

Open issues and solutions for Backplane EEE Mode

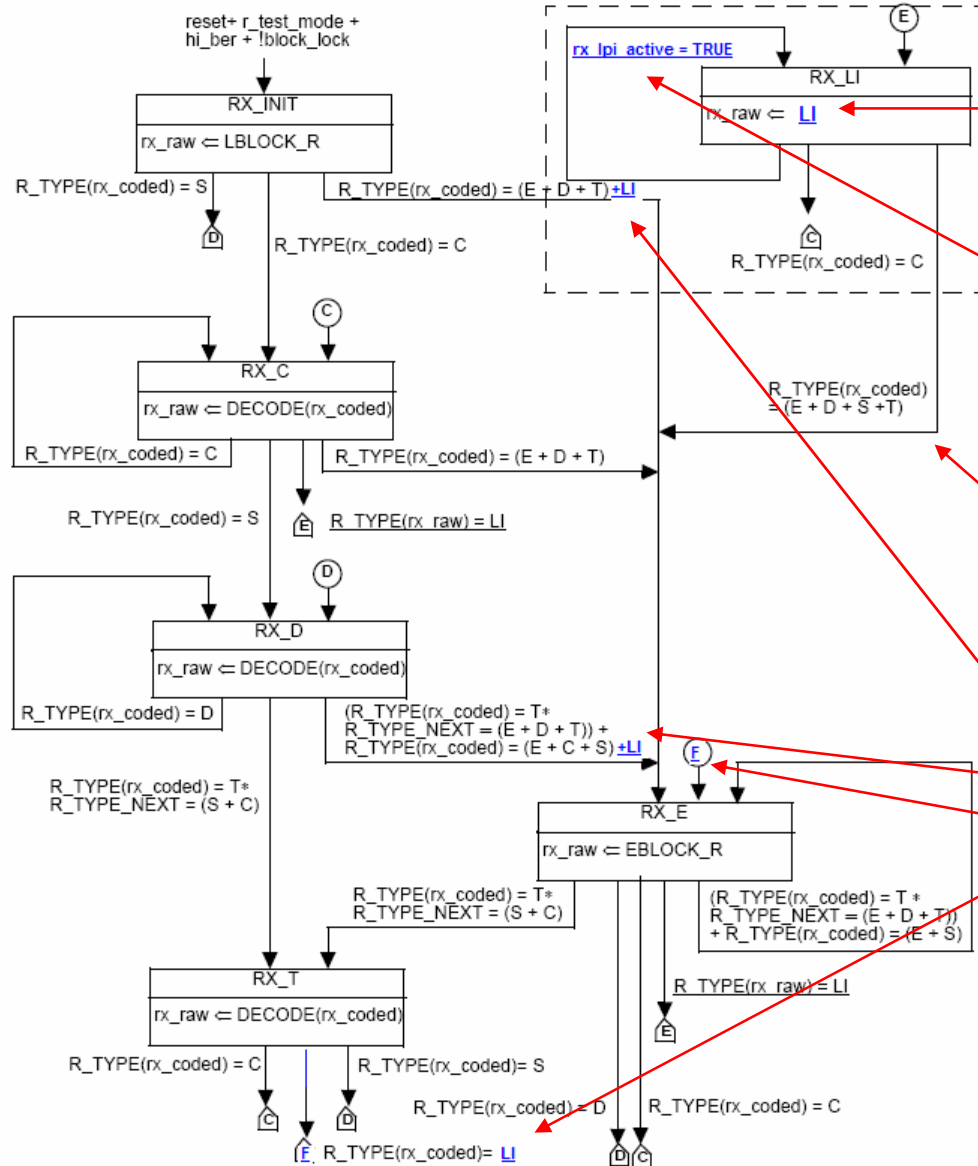
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IEEE 802.3az, Quebec, April 2009



Open issues in the backplane PCS FSM.

- During draft 1.2.1 comments resolution, there was one filed for using rx_lpi_mode in the receive PCS state diagram, but instead the resolution was to remove rx_lpi_mode variable itself.
- We still believe that it is necessary to have that variable to avoid asserting “non /LI/” to the RS layer during transitioning in and out of Quiet.
- The following set of slides discusses the open issues in the CL36, CL48 and CL49 PCS state diagrams for EEE specific states.
 - The proposed solution uses the variable rx_lpi_active. Renamed rx_lpi_mode to rx_lpi_active to be consistent with Base-T.
- The last couple of slides addresses some of the open items in the draft.

