

Energy Efficient Ethernet 1000BASE-T LPI WAIT-QUIET Timer

Presented by: Mike Grimwood, Broadcom

Contributor: Xiaotong Lin

IEEE P802.3az Task Force

Seoul, September 2008



Overview

- IEEE 802.3az Draft 0.9 uses the timer, `lpi_wait_timer`, as an exit transition from both the `WAIT_QUIET` and `WAKE_TRAINING` states.
- In the `WAKE_TRAINING` state when the timer expires, there is a transition to `UPDATE` (normal wake procedure).
- In the `WAIT_QUIET` state, when the timer expires there is a transition to training.
 - Duration of timer is not sufficient to prevent retraining.
 - Extending the timer will increase the wake time.
- The presentation proposes replacing the `lpi_wait_timer` to two separate timers
 - `lpi_waitq_timer` – extend the value of `lpi_wait_timer` to provide margin and prevent an inadvertent retrain.
 - `lpi_waketr_timer` – keep the value of this the same as the `lpi_wait_timer`

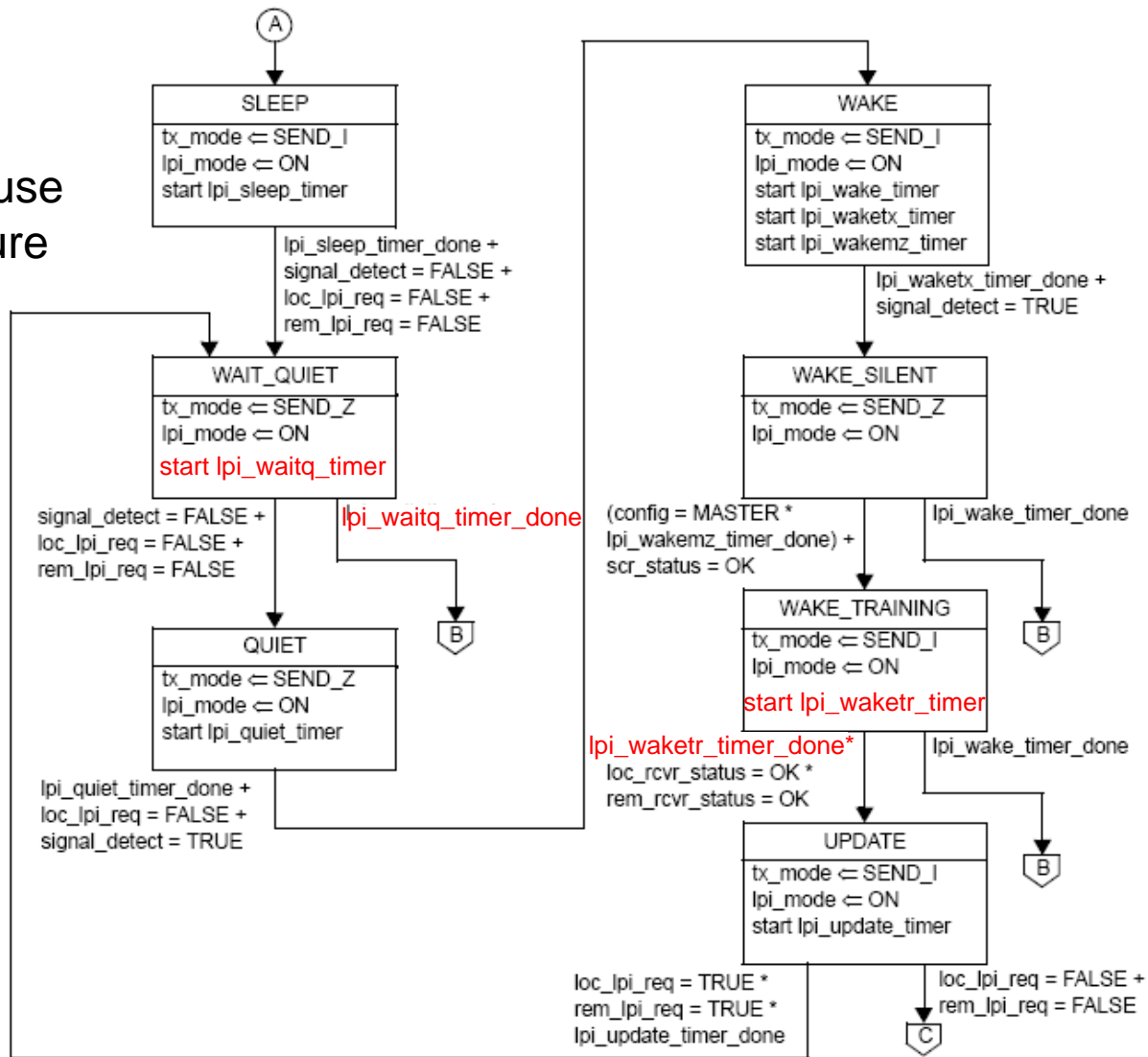


Justification for New Timer

- To avoid WAIT_QUIET transition to training, the following condition must be satisfied:
 - $2*(t1 + tp) + t2 + tw2 < lpi_wait_timer$
 - $2*(t1 + tp) + t2 + tw2 < 1.8 \text{ usec}$
 - Theoretically can be satisfied, but with very little margin.
 - Penalty against not satisfying is to retrain – unacceptable.
- Propose separating timer and adding additional margin to ensure that erroneous retraining events are avoided.

Updated PHY Control State Diagram

From
IEEE802.3az
D0.9, Subclause
40.4.6.1, Figure
40-15b, p92.



Updated Timer Descriptions

IEEE 802.3az D0.9, Subclause 40.4.5.2, pg 89, line 92, replace lpi_wait_timer (and its associated description) with the following:

lpi_waketr_timer

This timer defines the minimum time the PHY must remain in the WAKE_TRAINING state.

Values: The condition lpi_waketr_timer_done becomes true upon timer expiration.

Duration: This timer shall have a period between 1.8 μ s and 2.0 μ s.

lpi_waitq_timer

This timer defines the maximum time the PHY can dwell in the WAIT_QUIET state before retraining.

Values: The condition lpi_waketr_timer_done becomes true upon timer expiration.

Duration: This timer shall have a period between 4.5 μ s and 5.0 μ s.



Thank you!



IEEE 802.3az Seoul, Korea

