Proposed responses

IEEE P802.3az D1.4 Energy Efficient Ethernet comments

June 2009

Type: TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general

Comment Status: D/dispatched  A/accepted  R/rejected

Response Status: O/open  W/written  C/closed  U/unsatisfied  Z/withdrawn

Sort Order: Clause, Subclause, page, line

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Comment Type: ER  Comment Status: D

In many of the state machine figures, new transition criteria include comparison of boolean variable with boolean value (e.g., energy_detect = FALSE). This comparison is redundant and is inconsistent in style.

Suggested Remedy:
Replace all instances in draft as follows:

"<boolean_variable> = TRUE" with "<boolean_variable>
"<boolean_variable> = FALSE" with "!<boolean_variable>

Proposed Response  Response Status: W

PROPOSED ACCEPT IN PRINCIPLE.

In places where this would create a change in the base text of the draft,

Recommended change will be made where it does not, by itself, cause a change in the base text of the draft.

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Comment Type: ER  Comment Status: D

I find no text added anywhere to clause 14 that states or even gives a hint of the compatibility between 10BASE-T and 10BASE-Te. How is a customer to know how to mix the two on a network?

Suggested Remedy:
Add a new subclause to clause 14 to address the topic of cross compatibility between 10BASE-T and 10BASE-Te, i.e., the two MDI can be freely mixed as long as the cabling meets the requirements for 10BASE-Te.

Proposed Response  Response Status: W

PROPOSED ACCEPT IN PRINCIPLE.

Change 14.1.1.1 (i) from:

Provides for operation with reduced transmit amplitude for type 10BASE-Te (optional)

to:

Provides for operation with reduced transmit amplitude for type 10BASE-Te (optional). A 10BASE-Te PHY will interoperate with a 10BASE-T PHY if the minimum cabling requirements of a 10BASE-Te PHY are met.
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<td>25</td>
<td>25.4.5</td>
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<td>28</td>
<td>108</td>
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**Grimwood, Michael Broadcom**

**Comment Type:** T  **Response Status:** W

**Comment Status:** D  **Proposed Response**

To achieve consistency with related comments submitted against Clauses 35 and 46, change link_status from READY to OK. Clauses 40 and 55 and the associated link monitors do not have a "READY" state in their link monitor functions nor do they specify READY as an allowable value for link_status.

**Suggested Remedy**

Change:

\[LPI_{IDLE}\text{.request shall not be set to ASSERT unless the attached link is operational (i.e. link_status = READY, see 28.2.6.1.1). } \]

To:

\[LPI_{IDLE}\text{.request shall not be set to ASSERT unless the attached link is operational (i.e. link_status = OK, see 24.3.3.2). } \]

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

The commenter is correct that "link_status = OK" indicates that the link is operational not "link_status = READY" (which indicates that the autoneg has resolved and the link may be enabled). However, the definition of link_status from 28.2.6.1.1 must be used because it comes from the autonegotiation function and this clause is defining the RS behavior (not the PCS/PMA).

Therefore change "link_status = READY" to "link_status = OK" - 2 instances.

**Thompson, Geoff Nortel**

**Comment Type:** ER  **Response Status:** W

**Comment Status:** D  **Proposed Response**

The text: "the PHY enters the low power idle mode during periods of low link utilization." is, shall we say, mysterious. There is no "low link utilization" signal available within the PCS/PMA.

**Suggested Remedy**

It would be more appropriate to say something like that the transmitter, and in turn the linked receiver transition into low power mode in response to a command sent across the MII that is expected when the transmitting station is expecting low link utilization.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

Change the second sentence of the paragraph starting on line 8 to read:

When a transmitting station does not need the full bandwidth of a link with this capability, the LPI agent can use a command across the MII to put the local PHY transmitter and the link partner's receiver into low power idle mode to conserve energy.

**Grimwood, Michael Broadcom**

**Comment Type:** TR  **Response Status:** W

**Comment Status:** D  **Proposed Response**

For 100BASE-TX EEE, require that jitter specifications be met during low-power operation.

**Suggested Remedy**

In subclause 25.4.5, after the sentence, "The jitter measurement specified in 9.1.9 of TP-PMD may be performed using scrambled IDLEs.", add the following:

During Low Power operation, jitter shall be measured using scrambled SLEEP code groups transmitted during the TX_SLEEP state. Total transmit jitter with respect to a continuous unjittered reference shall not exceed 1.4 ns peak-to-peak with the exception that the jitter contributions from the clock transitions occurring during TX_QUIET and the first 5 usec of TX_SLEEP are ignored. The jitter measurement time period shall be not less than 100 msec and not greater than 1 second.

**Proposed Response**

PROPOSED ACCEPT.
I don't understand what this attribute indicates. Is it the state of the standard at time of implementation? Or is it the PHYs for which the PCS and higher can support EEE operation?

Suggested Remedy
Add text to clarify.

PROPOSED ACCEPT IN PRINCIPLE.

Also change spelling to "assertion"
During the adhoc/meetings, the decision was to have the wake timer to be for 1ms. But in the draft is point to TWR, which is only 10-11uSec. The purpose of this timer is to give the receiver a chance to gracefully recover from a wake time fault.

Suggested Remedy:
Add a row to Table 36-3b for Twtf and assign 1ms. In fact replace the TDA row for this.

PROPOSED ACCEPT IN PRINCIPLE.

Change definition of rx_wf_timer:
"The timer terminal count is set to Twr" to "The timer terminal count is set to Twtf"

Replace last row of Table 36-3b with:

| Twtf | Wake time fault recovery time | 1mS |

Comment Type: ER
Comment Status: D

Wake_error_counter needs to be added to the counter section

Suggested Remedy:
Add the description and link to the Register

PROPOSED ACCEPT IN PRINCIPLE.

