IEEE P802.3az D1.0
Clause 55 State Diagrams

Rick Tidstrom, Broadcom

Presented by: Mike Grimwood, Broadcom

IEEE P802.3az Task Force

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Overview

- The IEEE Draft P802.3az D1.0 state diagrams are not consistent with the defined Sleep/Quiet/Refresh and Wake signaling and do not address the need for synchronization between link partners for the purpose of Quiet and Refresh signal alignment.
  - See parnaby_01_1108.pdf for a proposal on link partner synchronization that establishes a fixed timing reference at the start-up PAM2/PAM16.

- To resolve these inconsistencies and in support of the PAM2/PAM16 synchronization proposal, this presentation proposes the following updated state diagrams:
  - PCS 64B/65B Transmit state diagram.
  - PCS 64B/65B Receive state diagram.
  - PCS LPI Transmit state diagram.
  - PCS LPI Receive state diagram.

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PCS 64/65B Transmit FSM Updates

- New states to be added to support Low Power Idle:
  - TX_L (Transmit Low Power Idle)
  - TX_WN (Transmit Wake Normal)
  - TX_WE (Transmit Wake Error)

- New transitions to be added to support Low Power Idle:
  - T_TYPE(tx_raw) = LI causes transition from TX_C to TX_L
  - T_TYPE(tx_raw) = LI causes transition from TX_INIT to TX_E
  - T_TYPE(tx_raw) = LI causes transition from TX_D to TX_E
  - T_TYPE(tx_raw) = LI causes transition from TX_T to TX_E
  - T_TYPE(tx_raw) = LI causes transition from TX_E to TX_E

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PCS 64/65B Transmit State Diagram Modifications

- New 64/65B control codes to support Low Power Idle.
  - T_TYPE(tx_raw) = LI for Low Power Idle
  - T_TYPE(tx_raw) = I for Normal Idle

- In the following state diagrams, the transition variable “C” normally refers to any control code. However, when a state has an exit transition conditioned on C that is parallel to any other exit transition using “LI” or “I”, then C should be considered as any control code except for LI if it is used on any other exit transition from that state AND except for I if it is used on any other exit transition from that state.

