several fonts on both horizontal and vertical axes are illegal. Figure 91-14 (P 72, L 8) also has the same problem.

SuggestedRemedy

It seems "minus" fonts should be replaced.

Proposed Response Response Status O

Cl 91 SC 91.9.9 P71 L8 # 1537  
Hajduczenia, Marek Nokia Siemens Networ

Comment Type E Comment Status X

Figure 91-13 on page 71 and Figure 91-14 on page 72 are affected.  
There are some illegal characters on both figures which did not get printed very well.  
Correct this by changing "Ä" to "-X".

SuggestedRemedy

Change all "Ä" to "-X" in Figure 91-13 on page 71 and Figure 91-14 on page 72.

Proposed Response Response Status O

Cl 91 SC 91.9.9 P72 L1 # 1556  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

Figure 91-14 has corrupted axis labels.

SuggestedRemedy

Set y-axis values (top to bottom) as: 1+Y3, 1, 1-Y1, 1-Y2, 0.5, Y2, Y1, 0, -Y3.  
Set x-axis values (left to right) as: 0, X1, X2, X3, 1-X3, 1-X2, 1-X1, 1.

Proposed Response Response Status O

Cl 91 SC 91.9.9 P72 L8 # 1555  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

Figure 91-13 has corrupted axis labels.

SuggestedRemedy

Set y-axis values (top to bottom) as: 1+Y3, 1, 1-Y1, .50, Y1, 0, -Y2.  
Set x-axis values (left to right) as: 0, X1, X2, 1-X2, 1-X1, 1.

Proposed Response Response Status O

Cl 92 SC 2.2.5.1 P109 L37 # 1540  
Effenberger, Frank Huawei Technologies,

Comment Type T Comment Status X

There was a call for a sync pattern that is more "data like", and that has controlled runs of 0's and 1's. This has certain benefits for certain Rx topologies. This comment suggests a new value for the SP that:

1. Has DC balance
2. Has a 50% transition density
3. Has equal run lengths of 1's and 0's up to 6 bits in length.
4. Has the flatest spectrum possible
5. Has a 66 bit length

When we change the SP, we must also change the BD. So far, the best BD found has a Hamming distance of 30 bits.

SuggestedRemedy

Modify the mentioned constants in the section to read:

SP

TYPE: 66-bit unsigned

A 66-bit value used to for the burst mode synchronization pattern.

Value: 0x 4 BF 40 18 E5 C5 49 BB 59 (transmission bit sequence: 10 1111 1101 0000 0010 0001 1000 1010 0111 1010 0011 1001 0010 1101 1101 1001 1010)

BURST\_DELIMITER

TYPE: 66-bit unsigned

A 66-bit value used to find the beginning of the first FEC codeword in the upstream burst.

Value: 0x 8 6B F8 D8 12 D8 58 E4 AB (transmission bit sequence: 01 1101 0110 0001 1111 0001 1011 0100 1000 0001 1011 0001 1010 0010 0111 1101 0101)

Proposed Response Response Status O

Cl 92 SC 92.1.6 P56 L # 131458  
Khermosh, Lior PMC-SIERRA

Comment Type T Comment Status D Deferred to July

currently as the draft is defined there is a potential condition that even though we do a compensation of the delay there can be the case that the PCS will not be ready for the next packet. This case happens when exactly the packet should be transmitted and the PCS transmits parity bytes of IPGs (this can happen if there is gaps between the packets which is above the minimal IPG). This will add a 2TQs jitter in the timestamp. The timestamp is added to the packet but the MAC will not start transmitting due to the feedback from the PCS (using PLS\_CARRIER.indication(CARRIER\_STATUS)) which delays the MAC. This feedback should be removed and the PCS should hold an elastic jitter FIFO to compensate with a maximal delay width and make it a fixed delay. Please note that both FEC\_overhead\_tx and FEC\_pverhead\_delay will compensate for that and should be accurate.