CI49 receive state diagram (Fig 49-15)



rx_raw <= LI is needed in this state to avoid asserting non LI during transitioning in and out of quiet mode.

Used "rx_lpi_active" to be consistent with 10GBASE-T state diagram. But without this

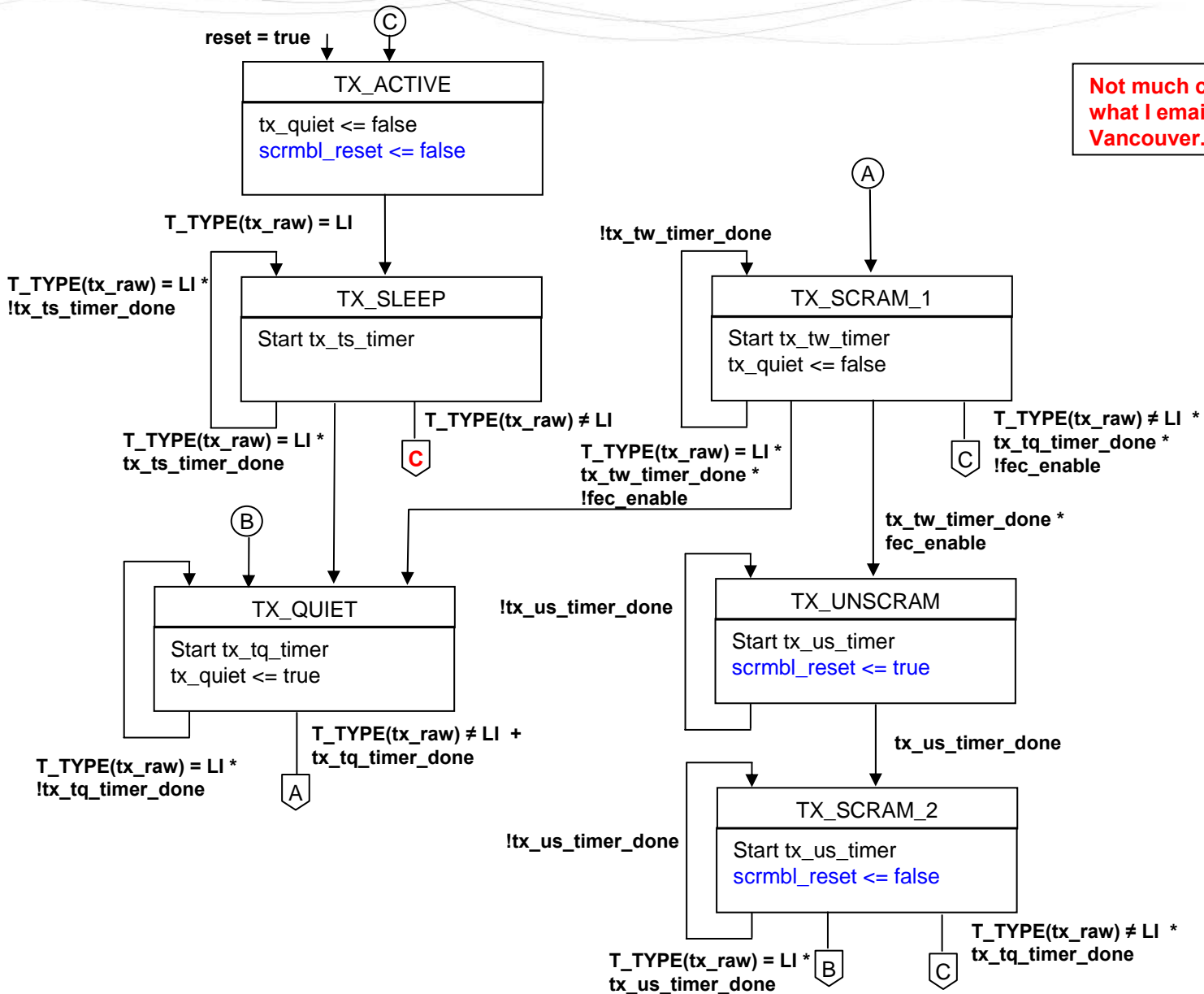
If the above two proposals are accepted, then this transition can be removed.