Add wake error counter (identical to 49.2.13.2.2).

Comment Type: E
Comment Status: D

Figure references wrong

Suggested Remedy:
Change "Figures 36-1 and 36-2" to "figures 36-5 and 36-6" (with active links).

Also, P.74, change figure title to "Figure 36-5"
The "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH are all invalid because they would cause the timers to keep restarting (even if they didn't, they would be redundant since the state machine remains in the state unless an exit is valid.

**Suggested Remedy**
Delete the "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH.

**Proposed Response**
PROPOSED ACCEPT.

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When detect_lpidle is asserted and the state transitions from RX_ACTIVE to RX_SLEEP, the next ordered set to be received is an LPI, which is /K28.5/D6.5/ or /K28.5/D26.4/. Then after /K28.5/ is received, detect_idle would be asserted using the definition from section 36.2.5.1.3 and the state would transition to RX_ACTIVE. When /D6.5/ or /D26.4/ is received then detect_lpidle is asserted, thus transitioning back to RX_SLEPLE from RX_ACTIVE. This means, as long as the LPI ordered set is received then the state transitions back and forth between RX_ACTIVE and RX_SLEEP and that is clearly not the intended behavior.

**Suggested Remedy**
To avoid toggling back and forth, while in RX_SLEEP active, detect_idle should be sampled only for every other code word. This way when an ordered set /K28.5/<some_code_word>/ is received, then detect_idle or detect_lpidle will go high appropriately after decoding <some_code_word>. One possible way to do this is to split RX_SLEEP into two states RX_SLEEP_1 and RX_SLEEP_2, both having the same functionality of the existing RX_SLEEP state.

When detect_lpidle is asserted, RX_ACTIVE/RX_WAKE/RX_WTF would transition into RX_SLEEP_1 state and as long as detect_lpidle is asserted state would always be RX_SLEEP_1. While in RX_SLEEP_1, detect_idle would transition to RX_SLEEP_2 state. If current state is RX_SLEEP_2 and detect_idle is asserted, then state transitions to RX_ACTIVE else if detect_lpidle is asserted then state transitions to RX_SLEEP_1. If signal_detect fails while either in state RX_SLEEP_1 or RX_SLEEP_2 then state transitions to RX_QUIET.

**Proposed Response**
PROPOSED ACCEPT IN PRINCIPLE.

The commenter has correctly identified the behavior problem.

The same can be achieved by including the term ""ODD"" (qualifying detect_idle) in the exit conditions for RX_SLEEP: RX_WAKE and RX_WTF.
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<td>Pillai, Velu</td>
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**Comment Type:** TR  **Comment Status:** D  
The variable rx_lpi_fail is not used any more.

**Suggested Remedy:**  
Hence remove rx_lpi_fail = TRUE condition to enter LINK_FAILED

**Proposed Response**  **Response Status:** W  
PROPOSED ACCEPT IN PRINCIPLE.

Implement the suggested remedy and also delete definition for rx_lpi_fail and assignment in state RX_ACTIVE (fig 36-9b)

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**Comment Type:** TR  **Comment Status:** D  
Transition from LPI_K to IDLE_D is not checking EVEN boundary

**Suggested Remedy:**  
Change the transition condition to detect_idle * rx_lpi_active =FALSE * !EVEN

**Proposed Response**  **Response Status:** W  
PROPOSED ACCEPT IN PRINCIPLE.

Use "ODD" instead of "EVEN"

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**Comment Type:** TR  **Comment Status:** D  
Arc from RX_WTF to RX_ACTIVE back to itself has condition sync_status!= code_sync_status. But sync_status latches code_sync_status inside RX_ACTIVE. Hence this transition condition is meaningless.

**Suggested Remedy:**  
Instead of the above, please use code_sync_status = FAIL

**Proposed Response**  **Response Status:** W  
PROPOSED REJECT.

Sync_status only latches code_sync_status on entry to RX_ACTIVE. Using *sync_status != code_sync_status* ensures that any change will cause it to cycle around (allowing all changes in code_sync_status to be reflected in sync_status.)
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<td>The states &quot;WAIT_SILENT, QUIET, WAKE, and WAKE_SILENT&quot; are listed with &quot;WAIT_SILENT&quot; in the list twice. I believe the first instance was intended to be &quot;WAIT_QUIET&quot;.</td>
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<td>The 06 character is often referred to in subsequent sections as the LP_IDLE character so should have this label here.</td>
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<td>Add &quot;LP_IDLE&quot; (all capitals) label under description in row with TXD = 06.</td>
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</table>
A one second timer for LP_IDLE.request assertion was applied to Clause 22 but not globally to all PHYs since only Clause 22 defines LP_IDLE.request.

Suggested Remedy
As has been done in 22.7a, add a section 46.5a entitled "LPI messages". Modify that section for XGMII compatibility.

In this new section, add the following requirement to the definition of LP_IDLE.request:

LP_IDLE.request shall not be set to ASSERT unless the attached link is operational (i.e. link_status = OK, see 55.4.5.1). LP_IDLE.request shall remain to be set to DEASSERT for 1 second following link_status changing state to OK.

PROPOSED ACCEPT IN PRINCIPLE.

This should be added in 46.1.7 (where the rest of the mapping changes are described).

Add after "This behavior and restrictions are the same as described in 22.7a, with the details of the signaling described in 46.3."

"LP_IDLE.request shall not be set to ASSERT unless the attached link is operational (i.e. link_status = OK, according to the underlying PCS/PMA). LP_IDLE.request shall remain to be set to DEASSERT for 1 second following link_status changing state to OK."

The diagram shows XGMII and PCS encoding spanning all LPI states but labels only the WAKE cycle.