SuggestedRemedy

Remove the carrier sense feedback from the PCS. Work in open loop. The MPCP has a prediction of the overhead added to the packet and should delay the MAC accordingly. The PCS should have an elastic FIFO to make the delay in the PCS fixed. Add a text to describe the FIFO and the work. Basically the FIFO read pointer is set to a fixed threshold of the maximal delay and the FIFO is filled in the MAC rate. When there is a gap the depth of the FIFO changes and filled afterwards. As the read threshold remains the same and read in the PCS output rate, it keeps the data going out in constant gaps, hence keeping the delay fixed. The FIFO should be described in the regular format of state machines in the spec.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.  
@@Deferred to July, 2008, see motion #4@@

Cl 92 SC 92.1.6.1 P91 L1 # 1532  
Mandin, Jeff PMC Sierra

Comment Type TR Comment Status X

MPCP in clause 93 transmits frames to using MAC:MA\_DATA.request(). MAC:MA\_DATA.request() transfers supplied data to the MAC sublayer for further processing and completes immediately (see 4.3.2.1 in 802.3as-2006 or 802.3ay/D2.2).

Since the RS CARRIER\_STATUS indication has \_no\_ effect on MPCP, the logic for generating it doesn't accomplish anything and should be removed.

Note that this issue is distinct from the considerations previously mentioned in comment 1458

SuggestedRemedy

- 1. Delete subclause 92.1.6.1
- 2. On page 91, line 1: Delete the paragraph:

"As discussed in Subclause @@46.1.7.3@@, the PLS\_CARRIER.indication primitive is not used for 10 Gb/s operation. However, 10G-EPON operation extends the 10 Gb/s RS by using the PLS\_CARRIER.indication primitive to defer the MAC between frames in order to allow the PCS to insert FEC parity octets"

Proposed Response Response Status O

Cl 92 SC 92.1.6.1.5 P94 L27 # 1557  
Lynskey, Eric Teknovus

Comment Type T Comment Status X

The exit condition from UPDATE that returns to UPDATE seems to have been partially lost and pushed off the end of the page. There is nothing shown after the not equal to sign.

SuggestedRemedy

Add "C))" to the end of the condition.

Proposed Response Response Status O

Cl 92 SC 92.1.6.1.6 P94 L1 # 1565  
Lynskey, Eric Teknovus

Comment Type TR Comment Status X

This comment applies to Figure 92-5. As written, the Carrier Status state diagram has a flaw when short frames are being transmitted. A 64-byte frame will end up causing CRS to be set for 54 columns when it may not need to be set at all during the frame. This will cause additional IPG to be sent for frames that have a length less than 54 columns. Additional information can be found in 3av\_0807\_lynskey\_2.pdf. The FrameMaker source file can be provided if necessary.

*SuggestedRemedy*

Replace Figure 92-5 with the diagram found on slide 5 of 3av\_0807\_lynskey\_2.pdf.

Proposed Response Response Status O

Cl 92 SC 92.1.6.2.3.2 P96 L7 # 1543  
Remein, Duane Alcatel-Lucent

Comment Type TR Comment Status X

Add support for ONU Control Channel  
Modify OLT and ONU comparison statements.  
Table 92-4 Reserved LLID Values.  
Reserve one LLID for ONU control channel path. This will enable other standards groups to define a common ONU control channel promoting a single standard for 10Gb/s PONs. (see related comments against Subclause 93.3.2.3 pg 165 ln 41)

*SuggestedRemedy*

Change text starting at line 7 from:

"b) If the received logical\_link\_id value matches 0x7FFF or 0x7FFE and an enabled MAC exists with a logical\_link\_id variable with the same value, then the comparison is considered a match to that MAC.

c) If the received logical\_link\_id has a value other than 0x7FFF or 0x7FFE and an enabled MAC exists with a mode variable with a value of 0 and a logical\_link\_id variable matching the received logical\_link\_id value, then the comparison is considered a match to that MAC."

To:

b) If the received logical\_link\_id value matches 0x7FFF, 0x7FFE or 0x7FFD and an enabled MAC exists with a logical\_link\_id variable with the same value, then the comparison is considered a match to that MAC.

c) If the received logical\_link\_id has a value other than 0x7FFF, 0x7FFE or 0x7FFD and an enabled MAC exists with a mode variable with a value of 0 and a logical\_link\_id variable matching the received logical\_link\_id value, then the comparison is considered a match to that MAC.

Change text starting at line 17 from:

"b) If the received mode bit is equal to 1 and the received logical\_link\_id value does not match the logical\_link\_id variable, or the received logical\_link\_id matches 0x7FFE, then the comparison is considered a match."

To:

"b) If the received mode bit is equal to 1 and the received logical\_link\_id value does not match the logical\_link\_id variable, or the received logical\_link\_id matches 0x7FFE or 0x7FFD, then the comparison is considered a match."

