Proposed BP Wake Shrinkage values

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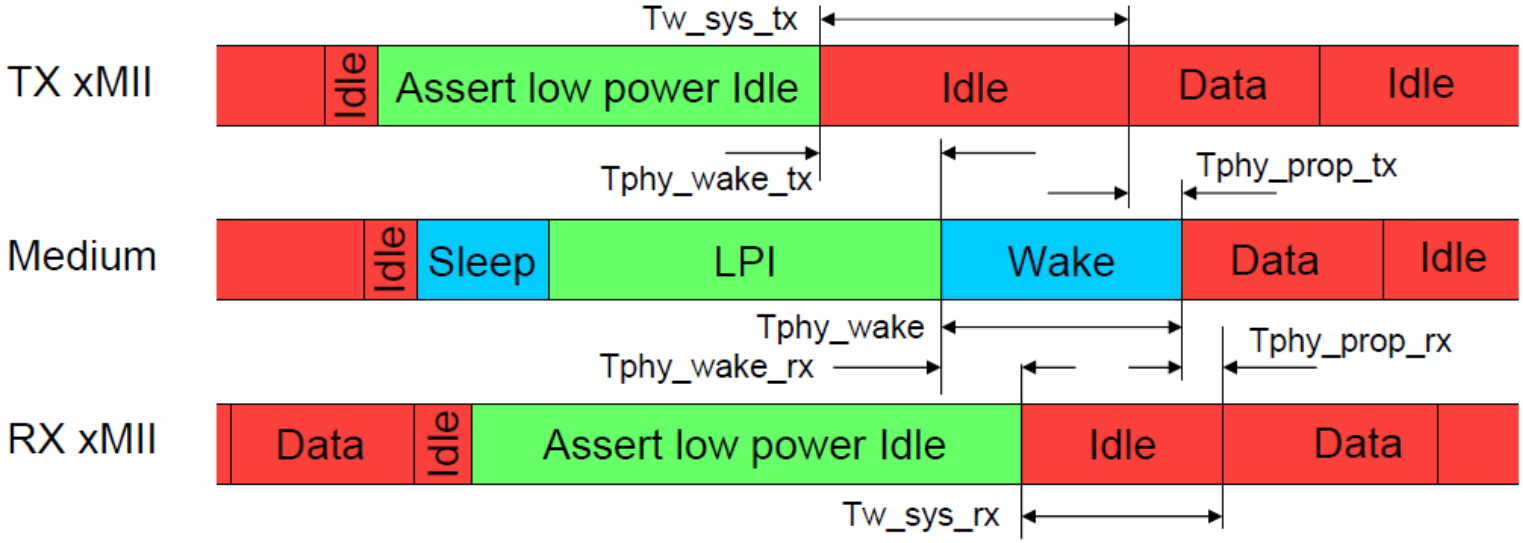
Overview.

- Wake shrinkage values for backplane PHY.

- Definitions, Calculations and Parameters presented here are adopted from law_1_0109_V3_0.pdf, law_1_0309.pdf and Ad Hoc presentations by Mike Grimwood and Adam Healey.

Wake Time Parameters Review



Tw_sys_tx (min) = Tw_sys_rx (min) + Tphy_shrink_tx (max) + Tphy_shrink_rx (max)
Tw_phy (min) = Tphy_wake (min) + Tphy_shrink_tx

Tw_sys_res (min) is greater of Tw_sys_tx (min) and Tw_phy (min)

Tphy_shrink_tx (max) = (Tphy_wake_tx(max) - Tphy_prop_tx (min))
Tphy_shrink_rx (max) = (Tphy_wake_rx(max) - Tphy_prop_rx (min))

Where:

- Tphy_wake_tx: xMII start of wake to MDI start of wake delay
- Tphy_prop_tx: xMII to MDI data propagation delay
- Tphy_wake_rx: MDI start of wake to xMII start of wake delay
- Tphy_prop_rx: MDI to xMII data propagation delay
- Tphy_wake: Minimum wake duration required by PHY

1000BASE-KX Wake time Shrinkage calculation

Tphy_wake_tx = Tphy_prop_tx + TTA
= Tphy_prop_tx + 0.5us

Tphy_shrink_tx = Tphy_wake_tx - Tphy_prop_tx
= Tphy_prop_tx + 0.5us - Tphy_prop_tx
= 0.5us

Tphy_wake_rx(max) = T_{RCVR}(max) + TSA
= 11us + 0.75us
= 11.75us

Tphy_shrink_rx(max) = Tphy_wake_rx(max) - Tphy_prop_rx(min)
= 11.75us - Tphy_prop_rx
= 11us (rounding up)

Tw_phy(min) = Tphy_wake(min) + Tphy_shrink_tx
= 10.75us + 0.5us
= 11.25us

Tw_sys_tx(min) = Tw_sys_rx(min) + Tphy_shrink_tx(min) + Tphy_shrink_rx(max)
= 1.76us + 0.5us + 11us
= 13.26us