Suggested Remedy
Label columns 1-2 and 16-18 as active time.
Label columns 3 to 15 as LPI time.
Label columns 3 to 9 and LPI sleep/quiet/refresh time.

PROPOSED ACCEPT.
The spec mentions that on receive, all ||I|| received during idle are translated to XGMII Idle control characters for transmission over the XGMII. All other ||I|| received during idle are mapped directly to XGMII data or control characters on a lane by lane basis, with the exception of /D20.5/ (Low Power Idle) being detected in any row and the rest of the rows in the same column being detected /K/ only or /R/ only, which will result in reporting LP_IDLE in all lanes.

This implies that ||A|| is always translated to normal XGMII Idle characters, even if the previous column was a low power idle stripe (/D20.5/ in one row and /K/ or /R/ in all other rows). Is this the intention? This would make the received XGMII sequence quite different from the link partner’s transmitted XGMII, and complicate the detection of LPI in the MAC. I think the received ||A|| that is part of a stream of low power stripes of idles should be translated to LPI as well.

Suggested Remedy

Change the spec to:

Whenever sync_status=OK, all ||I|| received during idle are translated to XGMII Idle control characters for transmission over the XGMII. All other ||I|| received during idle are mapped directly to XGMII data or control characters on a lane by lane basis, with the following exceptions:

1. /D20.5/ (Low Power Idle) being detected in any row and the rest of the rows in the same column being detected /K/ only or /R/ only, which will result in reporting LP_IDLE in all lanes.
2. ||A|| being detected AND /D20.5/ (Low Power Idle) being detected in any row of the previous column and the rest of the rows in the previous column being detected /K/ only or /R/ only, which will result in reporting LP_IDLE in all lanes.

Proposed Response

PROPOSED REJECT.

This change will require some discussion amongst interested parties and does not weigh on the “technical completeness” of the draft.

The commenter is urged to resubmit the comment during the Working Group ballot phase.

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Proposed responses

IEEE P802.3az D1.4 Energy Efficient Ethernet comments

June 2009

McCulloch, Ewan Cadence Design Syst

Comment Type: T  Comment Status: D

The spec mentions that on receive, all ||I|| received during idle are translated to XGMII Idle control characters for transmission over the XGMII. All other ||I|| received during idle are mapped directly to XGMII data or control characters on a lane by lane basis, with the exception of /D20.5/ (Low Power Idle) being detected in any row and the rest of the rows in the same column being detected /K/ only or /R/ only, which will result in reporting LP_IDLE in all lanes.

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Suggested Remedy

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2. ||A|| being detected AND /D20.5/ (Low Power Idle) being detected in any row of the previous column and the rest of the rows in the previous column being detected /K/ only or /R/ only, which will result in reporting LP_IDLE in all lanes.

Proposed Response

Response Status: W

PROPOSED REJECT.

This change will require some discussion amongst interested parties and does not weigh on the “technical completeness” of the draft.

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---

Brown, Matt AMCC

Comment Type: ER  Comment Status: D

Clarify that this means LP_IDLE characters.

Suggested Remedy

Change LP_IDLE to LP_IDLE characters.

Proposed Response

Response Status: W

PROPOSED ACCEPT.

---

Brown, Matt AMCC

Comment Type: ER  Comment Status: D

Define low power idle ordered sets here rather than as alias in comment section.

Suggested Remedy

Change title to “48.2.4.2 Idle (||I||) and Low Power Idle (||LPIDLE||)”. Add the following the paragraph on line 38 of page 128 as follows:

"The low power idle ordered set ||LPIDLE|| is a special of ||I|| where low power idle is ..."

Also, deleted the definition of ||LPIDLE|| in section 48.2.6.1.2 on page 128 line 47.

Proposed Response

Response Status: W

PROPOSED ACCEPT IN PRINCIPLE.

Move the definition of ||LPIDLE|| from 48.2.6.1.2 to the end of paragraph starting line 38, page 128.

"Reporting of Low power Idle is indicated by ||LPIDLE||.”
<table>
<thead>
<tr>
<th>Cl 48</th>
<th>SC 48.2.4.2.3</th>
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<td>McCulloch, Ewan</td>
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**Comment Type:** T  
**Comment Status:** D  
**Should idle insertion or deletion via clock tolerance compensation be allowed to proceed during LPI, if we choose not to implement the low power state machines (i.e. if the PCS is simply transporting LPI for compatibility, but not entering a low power state itself).**

48.2.4.2.3 states that idle insertion or deletion may be performed on ||R|| in the encoded data stream, which will never be the case when transporting LPI (one of the characters in the stripe of ||R||’s will be /D20.5/).

Our assumption is that clock rate compensation should be allowed to continue during LPI, as this is consistent with allowing the deskew and comma sync processes within the PCS RX to continue (using ||A|| and individual /K/ symbols respectively).

**Suggested Remedy:**  
Modify the spec to allow for clock rate compensation on a stripe that contained three /R/’s and one /D20.5/ in the encoded data stream.

**Proposed Response**  
**Response Status:** W  
PROPOSED ACCEPT IN PRINCIPLE.

Because Low Power Idle is defined as a case of IDLE, the same rules described in 48.2.4.2.3 still apply. This can be made clearer to the reader.

Add the following sentence at the end of the paragraph on line 38 of page 128:  
Clock compensation may be performed during Low Power Idle according to the rules described in 48.2.4.2.3.

---

<table>
<thead>
<tr>
<th>Cl 48</th>
<th>SC 48.2.6.1.2</th>
<th>P L</th>
<th>47</th>
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<tr>
<td>Brown, Matt</td>
<td>AMCC</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

**Comment Type:** ER  
**Comment Status:** D  
**This is not an "alias". ||LPIDLE|| is not the same as ||I||.**

**Suggested Remedy:**  
Modify the definition of ||LPIDLE|| to ...

"Low power idle ordered sets are a special case of Idle ordered sets (||I||) transmitted during low power idle mode as described in 48.2.4.2."  