"Add line in Table 92-4

"0x7FFD ONU Control Channel"

with reference to note b and c

Change last line to read

"0x7FFC-0x7F00 reserved for future use"

with reference to note b and c

Proposed Response      Response Status

Cl 92      SC 92.2.2.1.4      P101      L 24      # 1547

Lynskey, Eric      Teknovus

Comment Type **E**      Comment Status **X**

Typo in definition for DelCount.

SuggestedRemedy

Replace "than" with "that".

Proposed Response      Response Status

Cl 92      SC 92.2.2.1.5      P102      L 16      # 1551

Lynskey, Eric      Teknovus

Comment Type **E**      Comment Status **X**

Some state diagrams throughout the draft use "else" as an exit condition and some use "ELSE". We should be consistent. Clause 93 uses "else", so perhaps that is the way to go. If we choose "else", figures affected would be 92-19, 92-26, 92-27. If we choose "ELSE", figures affected would be 92-10, 92-11, and 92-18.

SuggestedRemedy

Select one method and be consistent throughout clause.

Proposed Response      Response Status

Cl 92      SC 92.2.2.5      P109      L 1      # 1535

Ben-Amram, Haim      PMC-Sierra

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

To support end-of-burst delimiter, change would be needed to AGC settling. This is detailed in 3av\_0807\_benamram\_1.pdf

SuggestedRemedy

Revise end-of-burst delimiter as in 3av\_0807\_benamram\_2.pdf.

Proposed Response      Response Status

Cl 92      SC 92.2.2.5.5      P110      L 48      # 1558

Lynskey, Eric      Teknovus

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

TBD for SyncBlockCount type. It should have the same type as SYNC\_LENGTH.

SuggestedRemedy

Replace TBD with 16-bit unsigned.

Proposed Response      Response Status

Cl 92      SC 92.2.2.5.6      P111      L 12      # 1545

Kramer, Glen      Teknovus, Inc.

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

Refer to Figures 92-17 and 92-18:

During state machine modeling, several problems got uncovered.

#1) ReceiveNextBlock() function is said to be a blocking function, but 66-bit blocks arrive not periodically, but with big gaps. During such gaps, the Data Detector will not output any data to the GearBox.

#2)In state TRANSMIT\_BURST\_PREAMBLE, the number of transmitted blocks may exceed SyncBlockCount, since additional blocks are inserted, but are not accounted for. Longer burst preamble leads to potential burst collisions and may overflow the FIFO\_DD queue.

#3) Idles are not being counted in states Transmit\_Burst\_Delimiter and Transmit\_Burst\_Terminator

See detailed explanation in 3av\_0807\_kramer\_1.pdf

SuggestedRemedy

Use the modified state diagrams and associated constants, vriables, counters, and functions as presented on pages 103-107 in the 3av\_0807\_kramer\_1.pdf.

Proposed Response      Response Status



Cl 92 SC 92.2.2.5.6 P112 L4 # 1548  
 Lynskey, Eric Teknovus  
 Comment Type E Comment Status X  
 The INIT state Figure 92-18 has idleBlockCount, but it should be IdleBlockCount.  
 SuggestedRemedy  
 Capitalize variable.  
 Proposed Response Response Status O

Cl 92 SC 92.2.3.3.3 P122 L9 # 1550  
 Lynskey, Eric Teknovus  
 Comment Type E Comment Status X  
 Pseudo-code could be made easier to read.  
 SuggestedRemedy  
 Start "else" branch on new line.  
 Proposed Response Response Status O

Cl 92 SC 92.2.3.1.3 P114 L25 # 1533  
 Mandin, Jeff PMC Sierra  
 Comment Type TR Comment Status X  
 Text refers to gearbox in the receive path, but there is no such animal.  
 SuggestedRemedy  
 1. Remove the function BlockFromGearbox() from 92.2.3.1.3  
 2. Change AppendInbuffer in 92.2.3.1.3 as follows so that it operates on a single new bit rather than a 66b block.  
 Proposed Response Response Status O

