Comment 38 - request to exit LPI

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Comment 38

"Editor's note to be removed in draft 1.3: The OAM request to exit LPI is unneeded. Commenters are requested to provide text and edits necessary to cleanly remove this function and describe the local fault mechanism for the RS to signal exit from LPI."

This function was added in Clause 97 (1000BASE-T1) to cause the local device to exit low power idle when the link partner receiver is having trouble tracking the low power idle refresh signaling. However this function may not be necessary in an XGMII based system. Also the mechanism of exiting LPI is not described. An XGMII based PHY could generate Local Fault signals toward the Reconciliation Sublayer in a low SNR condition. The RS would respond by sending Remote Faults to the link partner, causing the link partner to stop sending LPI and start sending Idle until the fault condition is cleared. The downside to this mechanism is that the data link is interrupted in the path from the local device to the link partner.

I propose we keep the current mechanism of exiting LPI based on the OAM SNR indication but clarify how the LPI is exited.

▸ Typo correction highlighted

▸ Goal is to allow device to recover from low SNR condition in low power idle without interrupting data

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Original Suggested Remedy

on page 69 line 42
Change: "When the PHY Health status received from the link partner indicates that LPI is insufficient to maintain PHY SNR, the PHY may temporarily exit LPI mode and send idles."
To: "When the PHY Health status received from the link partner indicates that LPI is insufficient to maintain PHY SNR, the PHY shall temporarily exit LPI mode and send idles by replacing an LPI symbol group received at the XGMII with Idle symbols until the link partner no longer indicates insufficient SNR."

▸ 149.1.3.3 is the wrong location for a normative requirement.

▸ Better to change PCS 64B/65B Transmit state diagram.

  ▪ We want the link partner to exit TX low power idle, just as if the link partner Reconciliation Sublayer stopped sending Low Power Idle and started sending Idle.

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Proposed Remedy

▸ Remove the editor's note in 149.3.8.2.5

▸ Create a new variable in 149.3.6.2.2 to represent the link partner low SNR condition:

  ▪ lp_low_snr   Set TRUE when the link partner indicates LPI refresh is insufficient to maintain PHY SNR. It is set false otherwise.

▸ Modify Fig 149–15 (PCS 64B/65B Transmit state diagram) as follows:

  ▪ Change the assignment inside state TX_L to prevent entering LPI

    IF !lp_low_snr THEN (tx_lpi_req <= true
        tx_coded <= LPBLOCK_T)

  ▪ Change the transition condition from TX_L to TX_WN to exit LPI for low SNR

    lp_low_snr + T_TYPE(tx_raw) = (C + D + E + S + T)

  ▪ Change the transition condition from TX_L to TX_L to balance other path

    !lp_low_snr * T_TYPE(tx_raw) = (LI + LII)

  ▪ Change the transition condition from TX_WN to TX_C, wait for RS to stop LPI

    !tx_lpi_active * !(T_TYPE(tx_raw) = (LI + LII))

  ▪ Remove the loopback path from TX_WN to TX_WN, it is unnecessary.
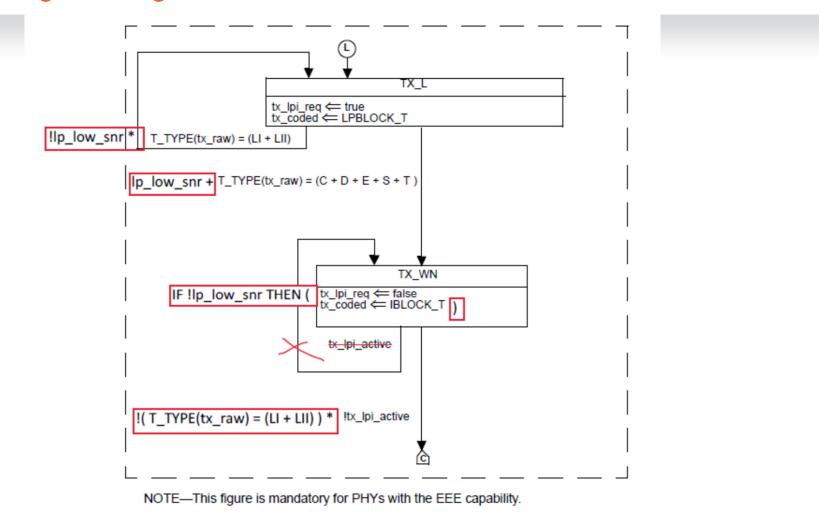
Changes to Figure 149–15

Figure 149–15—PCS 64B/65B Transmit state diagram, part b

Summary

▶ When the link partner indicates low SNR, the TX state machine will gracefully exit low power idle and stay in the Wake state sending Idles until the RS stops indicating LPI on the XGMII.

▶ Upon exit from Wake into normal Idle/Data, if the RS again presents LPI at the XGMII the TX state machine will not send the SLEEP signal and will not enter the low power idle state, but instead move to the Wake state and send Idles until the RS stops sending LPI.

▶ With these changes on the TX PCS side, no modifications are needed on the RX side and no changes are needed to the EEE state machine.

▶ There is no interruption to data in the receive path.

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