Alternately, make changes suggested for 48.2.4.2 and delete this definition altogether.

**Proposed Response**  
**Response Status:** W  
PROPOSED ACCEPT IN PRINCIPLE.

See resolution to comment #54.
Cl 48  SC 48.2.6.1.3  P 129  L 17  # 59
Brown, Matt  AMCC

Comment Type  T  Comment Status  D

Comment: Need text to indicate the significance of rx_quiet.

Suggested Remedy
Add the following sentence...
When this variable is TRUE it indicates that receive PCS and PMD may power-down non-essential functions.

Response Status  W
Proposed Response  PROPOSED ACCEPT.

Cl 48  SC 48.2.6.1.3  P 129  L 20  # 60
Brown, Matt  AMCC

Comment Type  T  Comment Status  D

Comment: Need text to indicate the significance of tx_quiet.

Suggested Remedy
Add the following sentence...
When this variable is TRUE it indicates that transmit PCS and PMD may power-down non-essential functions.

Response Status  W
Proposed Response  PROPOSED ACCEPT.

Cl 48  SC 48.2.6.1.3  P 129  L 6  # 55
Brown, Matt  AMCC

Comment Type  T  Comment Status  D

Comment: deskew_align_status is the same as align_status used to be not as it is. Need to adopt old align_status definition for deskew_align_status and re-define align_status.

Suggested Remedy
Delete current definition of deskew_align_status.

Pull in definition from 802.3-2008 for align status and rename from "align_status" to "deskew_align_status":
deskew_align_status
A parameter set by the PCS Deskew process to reflect the status of the ane-to-lane code-group alignment.
Values:
FAIL; The deskew process is not complete.
OK; All lanes are synchronized and aligned.

Re-define align status as follows ...
align_status
Variable equivalent to deskew_align_status when not in LPI mode. During LPI mode align_status is overridden by the LPI receive state machine as specified in Table 48-9.

Response Status  W
Proposed Response  PROPOSED REJECT.

The definitions, as written, are adequate.

Cl 48  SC 48.2.6.1.5  P 129  L 25  # 21
Pillai, Velu  Broadcom

Comment Type  ER  Comment Status  D

Comment: LPI_fail_timer is not needed anymore.

Suggested Remedy
Remove the timer.

Response Status  W
Proposed Response  PROPOSED ACCEPT.
IEEE P802.3az D1.4 Energy Efficient Ethernet comments

Proposed responses

Cl 48 SC 48.2.6.1.5 P 129 L 26 # 61
Brown, Matt AMCC

Comment Type T Comment Status D
LPI_fail_timer is no longer used in this section.

SuggestedRemedy
Delete LPI_fail_timer and description.

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 48 SC 48.2.6.1.5 P 129 L 29 # 22
Pillai, Velu Broadcom

Comment Type ER Comment Status D
Rx_deact_timer is no longer used

SuggestedRemedy
Remove the timer

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 48 SC 48.2.6.1.5 P 129 L 31 # 62
Brown, Matt AMCC

Comment Type T Comment Status D
rx_deact_time is no longer used in this section.

SuggestedRemedy
Delete rx_deact_timer and description.

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 48 SC 48.2.6.1.5 P 130 L 3 # 63
Brown, Matt AMCC

Comment Type T Comment Status D
The tx_tq_timer is part of the PCS LPI transmit state machine not PMD receiver.

SuggestedRemedy
Change "PMD's receiver enters the TX_QUIET state" to "LPI transmit state machine enters the TX_QUIET state".

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

The same typo is in the definitions for tx_ts_timer, tx_lq_timer, and tx_tr_timer. Change the 3 instances of "receiver" to "transmitter."
The tx_tr_timer is part of the PCS LPI transmit state machine not PMD receiver.

Suggested Remedy
Change "PMD's receiver enters the TX_REFRESH state" to "LPI transmit state machine enters the TX_REFRESH state".

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #63

PMD_RXQUIET.request(rx_quiet) description not correct.

Suggested Remedy
Delete current description and replace with the following:
"A boolean signal sent by the PCS to the PMD to indicate, when the value is TRUE that the PMD may power down non-essential functions. The value of PMD_RXQUIET.request(tx_quiet) is equal to the rx_quiet variable as set in the LPI receive state machine."

Proposed Response
PROPOSED REJECT.

The current definition is adequate.

PMD_TXQUIET.request(tx_quiet) description not correct.

Suggested Remedy
Delete current description and replace with the following:
"A boolean signal sent by the PCS to the PMD to indicate when the value is TRUE that the PMD must disable the driver output and may power down non-essential functions. The value of PMD_TXQUIET.request(tx_quiet) is equal to the rx_quiet variable as set in the LPI receive state machine."

Proposed Response
PROPOSED REJECT.

The current definition is adequate.

In the notes at the bottom of Figure 48-6...
/D20.5/ is replaced in one row not column.

Suggested Remedy
Replace "one column is replaced" with "one row is replaced".

Proposed Response
PROPOSED ACCEPT.

Redundant and out of style to equate variable to Boolean value.

Suggested Remedy
Change "reset=TRUE" to "reset"

Proposed Response
PROPOSED ACCEPT.
Comment Type: T  Comment Status: D

The "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH are all invalid because they would cause the timers to keep restarting (even if they didn't, they would be redundant since the state machine remains in the state unless an exit is valid.

Suggested Remedy
Delete the "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH.

Proposed Response: Response Status: W
PROPOSED ACCEPT.