Cl 92 SC 92.2.3.7 P124 L51 # 1531  
 Mandin, Jeff PMC Sierra  
 Comment Type TR Comment Status X  
 The RX PCS idle insertion scheme introduces a large amount of delay variation:  
 \* In the case where a 64byte frame terminates in the last octet of a FEC codeword, the frame will be delayed one parity region (ie. 264 PMA bit times).  
 \* Whereas a 1522 byte frame which terminates in the first octet of a FEC codeword will be delayed 8 full codewords (ie. 16320 PMA bit times).  
 \* This delay variation is much greater than the 1TQ that is permitted.  
 \* The delay variation derives from the fact that the idle insertion scheme passes the frame up as soon as it is fully received - in effect giving reduced latency to short frames.  
 \* Specifically, if we look at lines 17-18 of current figure 92-27, we see that the amount of time that a frame is retained in the II\_Fifo depends on when FrameReadyCount is bumped, for which we look to current figure 92-26 to see that it depends directly on the length of the frame.  
 SuggestedRemedy  
 Correct the Rx PCS delay variation by using a jitter buffer as indicated in 3av\_0806\_mandin\_1.pdf.  
 In keeping w/ the requests of the chair, the text modifications are kept "conservative" to include only the changes relevant to technical completeness of the draft.  
 Proposed Response Response Status O

Cl 92 SC 92.2.3.1.3 P114 L31 # 1549  
 Lynskey, Eric Teknovus  
 Comment Type E Comment Status X  
 Confusing notation here. We should use the special symbols and operators found on page 10.  
 SuggestedRemedy  
 Replace "<>" with "not equal to" symbol.  
 Proposed Response Response Status O

Cl 92 SC 92.2.3.7.5 P127 L5 # 1566  
Lynskey, Eric Teknovus

Comment Type TR Comment Status X

This comment applies to Figure 92-26 and Figure 92-27. These diagrams introduce an unacceptable amount of delay variation. This delay variation will impact the MPCP timestamp and will cause many problems throughout the PON. A new state diagram has been modeled and developed that provides a fixed delay of 40 vectors (16 TQ). Additional information can be found in 3av\_0807\_lynskey\_2.pdf. The FrameMaker source file can be provided if necessary.

SuggestedRemedy

Replace Figure 92-26 and 92-27 with the diagram found on slide 6 of 3av\_0807\_lynskey\_1.pdf.

Proposed Response Response Status O

Cl 93 SC P L # 1541  
Remein, Duane Alcatel-Lucent

Comment Type E Comment Status X

Invalid reference @@92.1.2.3.3.2@@

SuggestedRemedy

Change to:  
@@92.1.6.2.3.2@@

Proposed Response Response Status O

Cl 93 SC 93.1.1 P143 L41 # 1542  
Remein, Duane Alcatel-Lucent

Comment Type T Comment Status X

Objective c) "Support a single LLID per ONU" is incorrect as an ONT must support more than one LLID (ex. 0x7FFF or 0x7FFFE must be supported AND at least on LLID after registration and possibly one SCB LLID).

SuggestedRemedy

Change objective c) to:  
"Support at least one unregistered ONU LLID and at least one other LLID per ONU"

Proposed Response Response Status O

Cl 93 SC 93.2.2.1 P154 L1 # 1534  
Mandin, Jeff PMC Sierra

Comment Type TR Comment Status X

MPCP in clause 93 transmits frames to using MAC:MA\_DATA.request(). MAC:MA\_DATA.request() transfers supplied data to the MAC sublayer for further processing and completes immediately (see 4.3.2.1 in 802.3as-2006 or 802.3ay/D2.2).

Consequently:

a) the post-frame-transmission backoff timers in the OLT and ONU Control Multiplexer state diagrams are incorrect. They must be changed to account for the length of the frames+IPG themselves (and not just the FEC overhead)

b) The function for computing the delay to compensate for FEC overhead must result that is the same as (or perhaps higher than) the actual required delay. ie. The fec\_overhead\_min() function is incorrect and must be replaced.

Note that this is in addition to the considerations mentioned in comment ??

SuggestedRemedy

Modify state diagrams and overhead functions as indicated in 3av\_0806\_mandin\_2.pdf

The essential concept is that the PCS can keep track of when parity insertion is occurring and perform the precisely correct backoff. The DIC algorithm is performed by the RS, but since DIC only moves the next data position forward or backward within a column, there is never a case where DIC impacts FEC overhead.

In keeping w/ the requests of the chair, the text modifications are kept "conservative" so as to include only the changes relevant to "technical completeness" of the draft.

Proposed Response Response Status O

Cl 93 SC 93.2.2.4 P124 L119 # 131459  
 Khermosh, Lior PMC-SIERRA

Comment Type T Comment Status D Deferred to July

As I have promised in the IEEE meeting, I have put in another look at the FEC\_overhead function to try to suggest a coherent behavior. These are my conclusions. Appreciate comments.

