



# In support of EEE mode for 1000BASE-KX PHY

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# Supporters

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- TBS



# Industry Specifications

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- Energy Star's "Program Requirements for Computers" includes Sleep (S3) and Standby (S4) levels.
- Energy Star "Program Requirements for Computer Servers" being drafted. Idle and Low power modes noted. Applies to Rack & Blade servers.
- Microsoft's SDG requires at least one NIC port support Wake on LAN (WoL). WoL useful only when server in Standby (Aux) power mode.
- DMTF's NC-SI specifies in-band mgmt to Server BMC while in Standby mode.

## **Key take-away:**

Blade Servers need to be managed in Standby power mode.



# Implementation Directions (cont.)

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## NIC/Switch & PHY Devices:

- BP PHYs with both KR & KX and AutoNeg on single chip.
- Expect KR/KX integrated in NIC/Switch devices by 2010.
- Expect combined power for NICs with integrated KR/KX PHY and Upper Layer power mgmt to be 50% less for 1Gb EEE mode than no EEE mode for low utilization.
- SFP+ (SFI) interface for SR/LR similar to KR. Expect dual mode KR/SFI devices soon and integrated later.
- New SFP+ Direct Attached Cable will operate at both 1Gb & 10Gb. Could use similar EEE mechanism there.

## **Key take-away:**

Integration of 1Gb/10Gb SerDes the norm for Blades & SFP+



# Implementation Directions

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## Servers:

- Want to support WoL & NC-SI at 1Gb while server in Standby (S4) mode for deployment or on-demand spare for peak loads.
- When Server in Standby mode, need NIC to be active but in lowest possible power mode like: 100BASE-T or 1000BASE-KX in EEE mode. Applies to Tower, Rack Mount and Blade Servers.
- Some Blade Servers being used as Graphic Workstation or remote Desktops. Need similar PC power features to compete.
- Even w/EEE, 10GbE NIC Controller/MAC & PHY will consume too much power for PCIe 375mA Aux Pwr requirement. Blade NIC designed for and operating at 1Gb EEE can meet PCIe Spec.

## **Key take-away:**

For WoL & Mgmt support on PCI NIC, need 1Gb mode, desire 1Gb EEE mode.

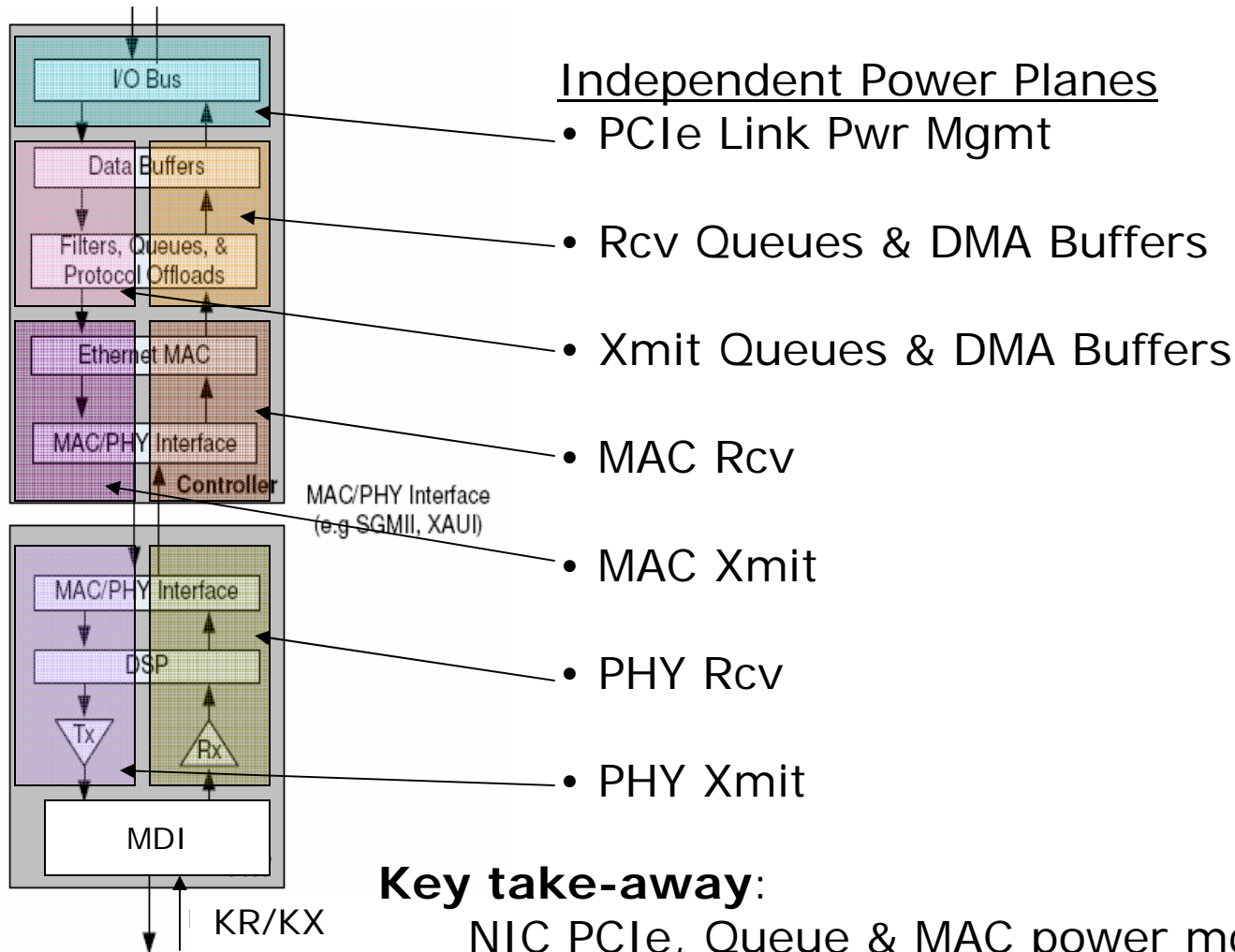


# EEE Thought Migration

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- Original EEE Objectives assumed using Rapid PHY Selection to go from KR <-> KX or KX4 <-> KX.
- Since then, noticeable direction change with baseline of 1000BASE-T and 100BASE-TX EEE using LPI.
- BP's KX4/KX dual simplex similar to 100BASE-TX. Could leverage many of same Asynchronous methods.
- To minimize complexity for implementation of upper layer power mgmt features, desire same set of voltage islands and clock distribution for different attached PHY types.
- Easier to design one set of PCIe, Queues & MAC power planes for 1/10Gb NIC/Switch ports to work with KX/KR or KX4/KX PHY when integrated.

# Possible KR/KX NIC Power Planes



## Key take-away:

NIC PCIe, Queue & MAC power mgmt planes similar for KR/KX PHY with LPI

Borrowed from Robert Hays' Hays\_1\_1107 slide.



# Summary

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- Blade Servers need to be managed in Standby power mode.
- Integration of 1Gb/10Gb to be the norm for Blades & SFP+.
- For WoL & Mgmt support on PCI NIC, need 1Gb mode. Desire 1Gb EEE mode.
- NIC PCIe, Queue & MAC power mgmt planes similar for KR/KX PHY with LPI.
  
- If linked at 1Gb and no EEE mode for KR/KX-PHY, NIC/Switch PHY layer can't tell upper layers when to wake-up. Therefore, can't get power saving from upper layer receive logic as it must always stay on.