Comment Type: T  Comment Status: D

In the LPI receiver state diagram in Figure 48-3, the exit criteria from RX_WTF and RX_WAKE required detection of either ||LPIDLE|| or ||IDLE||. For the latter, the length of the wake sequence is not enforced by the PCS but rather depends upon the layer above to give the correct value. This layer may be on another device so compliance may not be easy to guarantee.

Suggested Remedy
Make the following changes to the LPI transmit state machine.
Create new timer "tx_wake_timer" with terminal count equal to required wake time TWR.
In TX_REFRESH state add the action "Start tx_wake_timer".
Change the criteria for transition from TX_REFRESH to TX_ACTIVE to "TX != LPIDLE * tx_wake_timer_done".

Proposed Response: Response Status: W
PROPOSED REJECT.

This change will require some discussion amongst interested parties and does not weigh on the "technical completeness" of the draft.

The commenter is urged to resubmit the comment during the Working Group ballot phase.

Cl 48  SC 48.2.6.2.5  P 135  L 10  # 70
Brown, Matt  AMCC

Comment Type: TR  Comment Status: D

In Figure 48-9b, it is possible to be stuck in RX_SLEEP state if the link partner driver continues to send anything other than ||IDLE|| and does not disable its output.

Suggested Remedy
Create new timer rx_ts_timer with terminal time TSLRX slightly larger than TSL.
Define new timer in 48.2.6.1.5 as follows: "This timer is started when the LPI receive state machine enters the RX_SLEEP state. The timer terminal counter is set to TSLRX. When the timer reach the terminal count it will set rx_ts_timer_done = TRUE."
Add action to RX_SLEEP state "Start rx_ts_timer".
Add transition to RX_LINK_FAIL state with criteria "rx_ts_timer_done".

Proposed Response: Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

A new timer is unnecessary.

In state RX_SLEEP, add action "start rx_tq_timer"
Add a transition from RX_SLEEP to RX_LINK_FAIL "rx_tq_timer_done"
In Figure 48-9b, there are two instances of ||IDLE|| where the right-hand bars appear to be "II" (two "I's") not "||" (two bars).

**Suggested Remedy**
Replace IIIDLE|| with ||IDLE||.

**PROPOSED ACCEPT.**

In Figure 48-9b, the transition from RX_WAKE to RX QUIET when signal_detect=FAIL could be an endless loop in realistic failure conditions such as link partner driver soft failing where the signal level on the link is sporadic. The problem is caused by the timer being continually reset.

**Suggested Remedy**

The suggested remedy is to create a new state that prevents the timer from being reset every time a false wake or refresh is detected.

Create a new state between RX_SLEEP and RX QUIET.
Call the new state RX QUIET INIT (or other suitable name).
The transition criteria from RX_SLEEP to RX QUIET INIT will be "signal_detect=FAIL".
Within RX QUIET INIT state include the following action:
"Start rx_tw_timer"
The transition criteria from "RX QUIET INIT to "RX QUIET" is UCT (unconditional transition).
In RX QUIET state delete Start rx_tq_timer. (This is the key to letting the timer run.)

As a result, regardless of how many transitions occur between RX QUIET and RX_WAKE or RX WTF due to sporadic energy, the rx_tq_timer will time out and an fault will be detected.

**Proposed Response**

**PROPOSED REJECT.**

The proposed remedy will not support refresh cycles. The quiet / refresh / quiet / refresh sequence could indeed look like a sporadically failing transmitter but a remedy for such a failing would need to be carefully thought out.

The commenter is invited to submit comments against this during Working Group ballot.

**TDA defined in Table 48-10 is no longer used.**

**Suggested Remedy**

Delete row defining TDA.

**PROPOSED ACCEPT.**
<table>
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<th>SC</th>
<th>Subclause</th>
<th>Page</th>
<th>Line</th>
<th>Comment Type</th>
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<tr>
<td>48</td>
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<td>48.2.6.2.5</td>
<td>136</td>
<td>8</td>
<td>T</td>
<td>D</td>
<td>Replace TUL definition with &quot;Local refresh time from signal enable to signal disable.&quot;</td>
<td>W</td>
<td>PROPOSED ACCEPT.</td>
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<td>D</td>
<td>IIIDLE needs to be</td>
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<td>48</td>
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<td>Fig 48-9b</td>
<td>135</td>
<td>5</td>
<td>TR</td>
<td>D</td>
<td>RX_ACTIVE state should set rx_quiet &lt;= FALSE</td>
<td>W</td>
<td>PROPOSED ACCEPT.</td>
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Comment Type: T/technical, ER/editorial, TR/technical required, ER/editorial required, GR/general required
Comment Status: D/dispatched, A/accepted, R/rejected
Response Status: O/open, W/written, C/closed, U/unsatisfied, Z/withdrawn
Sort Order: Clause, Subclause, page, line
Transition out of RX_ACTIVE back to itself has a condition align_status!=deskew_align_status. But align_status latches deskew_align_status inside RX_ACTIVE. Hence this transition condition is meaningless.

Suggested Remedy
Instead of the above, please use deskew_align_status = FAIL

Proposed Response
Align_status only latches deskew_align_status on entry to RX_ACTIVE. Using "align_status!= deskew_align_status" ensures that any change will cause it to cycle around (allowing all changes in deskew_align_status to be reflected in align_status).

Arc from RX_WTF to RX_ACTIVE should be ![||LPIDLE||] instead of ![||IDLE||]. Any recovery from RX_WTF is not guaranteed to be receiving idle codewords.

Suggested Remedy
The signal is, indeed, called energy_detect - see 51.8a.1 for definition.

Proposed Response

rx_block_lock is not accurate. rx_block_lock is equal to what was block-lock and block_lock depends on receive LPI state.

