

# EEE status in 802.3bj

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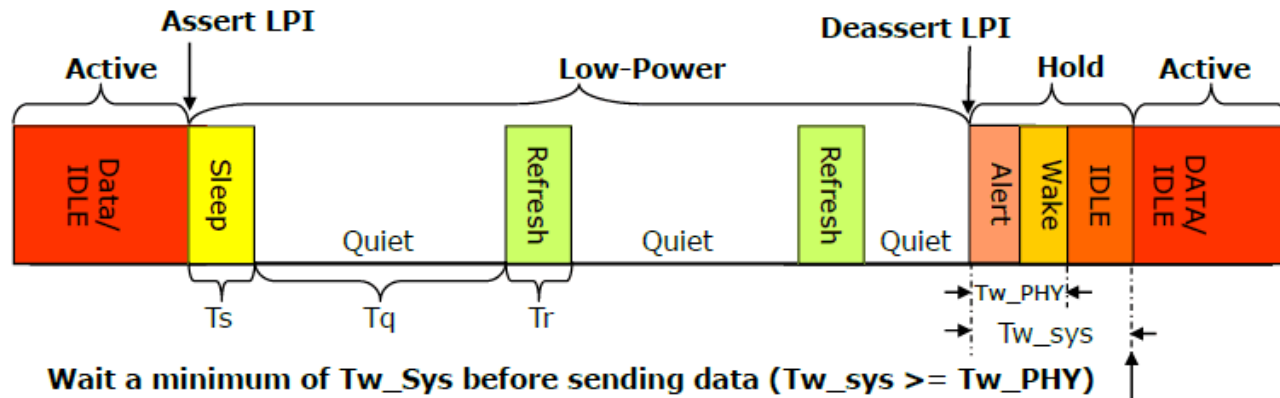
- ▶ EEE adopted for .3bj PHYs – and legacy PHYs
  - All 40G/100G copper & backplane PHYs
- ▶ Most of definition in RS, PCS – common for all 40G/100G
- ▶ Follows same mechanism as .3az
  - With addition of Fast Mode
- ▶ Change in PAR submitted for Nov. EC/SB
  - Changes to .3ba PHYs in draft, conditional on PAR change.

# EEE objectives

- ▶ To define optional Energy-Efficient Ethernet operation for 100G Backplane and Twinaxial cable PHYs specified in P802.3bj
- ▶ To define optional Energy-Efficient Ethernet operation for 100GBASE-CR10
- ▶ To define optional Energy-Efficient Ethernet operation for 40GBASE-CR4 and 40GBASE-KR4