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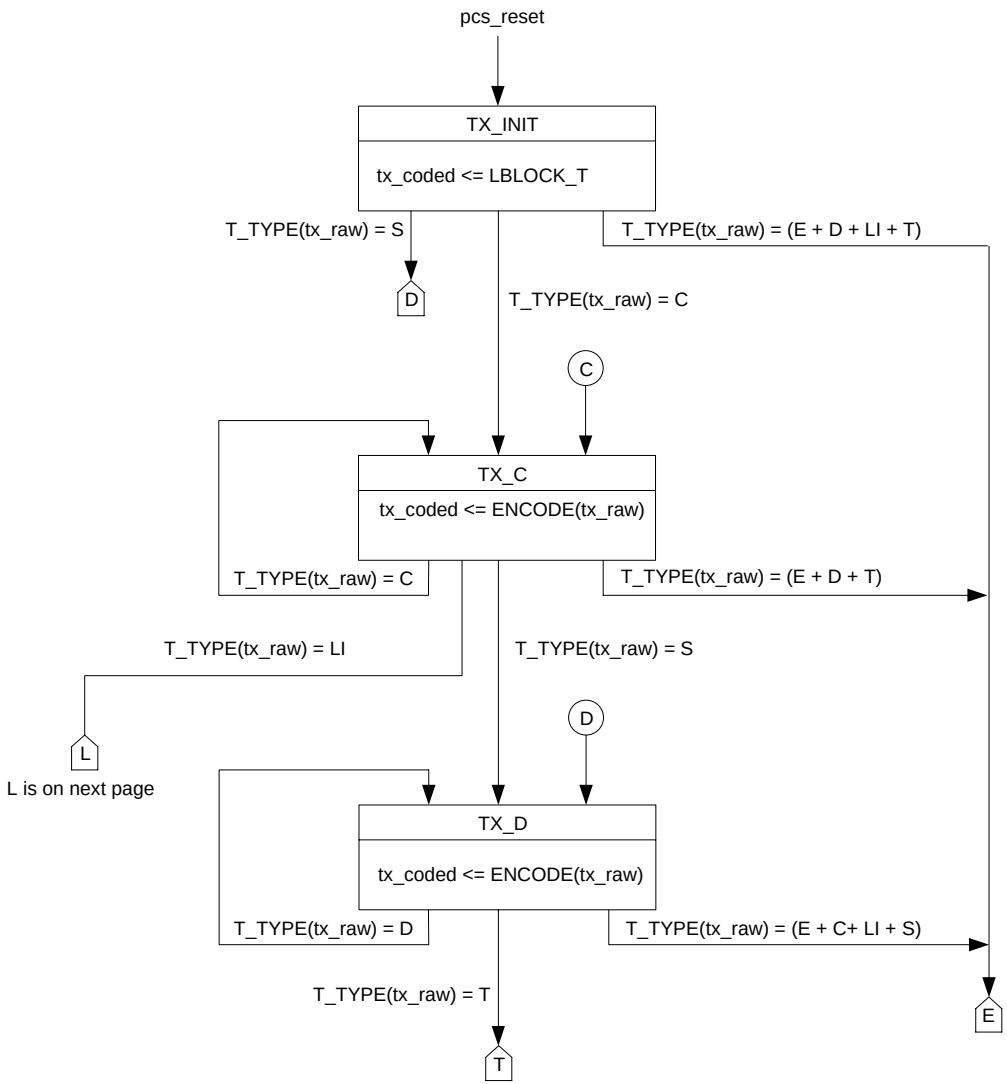