Suggested Remedy
Replace rx_block_lock definition with the current block_lock definition:
"Boolean variable that is set true when receiver acquires block delineation."
Re-define block_lock as follows:
"Boolean variable is set true when receiver acquires block delineation when receive LPI mode is not active and set based on the LPI receive state machine when receive LPI mode is active."

The definition is adequate as it is.
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<th>Suggested Remedy</th>
<th>Proposed Response</th>
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<tr>
<td>T</td>
<td>D</td>
<td>Replace definition for energy_detect with ...</td>
<td>PROPOSED REJECT.</td>
<td>W</td>
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<tr>
<td>ER</td>
<td>D</td>
<td>Clarify rx_quiet definition.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
<tr>
<td>T</td>
<td>D</td>
<td>Clarify scrambler_reset definition.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
<tr>
<td>ER</td>
<td>D</td>
<td>Change &quot;registers of the scrambler&quot; to &quot;bits of the scrambler delay line&quot;.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
<tr>
<td>T</td>
<td>D</td>
<td>Clarify scrambler_reset definition.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
<tr>
<td>ER</td>
<td>D</td>
<td>Replace &quot;LI type is a special case of the C type where&quot; with &quot;LI type is supported where&quot;.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
<tr>
<td>ER</td>
<td>D</td>
<td>Replace &quot;LI type is a special case of the C type where&quot; with &quot;LI type is supported where&quot;.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
</tr>
</tbody>
</table>
Cl  49  SC  49.2.13.2.5  P 145  L 22  # 28

Pillai, Velu  Broadcom

Comment Type  TR  Comment Status  D
During the adhoc/meetings, the decision was to have the wake timer to be for 1ms. But in the draft is point to TWR , which is only 11-12uSec (13-14uSec if FEC is ON). The purpose of this timer is to give the receiver a chance to gracefully recover from a wake time fault.

SuggestedRemedy
Add a row to Table 49-3 for Twtf and assign 1ms. In fact replace the TDA row for this.

Proposed Response  Response Status  W
PROPOSED ACCEPT IN PRINCIPLE.

Change definition of rx_wf_timer:
"The timer terminal count is set to Twr" to "The timer terminal count is set to Twtf"

Replace last row of Table 49-3 with:

Twtf  Wake time fault recovery time  1mS

Cl  49  SC  49.2.13.2.5  P 145  L 7  # 26

Pillai, Velu  Broadcom

Comment Type  ER  Comment Status  D
Rx_deact timer is no longer used

SuggestedRemedy
Remove it

Proposed Response  Response Status  W
PROPOSED ACCEPT.

Cl  49  SC  49.2.13.3  P 147  L 4  # 61

Brown, Matt  AMCC

Comment Type  ER  Comment Status  D
Incorrect use of /LI/.

SuggestedRemedy
In RX_LI state replace /LI/ with LI.

Proposed Response  Response Status  W
PROPOSED ACCEPT.

Cl  49  SC  49.2.13.3.1  P 148  L 20  # 45

Barrass, Hugh  Cisco

Comment Type  T  Comment Status  D
The "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH are all invalid because they would cause the timers to keep restarting (even if they didn't, they would be redundant since the state machine remains in the state unless an exit is valid.

SuggestedRemedy
Delete the "loop" transitions for states TX_SLEEP, TX_QUIET and TX_REFRESH.

Proposed Response  Response Status  W
PROPOSED ACCEPT.

Cl  49  SC  49.2.13.3.1  P 148  L 5  # 92

Brown, Matt  AMCC

Comment Type  ER  Comment Status  D
Redundant and out of style to equate variable to Boolean value.

SuggestedRemedy
Change "reset=TRUE" to "reset"

Proposed Response  Response Status  W
PROPOSED ACCEPT.

Type: TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general
Comment Status: D/dispatched  A/accepted  R/rejected  RESPONSE STATUS: O/open  W/written  C/closed  U/unsatisfied  Z/withdrawn
Sort Order: Clause, Subclause, page, line
In Figure 49.17, the transition from RX_ACTIVE state to itself the the criteria logic doesn't seem correct.

**Suggested Remedy**

Change criteria to the following (changing OR to AND)

"R_TYPE(rx_coded) != LI * align_status != deskew_align_status"

**Proposed Response**

Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Using the same reasoning as for comment #70:

Change criteria to "align_status != deskew_align_status"

---

The transition from RX_WAKE and RX_WTF to RX_QUIET when !energy_detect could be an endless loop in realistic failure conditions such as link partner driver soft failing where the signal level on the link is sporadic or taps at wrong value. The problem is caused by the timer being continually reset.

**Suggested Remedy**

The suggested remedy is to create a new state that prevents the timer from being reset every time a false wake or refresh is detected.

Create a new state between RX_SLEEP and RX_QUIET.

Call the new state RX_QUIET_INIT (or other suitable name). The transition criteria from RX_SLEEP to RX_QUIET_INIT will be "signal_detect=fail".

Within RX_QUIET_INIT state include the following action:

"Start rx_tw_timer"

The transition criteria from "RX_QUIET_INIT to "RX_QUIET" is UCT (unconditional transition).

In RX_QUIET state delete Start rx_tq_timer. (This is the key to letting the timer run.)

As a result, regardless of how many transitions occur between RX_QUIET and RX_WAKE or RX_WTF due to sporadic energy, the rx_tq_timer will time out and a fault will be detected.

**Proposed Response**

Response Status **W**

PROPOSED REJECT.

The proposed remedy will not support refresh cycles. The quiet / refresh / quiet / refresh sequence could indeed look like a sporadically failing transmitter but a remedy for such a failing would need to be carefully thought out.

The commenter is invited to submit comments against this during Working Group ballot.
Redundant and out of style to equate variable to Boolean value.