"F" is needed to handle LI code words appearing during non IPG states.

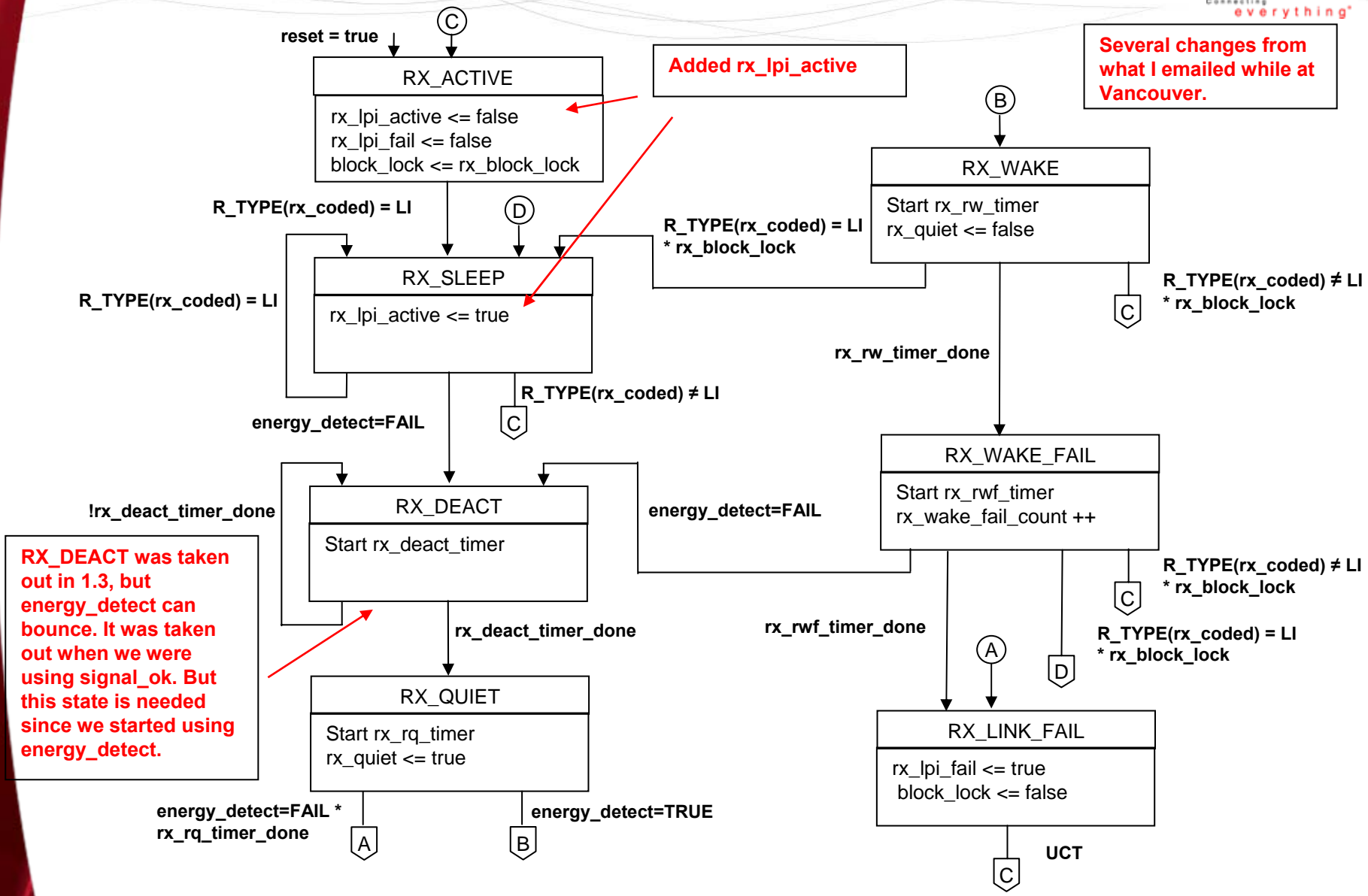
Figure 49-15—Receive state diagram

Clause 49: LPI Transmit state diagram (Fig 49-16)

Not much change from what I emailed while at Vancouver.