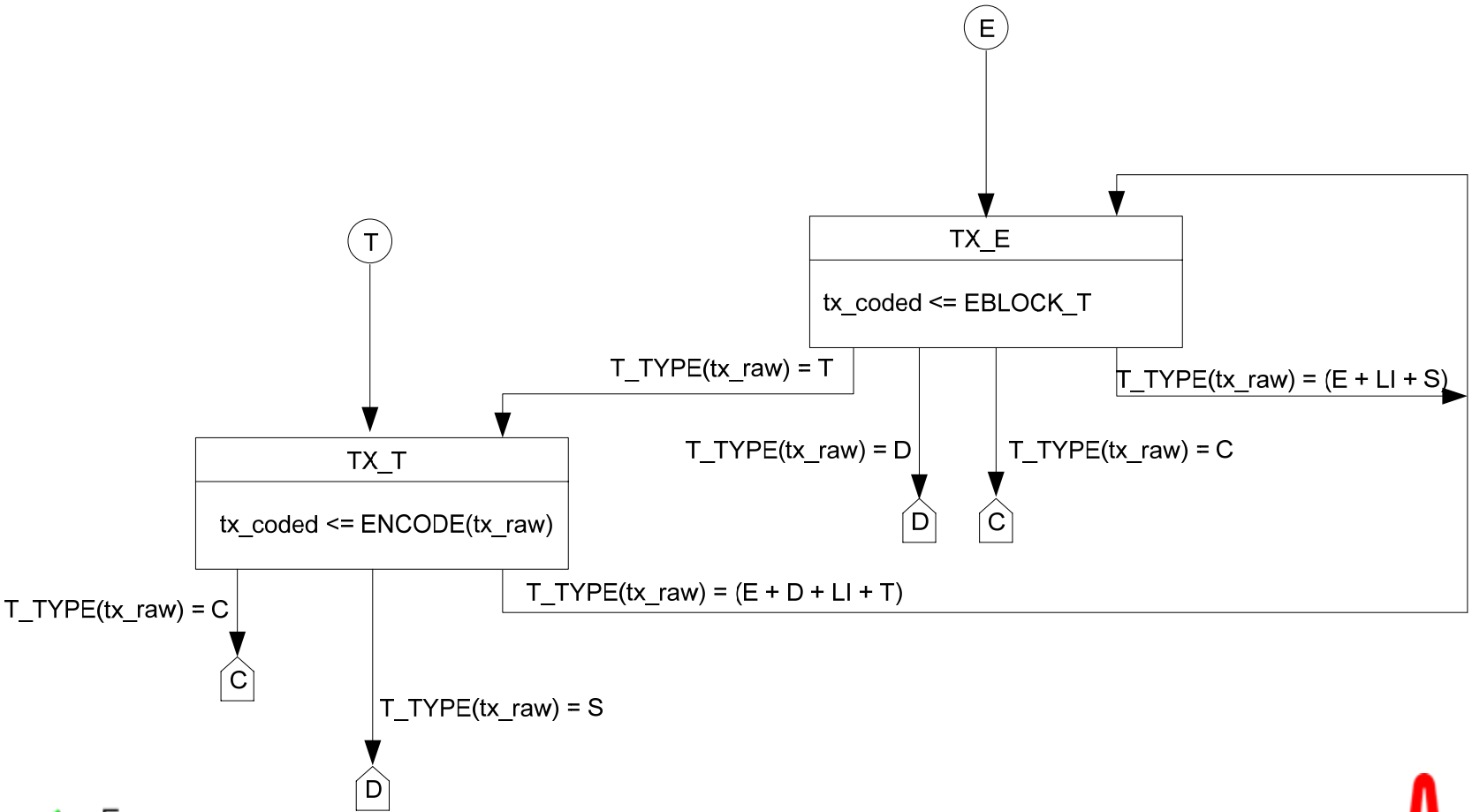