**Suggested Remedy**
- Replace all instances of "energy_detect=false" with "!energy_detect".
- Replace all instances of "energy_detect=true" with "energy_detect".
- Replace "reset=TRUE" with "reset".

**Proposed Response**  
**Response Status** W  
PROPOSED ACCEPT.

---

In Figure 49-17, need to initialize rx_quiet variable.

**Suggested Remedy**
- In RX_ACTIVE state add line...
  "rx_quiet <= FALSE"

**Proposed Response**  
**Response Status** W  
PROPOSED ACCEPT.

---

It doesn't make sense that the refresh time is longer than the time that the receiver is allowed to recover a wake signal. This also poses problems for the receive LPI state machine.

**Suggested Remedy**
- Change T(ul) to 11uS

**Proposed Response**  
**Response Status** W  
PROPOSED ACCEPT.
Brown, Matt

**Comment Type** ER
**Comment Status** D

Clariy sentence.

**Suggested Remedy**
Replace "idle control code 0x00 is replaced with 0x07" with "low power idle control character /LI/ (0x07) is sent continuously in place of /I/.

**Proposed Response**

PROPOSED ACCEPT.

---

Brown, Matt

**Comment Type** ER
**Comment Status** D

Clarify sentence.

**Suggested Remedy**

PROPOSED ACCEPT.

---

Pillai, Velu Broadcom

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

Transition out of RX_ACTIVE back to itself has a condition block_lock != rx_block_lock. But block_lock latches rx_block_lock inside RX_ACTIVE. Hence this transition condition is meaning less.

**Suggested Remedy**

Instead of the above, please use rx_block_lock = FAIL

**Proposed Response**

PROPOSED REJECT.

Block_lock only latches rx_block_lock on entry to RX_ACTIVE. Using "block_lock != rx_block_lock" ensures that any change will cause it to cycle around (allowing all changes in rx_block_lock to be reflected in block_lock).

---

Pillai, Velu Broadcom

**Comment Type** ER
**Comment Status** D

Transition from RX_SLEEP to RX_ACTIVE needs be R_TYPE(rx_coded) = IDLE and not R_TYPE(rx_coded) != LI. When Transmitter deactivates, received codewords may not be LI.

**Suggested Remedy**

PROPOSED ACCEPT.

---

Brown, Matt

**Comment Type** ER
**Comment Status** D

Clarify sentence.

**Suggested Remedy**

PROPOSED ACCEPT.
LPI TX state diagram designed only to go through scrambler reset only during WAKE. Hence during refresh the PCS will not detect codewords, if FEC is ON. Which means the receiver will not take the arc from RX_WAKE to RX_QUIET shown in LPI receive state diagram. The refresh time for KR PHY is 17usec and rx_tw_timer timeout is 13-14usec, hence it is guaranteed that rx_tw_timer_done will be asserted during every refresh cycle.

Suggested Remedy
A state is needed between RX_WAKE and RX_WTF when rx_tw_timer_done is asserted. This new state (RX_REFRESH_WITH_FEC), should set Start rx_wf_timer and the transition out of it needs to be
1. An arc to RX_QUITE for energy_detect = false.
2. And arc to RX_WTF for rx_rwt_timer_done + (R_TYPE(rx_coded != LI * rx_block_lock).

Remove the arc going from RX_WTF to RX_SLEEP and also to RX_QUIET. Remove setting Start rx_wf_timer.

This problem is fixed by reducing the refresh time (see comment #44)

Value of Twl is 17 us. This was the original value, before the proposal to use scrambler reset to handle FEC. And this value is also more than the total T wake sys.

Reduce this value to 12usec.

There is a row for Tda. But there is no debounce state, hence no need for this timer value

Remove the entire row

PROPOSED ACCEPT.

PROPOSED ACCEPT.
Both Clause 55 and Clause 49 share a common block encoder (64B/65B and 64B/66B). However the changes made for /LI/ are different between Clause 49 and 55. The control code for Clause 49 is 0x07 while the control code for Clause 55 is 0x06. These clauses should maintain commonality as much as possible.

Suggested Remedy
Change the control code for /LI/ in Clause 55 to 0x07. Also make the associated changes to R_BLOCK_TYPE LI and T_BLOCK_TYPE LI.

PROPOSED ACCEPT.

A new T_BLOCK_TYPE and R_BLOCK_TYPE of LI has been introduced for use in Figure 55-15a and Figure 55-16a. However the control code listed as 0x07 is incorrect. The control code for an idle control character in the 64B/65B encoder is 0x00.

Suggested Remedy
Change the control code for LI from 0x07 to 0x00 on lines 3 and 32 on page 171.

PROPOSED ACCEPT IN PRINCIPLE.

The creation of the T_BLOCK_TYPE I and separation of type I from type C when low power idle is supported has broken the transmit state diagram in Figure 55-15. Transitions that only call out C will not be taken when an I block is to be transmitted. For example from state TX_C there is no transition for a type I.

Suggested Remedy
Change state machine transitions that originally included only C to include both C and I.

PROPOSED ACCEPT IN PRINCIPLE.

On page 171 I and LI are currently defined as special types of the C field, therefore C includes I.

While the specific example in the comment does not seem to be a problem, there are issues caused by this definition.

For example at the transitions from TX_WN to TX_C and to TX_E (Figure 55-15a), either transition could be taken since LI is a subtype of C in draft 1.4. The transitions from TX_C to TX_C and TX_C to TX_L on Figure 55-15 have a similar problem. Also on Figure 55-15a TX_L to TX_WN and TX_L to TX_WE are ambiguous (there are separate transitions on I and C, but I is a subtype of C).