Clause 49: LPI Receive state diagram (Fig 49-17)



CI49 BER monitor state diagram (Fig 49-13)

When in EEE mode, block_lock is latched in CI49 Rx Ipi fsm. During transitions in and out of Quiet mode, PCS gets some garbage data which will trigger hi_ber. When hi_ber is set, 10G-R link is dropped. To avoid this freeze the BER fsm during low power mode

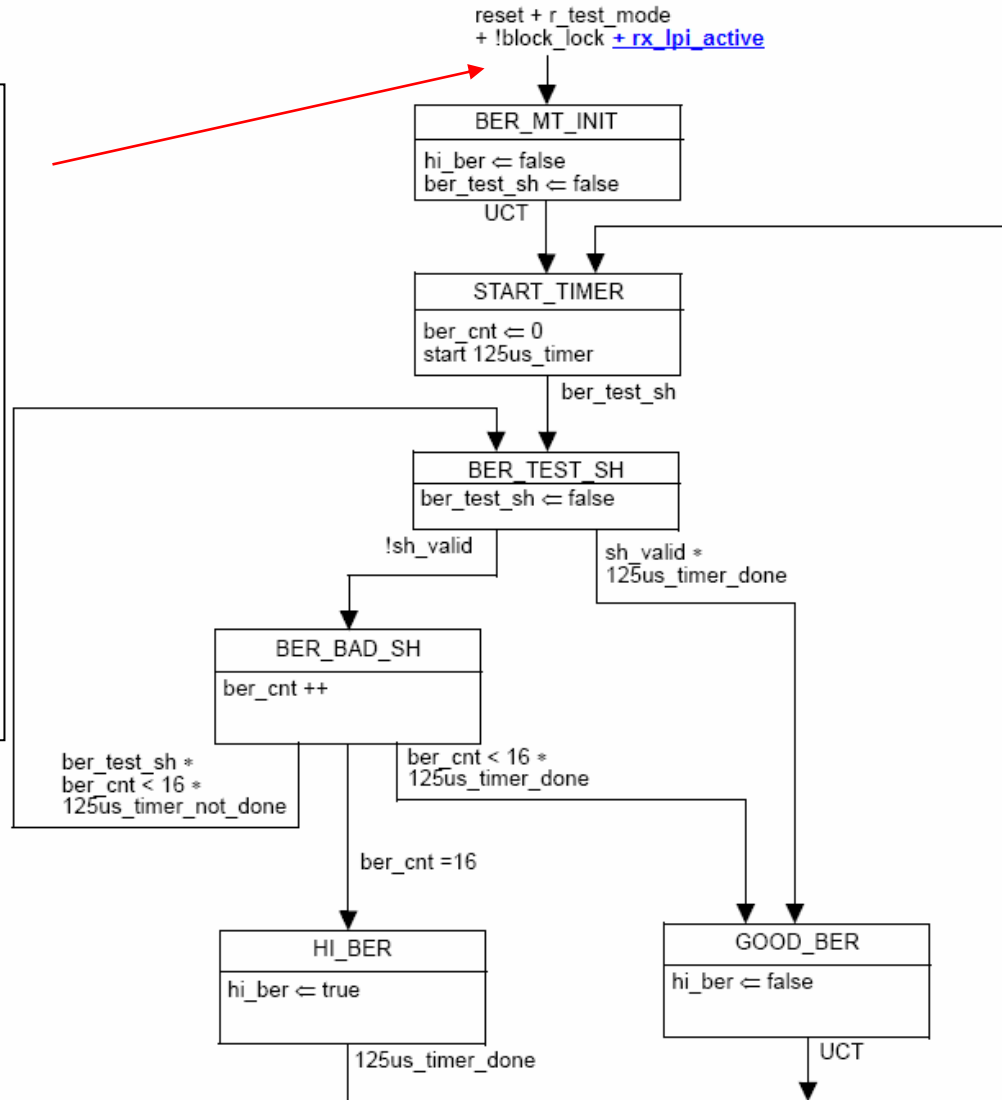


Figure 49-13—BER monitor state diagram

CL48 receive state diagram (Fig 48-9)