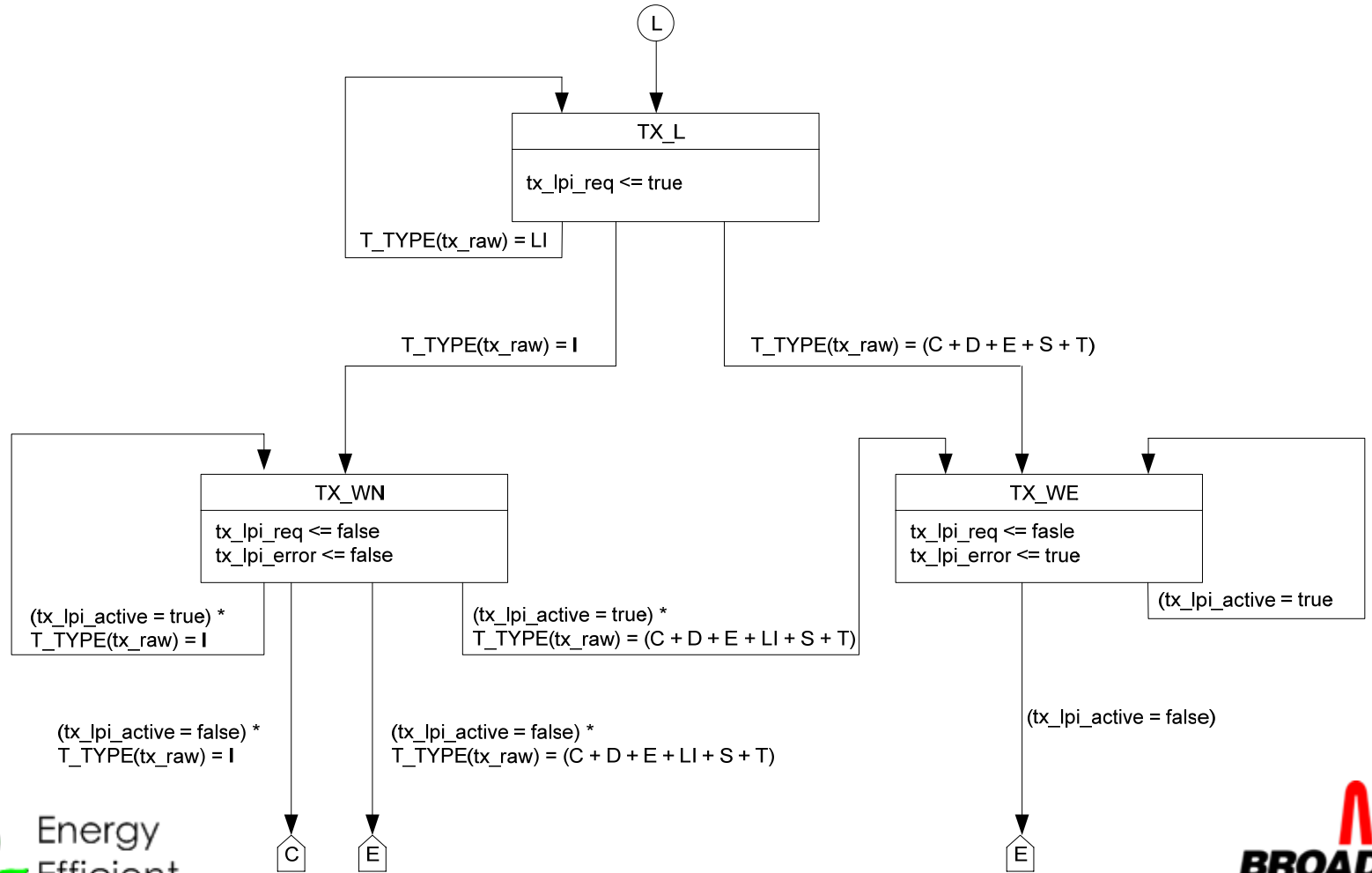
PCS 64B/65B Transmit State Diagram (1 of 3)