In addition, it was noted that transitions from TX_C to TX_E caused by a single error followed by /LI/ will stall the 64B/65B Tx state machine in the error state. An extra transition from TX_E to TX_L when /LI/ is detected will be added to the diagram to fix this. A similar transition is required on the receive state diagram.

LI will be redefined as its own type, and not as a subtype of C.

The following changes will be made to the state diagrams:
1) remove LI from transition from TX_E to TX_E on Figure 55-15

Edited text (to be applied to R_BLOCK_TYPE and T_BLOCK_TYPE):
C; The vector contains a data/ctrl header of 1 and one of the following:
a) A block type field of 0x1E and eight valid control characters, none of which are /E/ and, if the low power idle function is supported, all of which are not /LI/;

I; If the optional Low Power Idle function is supported then the I type is a special case of the C type where the vector contains a data/ctrl header of 1, a block type field of 0x1e, and eight control characters of 0x00 (/I/) [see comment #117]

LI; If the optional Low Power Idle function is supported then the LI type occurs when the vector contains a data/ctrl header of 1, a block type field of 0x1e, and eight control characters of 0x06 (/LI/).

The following changes will be made to the state diagrams:
1) remove LI from transition from TX_E to TX_E on Figure 55-15
<table>
<thead>
<tr>
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<th>D</th>
<th>CL</th>
<th>SC</th>
<th>P</th>
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<tr>
<td>Brown, Matt</td>
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<td>72</td>
<td>72.7.1</td>
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2) add transition from TX_E to TX_L conditioned on /LI/ on Figure 55-15
3) change C to (C.!!) on transition from TX_L to TX_WE on Figure 55-15a
4) change C to (C.!!) on transition from TX_WN to TX_WE on Figure 55-15a
5) change C to (C.!!) on transition from TX_WN to TX_E on Figure 55-15a
6) remove LI on transition from RX_E to RX_E on Figure 55-16.
7) Add transition from RX_E to RX_L on Figure 55-16
8) Correct a typo on Figure 55-15a : tx_lpi_done=false should be tx_lpi_active=false

Also note that the E (circle) entrance to TX_E has disappeared from the diagram and will be replaced.

<table>
<thead>
<tr>
<th>Comment Type</th>
<th>TR</th>
<th>Comment Status</th>
<th>D</th>
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<td>Brown, Matt</td>
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</table>

McClellan, Brett Solarflare

The creation of the R_BLOCK_TYPE I and separation of type I from type C when low power idle is supported has broken the receive state diagram in Figure 55-16. Transitions that only call out C will not be taken when an I block is to be transmitted. For example from state RX_C there is no transition for a type I.

**Suggested Remedies**
- Change state machine transitions that originally included only C to include both C and I.

**Proposed Response**
- PROPOSED ACCEPT IN PRINCIPLE.

- See response to comment #115

- Clarification of Tx target level. No need to specify "maximum" value. Also, the values are trained not negotiated.

**Suggested Remedies**
- Replace "greater than 90% of the negotiated maximum value" with "greater than 90% of the trained peak-to-peak value."

**Proposed Response**
- PROPOSED ACCEPT.
<table>
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**Proposed Response**

**Response Status**

PROPOSED ACCEPT.

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**Proposed responses**

**IEEE P802.3az D1.4 Energy Efficient Ethernet comments**

**June 2009**

<table>
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**Comment Type**

TR

**Comment Status**

D

**Suggested Remedy**

The wording is not representative of the number of pages needed nor does it provide enough information for implementation. Suggested fix is similar to existing wording for other next pages defined in the existing annex.

**Proposed Response**

W

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**Proposed responses**

**IEEE P802.3az D1.4 Energy Efficient Ethernet comments**

**June 2009**

<table>
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**Comment Type**

TR

**Comment Status**

X

**Suggested Remedy**

LPI Client will need additional interfaces to control the Layer 2 LLDP negotiation of Transmit Tw and Receive Tw. There are cases within 802.1 AVB standards where LPI is desired but only if the negotiated transmit wait time is held to some maximum that may or may not be less than what the Ethernet implementation could otherwise support (when AVB streams are active on the link). Other upper layer technologies may have similar constraints that will be known to the LPI Client.

**Proposed Response**

O

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**Proposed responses**

**IEEE P802.3az D1.4 Energy Efficient Ethernet comments**

**June 2009**

<table>
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**Comment Type**

T

**Comment Status**

D

**Suggested Remedy**

A one second timer for LP_IDLE.request assertion was applied in Clause 22 for MII but not globally to all PHYs.

**Proposed Response**

W

PROPOSED ACCEPT.
Comment Type: E  Comment Status: D
Suggestion to simplify language and eliminate "set of link partners".

Suggested Remedy:
The transmitting side controls the data placed on the medium connecting the transmit and receive link partners and enforces Tw_sys. The transmitting link partner shall wait for the time indicated by the Transmit Tw_sys after deasserting Low Power Idle at the xxMII before sending data frames.

The receiving link partner shall be ready to accept data based on (its echoed value of the) Transmit link partner's Tw_sys. This ensures that the link partners transition out of LPI mode and receive frames without loss or corruption.

Proposed Response:  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

Text could be simplified without loss of content:
- Delete the words "Thus, ", "a set of" from the second sentence
- Delete the words "Similarly," from the third sentence

Comment Type: ER  Comment Status: D
The description on the front page is only a project description, not a draft description

Suggested Remedy:
Please expand the description to include where the draft was in the process and a result of what meeting. This sort of information has turned out to be tremendously helpful when it is necessary to go back and pull out old drafts. A macro textual description of what changes went into the particular draft is also very helpful.

Proposed Response:  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

Description will be expanded to include where the draft was in the process and the result of what meeting.

A macro textual description of what changes went into the particular draft may be too long to put into the abstract in general though this will be done if there are a few very significant changes.