A bit of a history.

The FEC\_overhead function is a legacy heritage from 802.3ah clause 64. The function appears in 3 places with 2 use cases.

Basically the function calculates the additional overhead that should be added to a packet due to the FEC. In the 802.3ah frame based FEC, this is a value per packet which depends only on the packet length.

1) OLT transmit state machine:

The overhead is used to add a delay after the packet, to stall the MPCP layer (which also inserts timestamp) to match the MAC transmission.

2) ONU transmit state machine.

The overhead appears in 2 places:

A) The overhead is used to check if the packet fits inside the remaining time for grant transmission.

B) The overhead is used to add a delay after the packet, to stall the MPCP layer (which also inserts timestamp) to match the MAC transmission.

3) Gate processing ONU activation state diagram

The overhead is used to reduce the window for the random delay.

Use in 802.3av

Currently the function was exported to the 802.3av, as is, in all state machines, just the formula was changed a bit.

However when checking, it seems that a different adaptation is needed due to the fact that the FEC is now stream based and not packet based.

Looks like it would be more convenient to divide the overhead into 2 functions for each use case in the state diagrams.

One function (FEC\_Overhead\_tx) to check if the packet fits the grant and the other (FEC\_Overhead\_delay) calculating the delay for the MAC.

(Basically the discovery calculation should use the first function however we can simply put in there a fixed value of single CW, as all values there are fixed and known (frame size is 64bytes) and have the random in CW granularity).

The FEC\_Overhead\_tx takes all worse case rounding scenarios. It includes rounding up of the current packet size into the nearest FEC codeword. (This what would happen if it is the last frame in the grant)

The FEC\_Overhead\_delay reflects the estimated delay required after a packet due to insertion of FEC overhead. So the average value for IPG (ie. 12) is used, and the packet size (plus the "balance" remaining from the previous packet) should be rounded down to

the nearest FEC block. If the FEC block is not full then there is no delay added.

The FEC overhead is a function of packet length, IPG and (localTime-beginTime). (localTime-beginTime) defines the position of the packet in the FEC codeword's chain.

At the OLT - beginTime is the OLT init time.

At the ONU - beginTime is the start of the Fec codewords in the grant (start\_time+laser\_on+syn\_time)

Inaccuracies:

There is an inherent inaccuracy in both functions since the MPCP layer works in TQs and not bytes.

Another inaccuracy is involving the IPG which should be added in the overhead. IPG changes in 10G between 9-15bytes due to the DIC functionality.

The state machines of the MPCP coordinates between the MAC and MAC control which are not aware of the DIC so we could have fixed IPG to 12bytes. However the function really should be aware of the line transmission so DIC should be accounted.

FEC\_Overhead\_tx can must ensure that the packet can be transmitted. So it either takes worse case for the IPG (15 bytes) or holds a DIC function like the RS and monitor the real IPG.

FEC\_Overhead\_delay can use the average of 12 bytes and MAC would be aligned. The data on the line will jitter in 3bytes (added to the RTT jitter).

*SuggestedRemedy*

FEC\_Overhead\_tx(length)

This function calculates the size of additional overhead, to be added by the FEC encoder, while encoding a frame of size length, using worst-case assumptions about FEC parity requirements for the frame. The function is used to check if the packet fits the grant.

This function is calculated at the beginning of the packet.

Parameter length represents the size of an entire frame including preamble, SFD, DA, SA, Length/Type, and FCS.

As described in Clause @@92.2.3@@, FEC encoder adds 32 parity octets for each block of 216 data or control octets.

The following formula is used to calculate the overhead:

Parameters:

IPG [bytes] - IPG =15

payloadBalance [bytes]

FEC\_Overhead\_tx [TQs]

length [bytes] - the length of a packet, not including IPG

beginTime [TQs]

localTime [TQs]

Initial conditions

OLT:

beginTime = start\_of\_time

payloadBalance =0

For the ONU the initial conditions are set at beginning of a grant:  
beginTime = start\_of\_grant\_time + laser\_on + sync\_time  
payloadBalance =0

The value for each packet:  
payloadBalance = ((localTime - beginTime)\*20)%248 + length + IPG  
FEC\_overhead\_tx = round\_up(((32+ 216) \*round\_up( payloadBalance / 216) -  
payloadBalance)/20)