PCS 64B/65B Transmit State Diagram (2 of 3)



PCS 64B/65B Transmit State Diagram (3 of 3)



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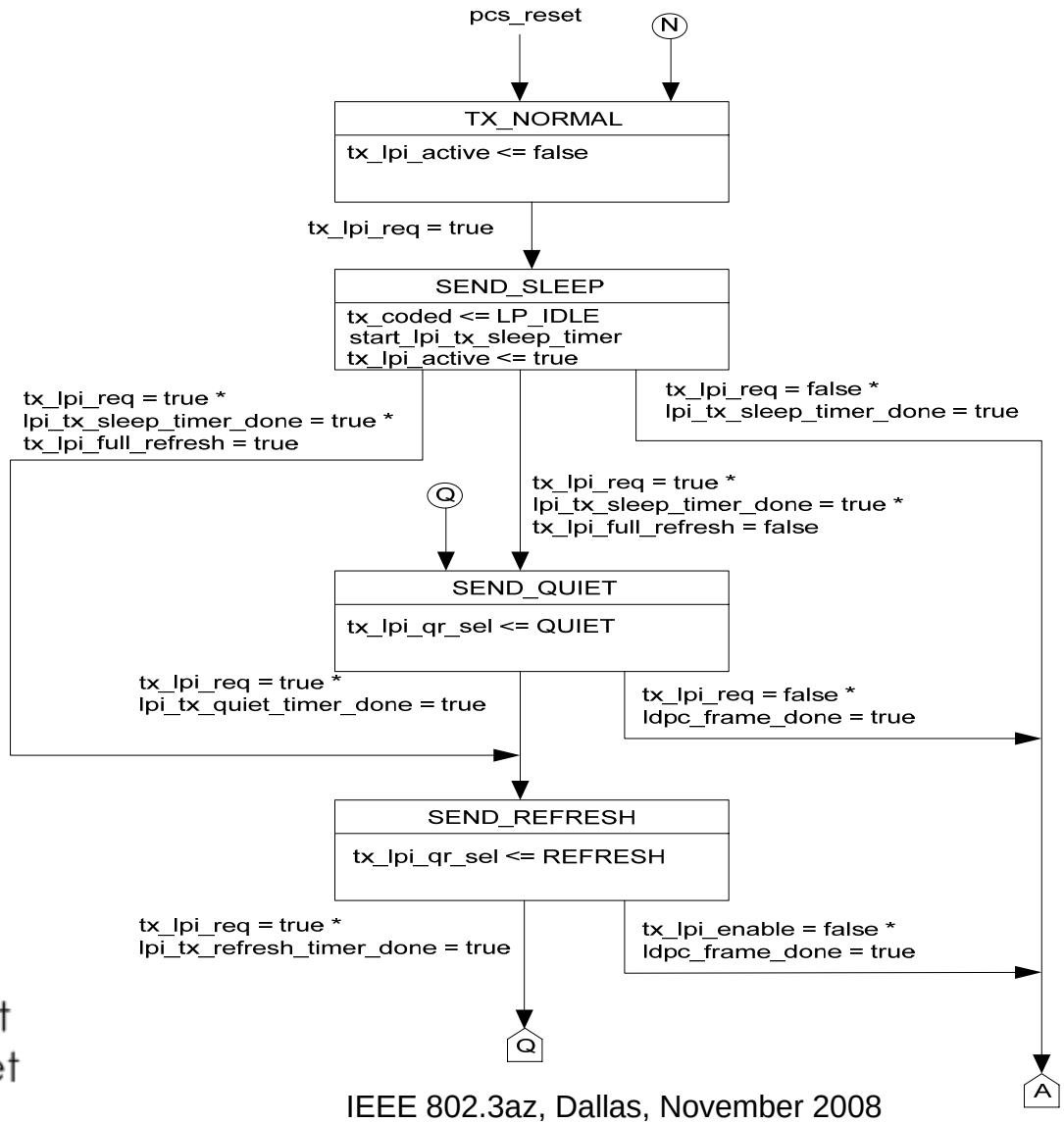
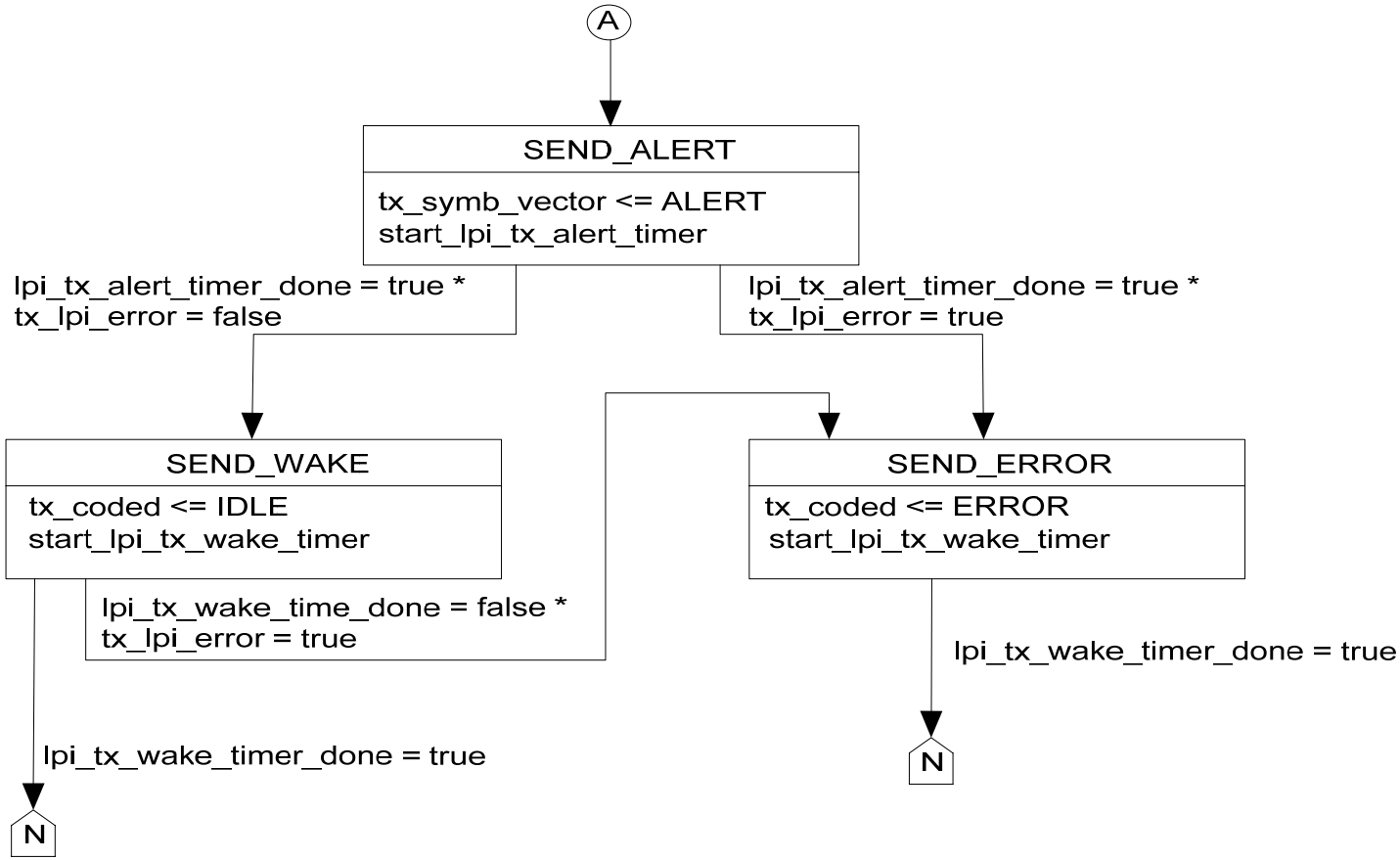
PCS LPI Transmit FSM