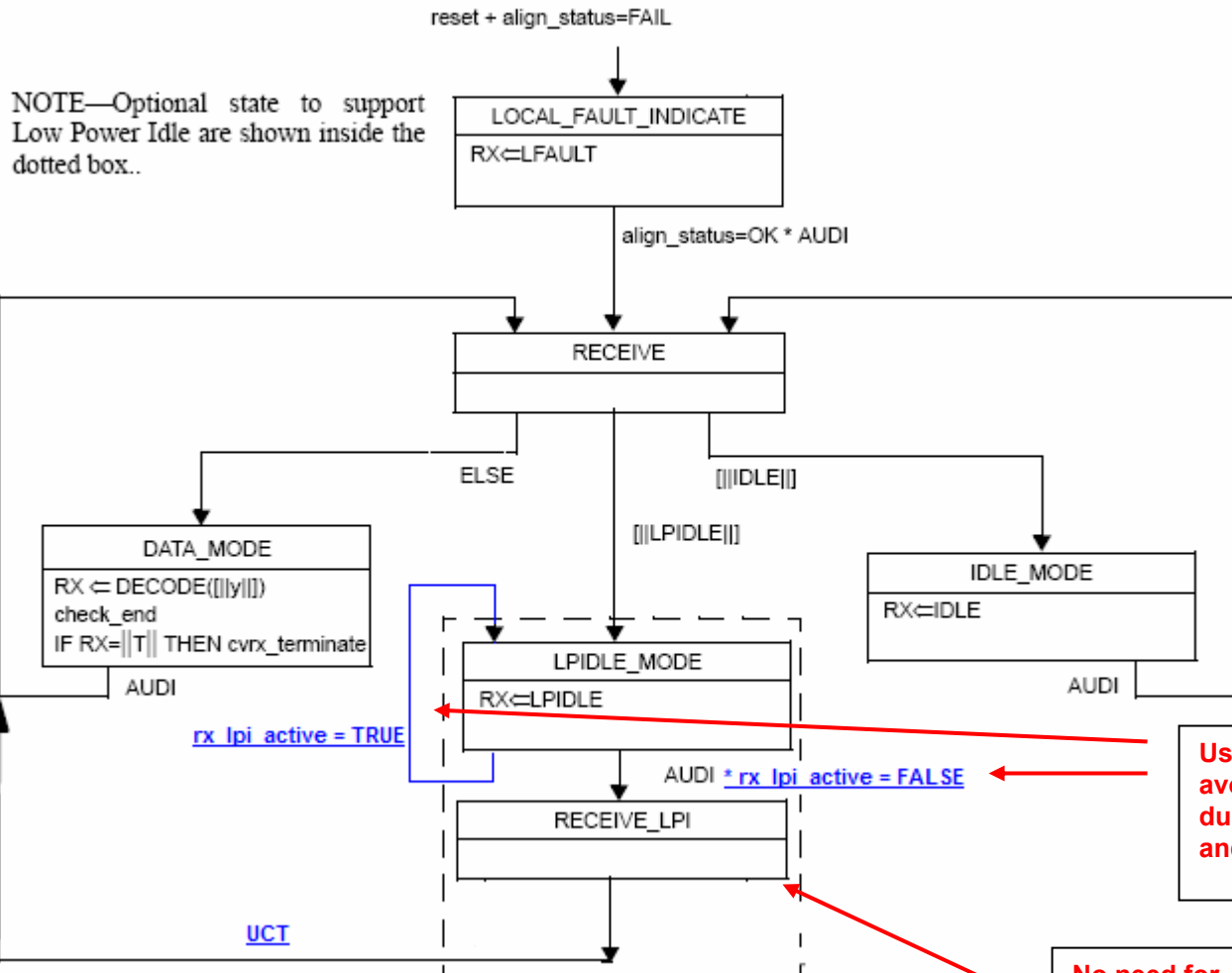


Figure 48-9—PCS receive state diagram

Used "rx_lpi_active" to avoid asserting non LI during transitioning in and out of quiet mode.

No need for "RECEVIE_LPI" state

CI48 Receive LPI state diagram (Fig 48-9b)