# EEE Overview (from .3az)

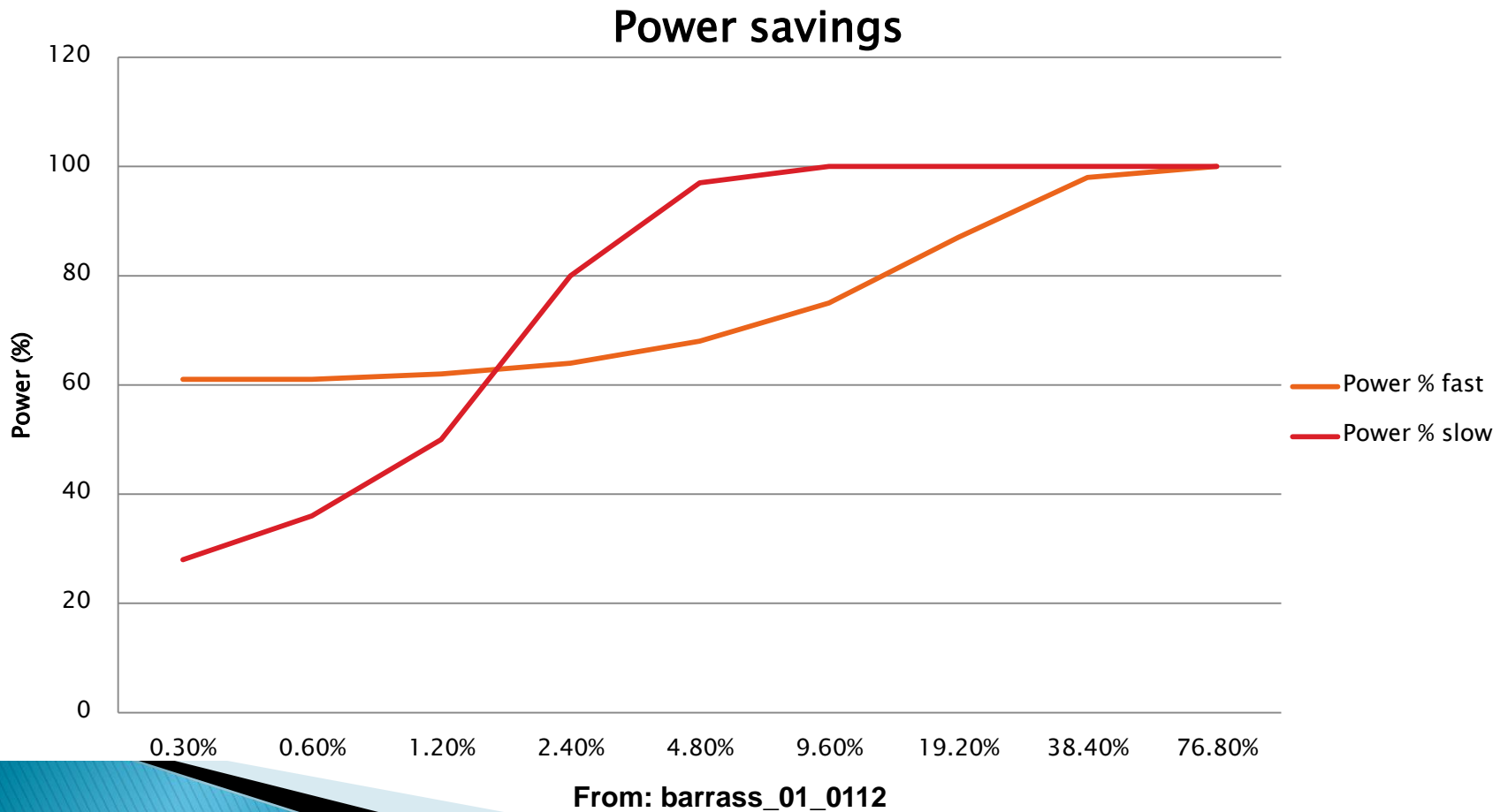
## LPI Overview



- LPI – PHY non-essential circuits shut down during idle periods
- During power-down, maintain coefficients and sync to allow rapid return to Active state
- Wake times for the respective backplane PHYs:
  - 1000BASE-KX:  $T_w\_PHY_{(min)}$  = 11.25 usec
  - 10GBASE-KX4  $T_w\_PHY_{(min)}$  = 9.25 usec
  - 10GBASE-KR:  $T_w\_PHY_{(min \text{ w/o FEC})}$  = 12.25 usec
  - 10GBASE-KR:  $T_w\_PHY_{(min \text{ w/FEC})}$  = 14.25 usec

# Fast Mode

- ▶ 40G/100G – needs faster wake



# Fast mode advantages

- ▶ Shorter wake time => saves power @ moderate utilization
- ▶ PCS/RS & higher layer functions
  - Largest proportion of system-level savings
- ▶ Compatibility with legacy modules
  - PMA/PMD operate without change
  - Could also be compatible with optical PHYs

# Outstanding work to do

- ▶ Detailed timing breakdown
- ▶ LPI across XLAUI/CAUI
  - Parameters defined for integrated PHYs
  - FEC/PMA could use inference
  - Not an issue for Fast Mode
- ▶ XLAUI/CAUI shutdown (optional)
  - Details not finalized
  - Not an issue for Fast Mode

# Questions...

# ???



# CISCO