- Two new variables introduced:
  - tx_lpi_full_refresh (Transmit LPI Full Refresh)
    - Is set active when (lpi_tx_mode = QUIET) * (lpi_tx_quiet_timer_done = true). It prevents partial refreshes from being transferred at the Sleep to LPI transition.
  - tx_lpi_qr_sel (Transmit LPI Quiet/Refresh Select)
    - Overrides (tx_lpi_mode = REFRESH) at the Sleep to LPI transition so that Quiet frames can be transmitted.

PCS LPI Transmit FSM (1 of 2)



PCS LPI Transmit FSM (2 of 2)



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PCS 64/65B Receive State Diagram Updates

- New states to be added to support Low Power Idle:
  - RX_L (Receive Low Power Idle)

- New transitions to be added to support Low Power Idle:
  - T_TYPE(rx_raw) = LI causes transition from RX_C to RX_L
  - T_TYPE(rx_raw) = LI causes transition from RX_INIT to RX_E
  - T_TYPE(rx_raw) = LI causes transition from RX_D to RX_E
  - T_TYPE(rx_raw) = LI causes transition from RX_E to RX_E

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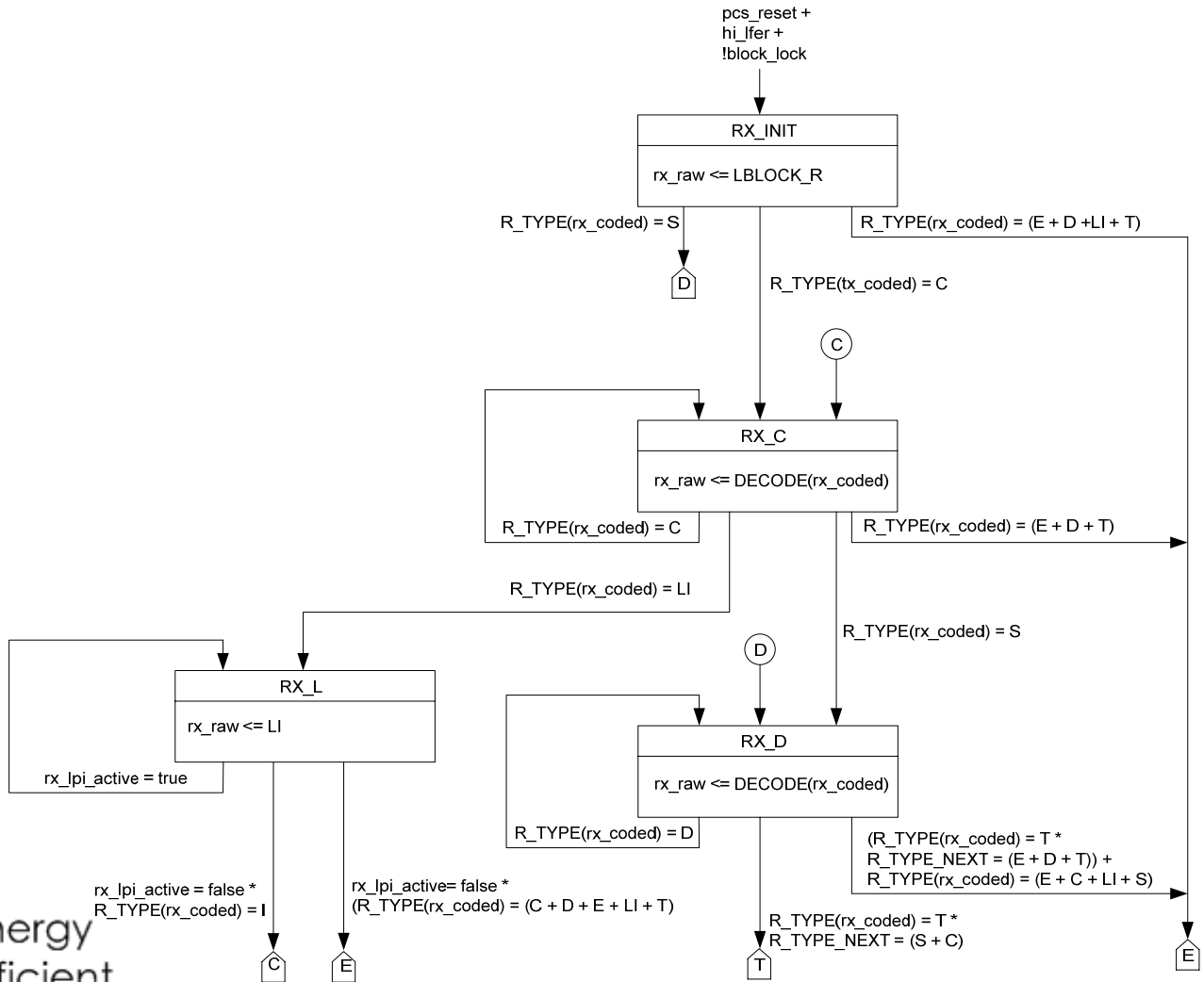
PCS 64B/65B Receive State Diagram (1 of 2)