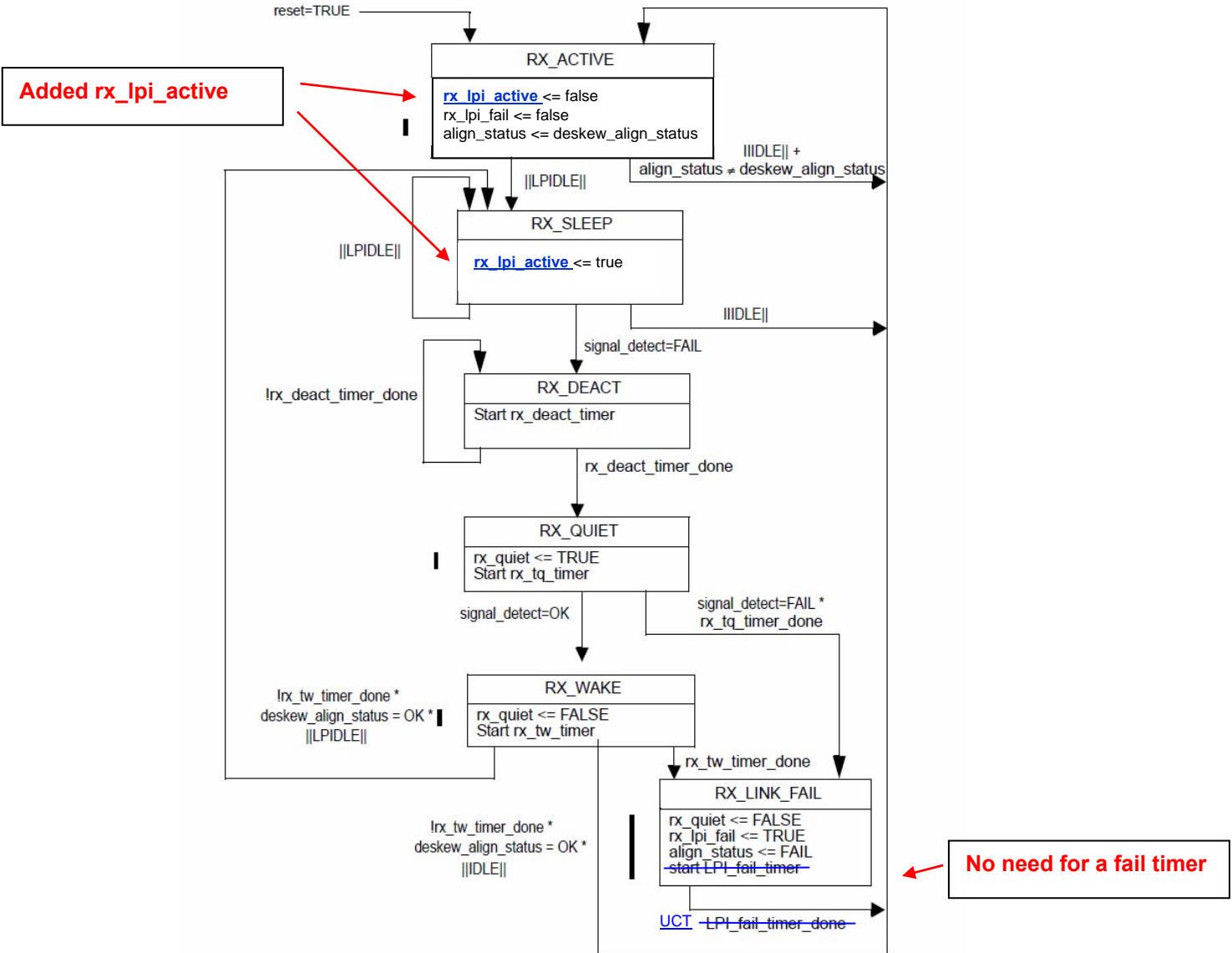
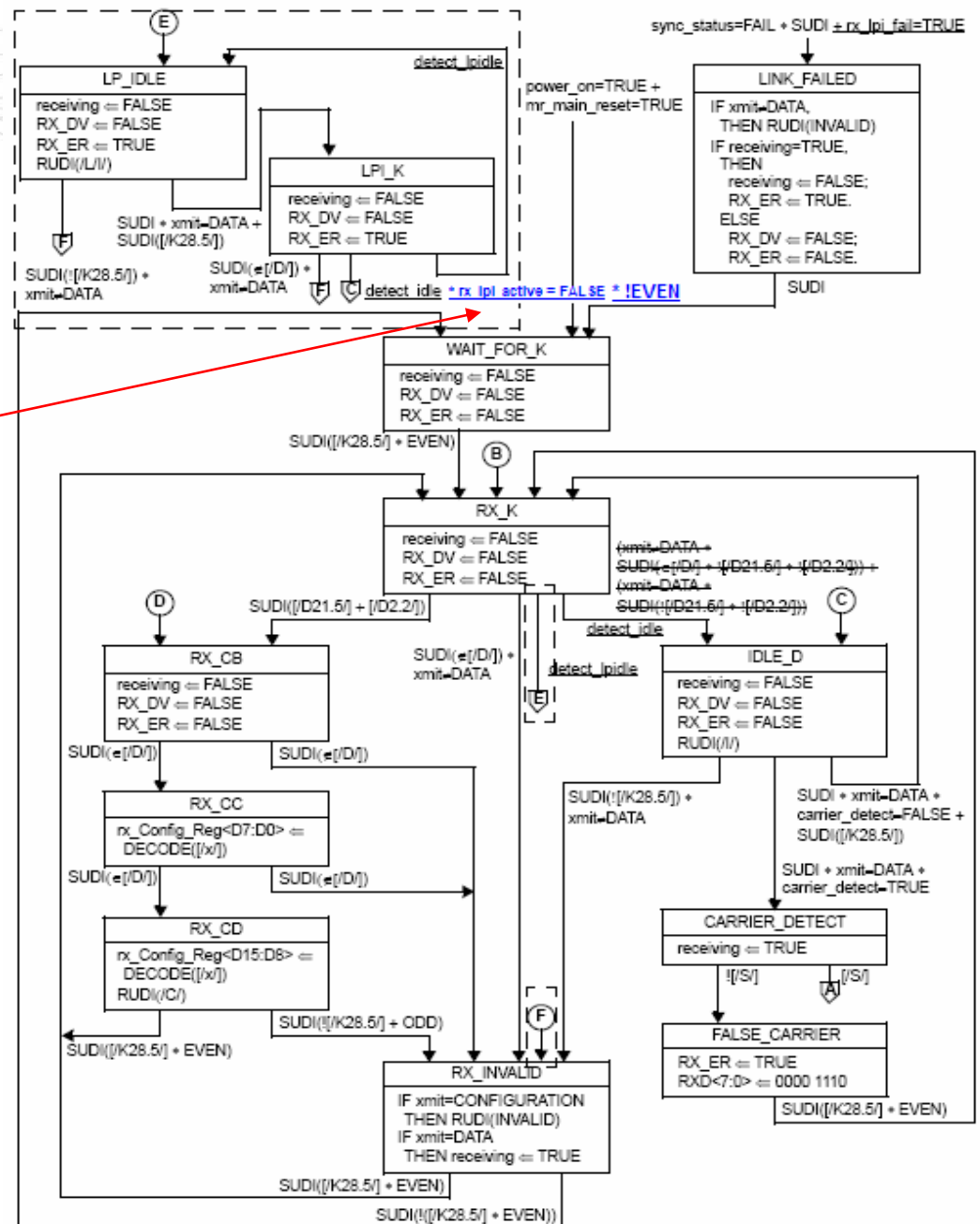