PHY Type	$T_{w\_sys\_tx}$ (min), in usec	T_{w_phy} (min), in usec	$T_{phy\_shrink\_tx}$ (max), in usec	$T_{phy\_shrink\_rx}$ (max), in usec	$T_{w\_sys\_rx}$ (min), in usec
1000BASE-KX	13.26	11.25	0.5	11	1.76

10GBASE-KX4 Wake time Shrinkage calculation

Tphy_wake_tx = Tphy_prop_tx + TTA
= Tphy_prop_tx + 0.5us

Tphy_shrink_tx = Tphy_wake_tx - Tphy_prop_tx
= Tphy_prop_tx + 0.5us - Tphy_prop_tx
= 0.5us

Tphy_wake_rx(max) = T_{RCVR}(max) + TSA
= 9us + 0.75us
= 9.75us

Tphy_shrink_rx(max) = Tphy_wake_rx(max) - Tphy_prop_rx(min)
= 9.75us - Tphy_prop_rx
= 9us (rounding up)

Tw_phy(min) = Tphy_wake(min) + Tphy_shrink_tx
= 8.75us + 0.5us
= 9.25us

Tw_sys_tx(min) = Tw_sys_rx(min) + Tphy_shrink_tx(min) + Tphy_shrink_rx(max)
= 2.88us + 0.5us + 9us
= 12.38us

PHY Type	$T_{w\_sys\_tx}$ (min), in usec	T_{w_phy} (min), in usec	$T_{phy\_shrink\_tx}$ (max), in usec	$T_{phy\_shrink\_rx}$ (max), in usec	$T_{w\_sys\_rx}$ (min), in usec
10GBASE-KX4	12.38	9.25	0.5	9	2.88

10GBASE-KR Wake time Shrinkage calculation Case 1 – without scrambler reset enabled

Tphy_wake_tx = Tphy_prop_tx + TTA
= Tphy_prop_tx + 0.5us

Tphy_shrink_tx = Tphy_wake_tx - Tphy_prop_tx
= Tphy_prop_tx + 0.5us - Tphy_prop_tx
= 0.5us

Tphy_wake_rx(max) = TRCVR(max) + TSA
= 12us + 0.75us
= 12.75us

Tphy_shrink_rx(max) = Tphy_wake_rx(max) - Tphy_prop_rx(min)
= 12.75us - Tphy_prop_rx
= 12us (rounding up)

Tw_phy(min) = Tphy_wake(min) + Tphy_shrink_tx
= 11.75us + 0.5us
= 12.25us

Tw_sys_tx(min) = Tw_sys_rx(min) + Tphy_shrink_tx(min) + Tphy_shrink_rx(max)
= 2.88us + 0.5us + 12us
= 15.38us

PHY Type	$T_{w\_sys\_tx}$ (min), in usec	T_{w_phy} (min), in usec	$T_{phy\_shrink\_tx}$ (max), in usec	$T_{phy\_shrink\_rx}$ (max), in usec	$T_{w\_sys\_rx}$ (min), in usec
10GBASE-KR case 1	15.38	12.25	0.5	12	2.88

10GBASE-KR Wake time Shrinkage calculation Case 2 – with scrambler reset enabled

Tphy_wake_tx = Tphy_prop_tx + TTA
= Tphy_prop_tx + 0.5us

Tphy_shrink_tx = Tphy_wake_tx - Tphy_prop_tx
= Tphy_prop_tx + 0.5us - Tphy_prop_tx
= 0.5us

Tphy_wake_rx(max) = TRCVR(max) + TSA
= 14us + 0.75us
= 14.75us

Tphy_shrink_rx(max) = Tphy_wake_rx(max) - Tphy_prop_rx(min)
= 14.75us - Tphy_prop_rx
= 14us (rounding up)

Tw_phy(min) = Tphy_wake(min) + Tphy_shrink_tx
= 13.75us + 0.5us
= 14.25us

Tw_sys_tx(min) = Tw_sys_rx(min) + Tphy_shrink_tx(min) + Tphy_shrink_rx(max)
= 2.88us + 0.5us + 14us
= 17.38us

PHY Type	$T_{w\_sys\_tx}$ (min), in usec	T_{w_phy} (min), in usec	$T_{phy\_shrink\_tx}$ (max), in usec	$T_{phy\_shrink\_rx}$ (max), in usec	$T_{w\_sys\_rx}$ (min), in usec
10GBASE-KR case 2	17.38	14.25	0.5	14	2.88

Proposed Backplane PHY Timer Values.

PHY Type	$T_{w\_sys\_tx}$ (min), in usec	T_{w_phy} (min), in usec	$T_{phy\_shrink\_tx}$ (max), in usec	$T_{phy\_shrink\_rx}$ (max), in usec	$T_{w\_sys\_rx}$ (min), in usec
1000BASE-KX	13.26	11.25	0.5	11	1.76
10GBASE-KX4	12.38	9.25	0.5	9	2.88
10GBASE-KR, without FEC	15.38	12.25	0.5	12	2.88
10GBASE-KR, with FEC	17.38	14.25	0.5	14	2.88

Thank You