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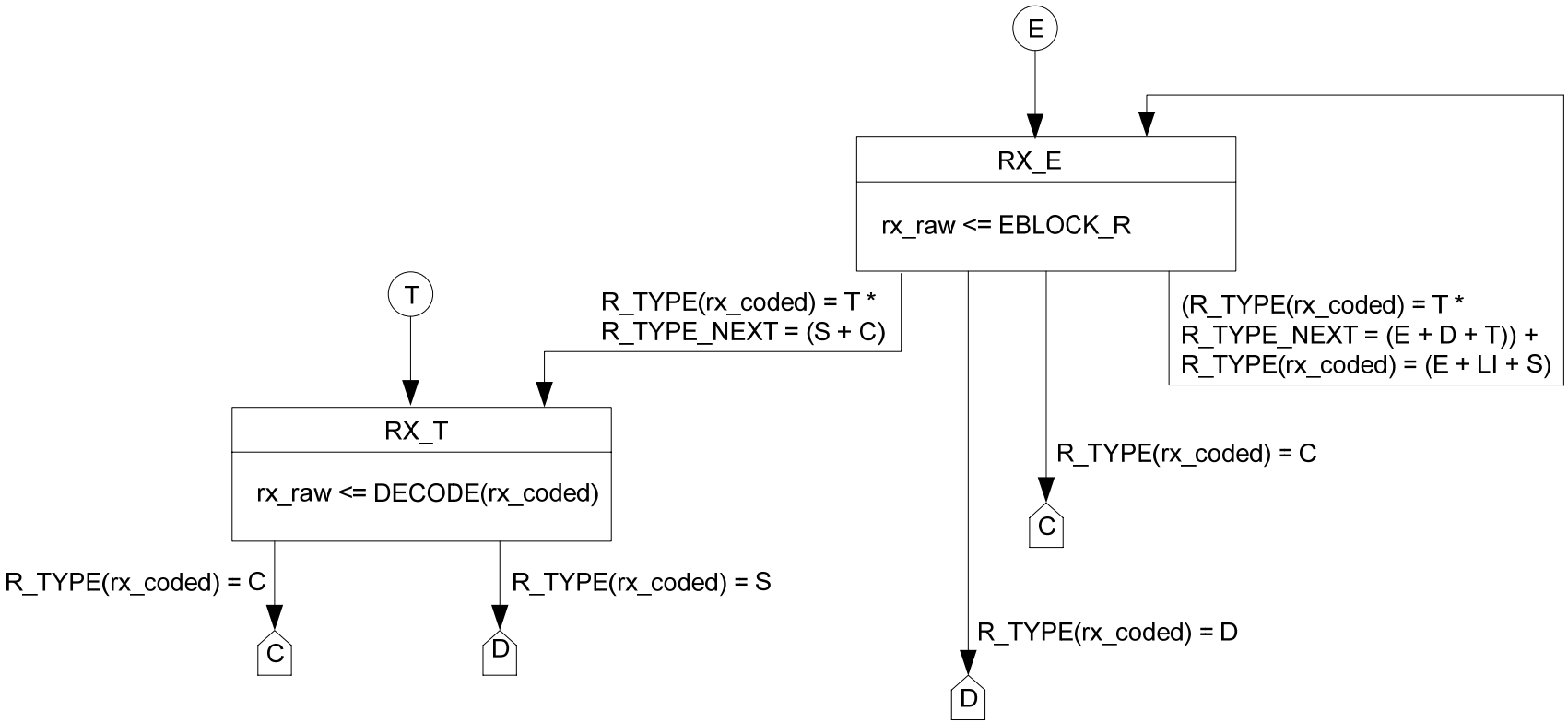
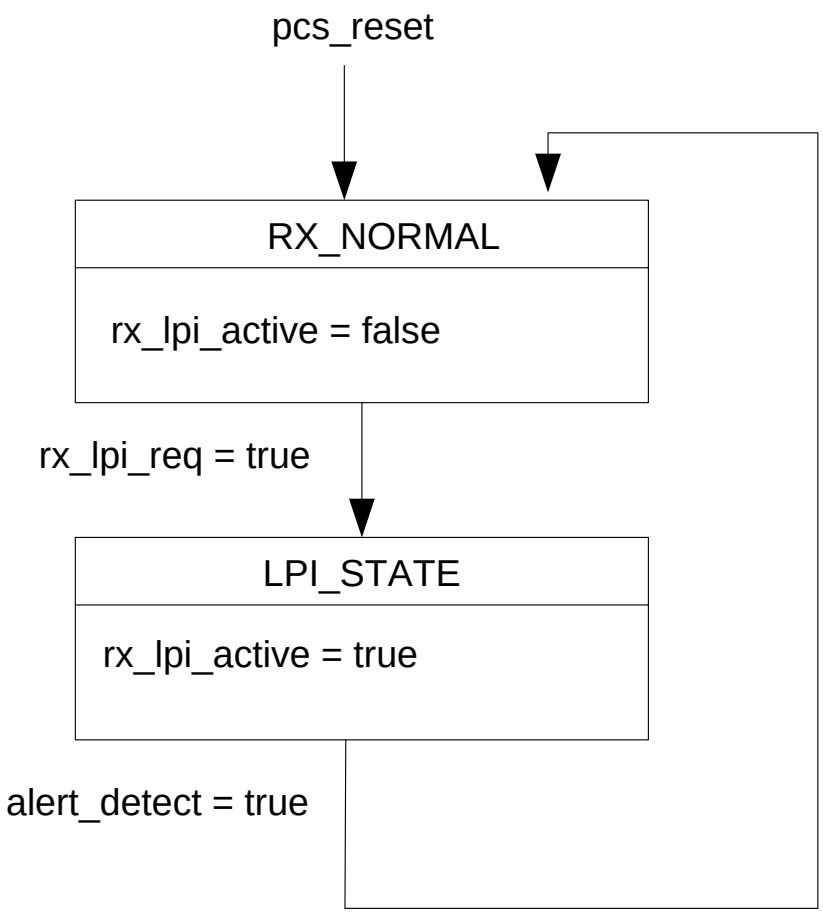
PCS 64B/65B Receive State Diagram (2 of 2)



PCS LPI Receive State Diagram (1 of 1)



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Summary

- Updated state diagrams proposed:
  - PCS 64B/65B Transmit.
  - PCS 64B/65B Receive.
  - PCS LPI Transmit.
  - PCS LPI Receive.

- Proposed diagrams provide consistency with existing defined signaling and the proposed PAM2/PAM16 synchronization mechanism.

Thank you