Figure 48-9b—LPI Receive state diagram

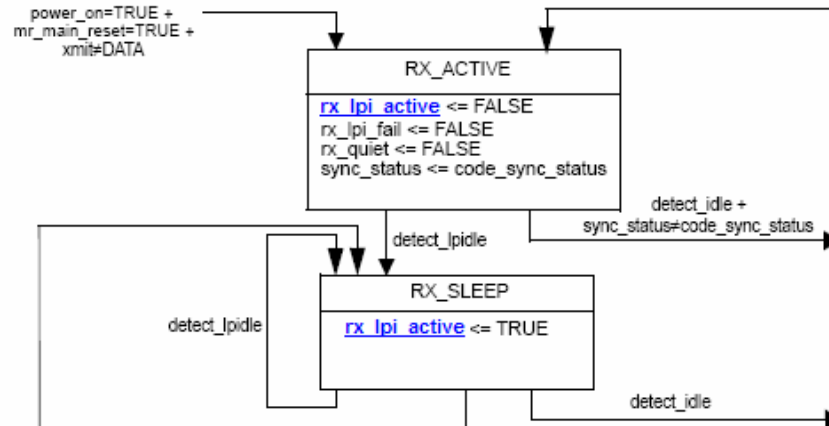
CI36 Receive state diagram (Fig36-7a)

Without "rx_lpi_active" transition from LPI_K to IDEL_D can happen in and out of quiet mode.



Change Figure 36-7a, new states and transitions in dotted boxes

CI36 Receive LPI state diagram (Fig 36-9b)



Other open items in the draft.