FEC\_Overhead\_delay(length)  
This function calculates the size of additional overhead to be added by the FEC encoder while encoding a frame of size length as the last frame in the grant.  
The function provides the additional delay before the next packet to fit to the gap the FEC encoder needs for the parity bytes  
This function is calculated at the beginning of the packet.  
Parameter length represents the size of an entire frame including preamble, SFD, DA, SA, Length/Type, and FCS.  
As described in Clause @@92.2.3@@, FEC encoder adds 32 parity octets for each block of 216 data or control octets.  
The following formula is used to calculate the overhead:

Parameters:  
IPG [bytes] - IPG =12  
payloadBalance [bytes]  
FEC\_Overhead\_tx [TQs]  
length [bytes] - the length of a packet, not including IPG  
beginTime [TQs]  
localTime [TQs]

Initial conditions  
OLT:  
beginTime = start\_of\_time  
payloadBalance =0

For the ONU the initial conditions are set at beginning of a grant:  
beginTime = start\_of\_grant\_time + laser\_on + sync\_time  
payloadBalance =0

The value for each packet:  
payloadBalance = ((localTime - beginTime)\*20)%248 + length + IPG  
FEC\_overhead\_delay = round\_up(32/20\*round\_down(payloadBalance / 216 ))

NOTE-The notation round\_up(x) represents a ceiling function, which returns the value of its argument x rounded up to the nearest integer. The notation round\_down(x) represents a flooring function, which returns the value of its argument x rounded down to the nearest

integer. The notation a%b represents a modulo division of two numbers a and b.

Also change in Figure 93-12 on page 118 at the "start packet initiate timer" state on line 42 the FEC\_overhead to FEC\_overhead\_delay

Also change in Figure 93-13 on page 119 at the "check Size" state on line 31 the FEC\_overhead to FEC\_overhead\_tx

Also change in Figure 93-13 on page 119 at the "start packet initiate timer" state on line 43 the FEC\_overhead to FEC\_overhead\_delay

Also in Figure 93-13:

\* Add the following text at the beginning of the "Transmit Frame" State on line 36 (ie. before the invocation of "TransmitFrame"):

"packet\_initiate\_delay = FEC\_Overhead\_Delay(length+tailGuard)"

\* delete the first four lines from the "start packet initiate timer" state on line 43 (so that the only text remaining is "[start packet\_initiate\_timer, packet\_initiate\_delay]"

Proposed Response Response Status W  
PROPOSED ACCEPT IN PRINCIPLE.  
@@Deferred to July 2008 for consideration, see motion #4@@

Cl 93 SC 93.2.2.7 P162 L42 # 1559  
Lynskey, Eric Teknovus

Comment Type T Comment Status X  
In Figure 93-12, there is a slight error in the value to be loaded into the packet\_initiate\_timer. If FEC were not enabled, this timer would be seeded with a value of 12 bytes to enforce a minimum IPG between two frames. Since FEC is enabled, this timer should be seeded with the minimum IPG plus the overhead required for FEC. Note that the FEC\_Overhead function already takes this IPG into account when calculating the overhead, so no change is necessary to this function. We may want to create a constant called minIpgBytes instead of using a value of 12 in the state diagram, but the end result would be the same.

Suggested Remedy  
In both Figure 93-12 and 93-13, modify to read:  
packet\_initiate\_delay = FEC\_Overhead\_Min(sizeof(data\_tx) + tailGuard) + 12

Proposed Response Response Status O

CI 93 SC 93.3.2.3 P165 L41 # 1544  
Remein, Duane Alcatel-Lucent

Comment Type TR Comment Status X

Add support for ONU Control Channel LLID.  
(see related comment against Subclause 92.1.6.2.3.2 pg 96 ln 7)

*SuggestedRemedy*

Add below 93.3.2.3 Multicast and single copy broadcast support

"93.3.2.4 ONU Control Channel support

In addition to the unicast MAC and the SCB MAC the OLT and ONU shall support a single ONU Control Channel(OCC). The associated MAC is reserved for optional higher layers for control of the ONU functions not specified in this standard. The Configuration of SCB channels as well as filtering and marking of frames for support of SCB is defined in Clause @@92.1.6.2.3.2@@ for 10G-EPON compliant Reconciliation Sublayers."

Renumber remaining subclauses and update PICS.

Proposed Response Response Status O