Timing Parameters of LPI 100BASE-TX

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Objectives

Revise state diagrams proposed in chou_01_0508 to make implementation easier and cover some logic loose ends.

- □ List timers used in the LPI 1000BASE-TX and propose their default value;
 - Enough margin to allow flexibility of implementation
 - Support Single Tg:Tr duty cycle with specified Tg:
 - Tg is 20ms for TX, and 24ms for RX
 - Ts is set to be equal to Tr
 - Lowest power with 200:1 ratio; Ts=Tr=100us





⁴ **Modifications of PCS state diagrams**

□ Transmit State Diagram (Fig 24-8)

- > No explicit Wake state. The Wake timer is controlled by system.
- The Refresh state goes directly to Quiet state without passing through Sleep state. The Refresh state will send Sleep signal.
- □ Receiver State Diagram (Fig 24-11)
 - No explicit Refresh state. The Refresh state is acted by entering Sleep state from Wake state when the received signal is decoded as Sleep. The Refresh duration is determined by the Sleep time.
 - The Link failure can be triggered by expirations of both Quiet timer, which is 20% longer than Quiet timer of TX, and the Wake timer.
 - The LPI_Link_Fail state will automatically exit to IDLE state when link_status is not OK.















LPI Transition Diagram (Sleep)













¹¹ **Proposed LPI Timing Parameters (PMD)**



Figure 18 - Signal_Detect threshold and timing

Characteristic	Minimum	Maximum	Units
Assert time Normal operation mode		1000	us
Deassert time Normal operation mode		350	us
Assert time Low Power Idle mode		TBD(5)	us
Deassert time Low Power Idle mode		TBD(5)	us
Assert threshold VSDA 100 ohm balanced cable		1000	mV peak to peak
Desssert threshold VSDD 100 ohm balanced cable	200		mV peak to peak
Assert threshold VSDA 150 ohm balanced shielded cable		1225	mV peak to peak
Desssert threshold VSDD 150 ohm balanced shielded cable	245		mV peak to peak

Table 25–2—Signal_Detect summary





Summary

□ PCS Timers (All specified values have ± 10% margin)

- Tg:Tr(Ts) duty cycle: 200:1
- Lpi_tx_ts_timer: Sleep state timer for Transmitter (100us)
- Lpi_tx_tq_timer: Quiet state timer for Transmitter (20ms)
- Lpi_tx_tr_timer: Refresh state timer for Transmitter (100us)
- Lpi_tx_tw_timer: Wake state timer for Transmitter (30us) (Note: This timer is not implemented in PHY)
- Lpi_rx_ts_timer: Sleep state timer for Receiver (100us)
- Lpi_rx_tq_timer: Maximum time allowed for Quiet state of Receiver (24ms)
- Lpi_rx_tw_timer: Wake state timer for Receiver (30us)
- PMD Timers (Maximum value)
 - AS_MAX on LPI mode : Assert time of signal_detect (5us)
 - AMS_MAX on LPI mode : De-assert time of signal_detect (5us)











Link Monitor state diagram



NOTE—The variables link_control and link_status are designated as link_control_[TX] and link_status_[TX], respectively, by the Auto-Negotiation Arbitration state diagram (Figure 28–18).

Figure 24–15—Link Monitor state diagram