- **Clause: 46.3.2.4a** **Page:130** **Draft 1.2.1: Fig 46-8a**
 - RXC needs to be high during IDLE
 - This diagram should show RXC<3:0>, RXD<31:24>, RXD<23:16>, RXD<15:8>, RXD<7:0>.
 - Line 9 is not correct. RXC<3:0> is 0XF during IDLE and LPI
- **Clause: 46.3.1.5a** **Page:128** **Draft 1.2.1: Fig 46-7a**
 - TXC needs to be high during IDLE
 - This diagram should show TXC<3:0>, TXD<31:24>, TXD<23:16>, TXD<15:8>, TXD<7:0>.
 - Page 127, line 51 is not correct. TXC<3:0> is 0XF during IDLE and LPI.

Other open items in the draft.

Table 36–3b—Receiver LPI timing parameters

Parameter	Description	Min	Max	Units
T _{QR}	The time the receiver waits for signal detect while in the RX_QUIET state before asserting rx_fault	3	4	ms
T _{WR}	Time to wake remote link partner's receiver. T _{WR} is set by the remote link partner during Auto-negotiation.	10	11	μs
T _{DA}	Time to deactivate receiver to handle debounce	1	2	μs

Table 48–10—Receiver LPI timing parameters

Parameter	Description	Min	Max	Units
T _{QR}	The time the receiver waits for signal detect while in the RX_QUIET state before asserting rx_fault	3	4	ms
T _{WR}	Time to wake remote link partner's receiver. T _{WR} is set by the remote link partner during Auto-negotiation.	8	9	μs
T _{DA}	Time to deactivate receiver to handle debounce	1	2	μs

Table 49–3—Receiver LPI timing parameters

Parameter	Description	Min	Max	Units
T _{QR}	The time the receiver waits for signal detect while in the RX_QUIET state before asserting rx_fault	2	3	ms
T _{WR}	Time to wake remote link partner's receiver. T _{WR} is set by the remote link partner during Auto-negotiation.(for PHYs that set scrambler_reset_enable = FALSE)	11	12	μs
T _{WR}	Time to wake remote link partner's receiver. T _{WR} is set by the remote link partner during Auto-negotiation.(for PHYs that set scrambler_reset_enable = TRUE)	13	14	μs
T _{DA}	Time to deactivate receiver to handle debounce	1	2	μs

In all these three tables the description for T_{WR} mentions about Auto-negotiation. But T_{WR} is a fixed timer value from Draft 1.3 onwards.

Annex 73A



- Annex 73A says EEE technology messages will follow the transmission of this page with at least two unformatted next pages that contain information defined in 45.2.7.13a which amounts to 144 bits sent when there are only 6 bits of information defined.
- The 6 bits of information can be transferred as part of the message page and thus only require 48 bits of transmission.
- Add table like in Annex 28C for clarity:

													M[10:0]												
24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
								NP	ACK	MP	ACK2	T	0	0	0	0	0	0	0	0	0	0	0	Reserved for AN	
								NP	ACK	MP	ACK2	T	0	0	0	0	0	0	0	0	0	0	1	Null Message	
OUI[20:13]								NP	ACK	MP	ACK2	T	0	0	0	0	0	0	0	0	1	0	1	OUI Tagged	
								NP	ACK	MP	ACK2	T	0	0	0	0	0	0	0	0	1	1	0	PHY ID Tague Code	
		7.60.6:1						NP	ACK	MP	ACK2	T	0	0	0	0	0	0	0	1	0	1	0	0	EEE Tech
								NP	ACK	MP	ACK2	T	1	1	1	1	1	1	1	1	1	1	1	Reserved for AN	

Clause 49 - 49.2.13.2.2 Variables

- **scrambler_reset_enable**

A variable used to indicate to the transmit LPI state machine that the scrambler reset option is required.

- We need to add more text to set this variable, if the FEC is in operation. It is optional to the PHY to set it otherwise.

Clause 45 Registers for LPI bits

- LPI control and status bits are defined in Clause 45 PCS registers 3.0.x and 3.1.x for KX, KX4 and KR.
- 1000BASE-KX PCS is based on 1000BASE-X PCS that uses Clause 22 register space. Hence some of the other bits in the 3.0.x and 3.1.x registers are not valid for KX.
- The above point needs to be clarified for these registers.



Thank You