AQUANTIA

10GEEE – Time to Switch

- **Objectives**
- **Technical Feasibility**

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Objective

Down-time waiting for the shift is not a good thing.

- What are the system level impacts?
- What are the benefits of shifting orders of magnitude faster?

From barrass_01_0107

- Define the means to change between 1000BASE-T & 100BASE-TX PHYs, without loss of link
- Define the means to change between 10GBASE-T & 1000BASE-T PHYs, without loss of link

“…without loss of link” gives no value to the speed of the shift

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Moving Rates Takes Time

When 10GBASE-T downshifts to 1000BASE-T

- Derive 1000BASE-T taps from 10GBASE-T taps?
- Time-to-Shift can end up being milliseconds

When 1000BASE-T upshifts to 10GBASE-T

- 125MHz signaling vs. 800MHz signaling; many taps not exercised in GE mode
- No limit on duration at GE. Cabling can physically change; in temperature, be affected by physical movement
- May force duplicating the majority of a start-up sequence; time-to-shift of 100ms or more

What are systems impacts of a time-to-shift of hundreds of milliseconds?

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Freedoms Available to 10GEEE

Boundary conditions

- A 10GEEE device need to interoperate with any 802.3an compliant 10GBASE-T device; i.e. be compliant to 802.3an

When a pair of 10GEEE devices shift to GE operation

- Must we use 1000BASE-T?

We should examine other options

- GE operation within 10GEEE devices can be wholly defined within EEE
- Deviating from 1000BASE-T for GE should only be considered if it delivers a compelling benefit

Example Concept

What if….

- GE within 10GEEE was implemented with dual simplex
- GE within 10GEEE used a subset of the 10GBASE-T line code, with DSQ128 symbols at 800MS/s

Resulting 10GEEE could

- Upshift within a few ticks of the frame clock, 1 microsecond or less
  - Three orders of magnitude or more *faster*
- Maximize re-use of 10GBASE-T circuitry
  - Incremental circuitry may be very minor
- May have lower power in GE mode than 1000BASE-T
  - Echo cancellation simpler, LDPC decode simpler
- Mimic 10GBASE-T behavior as an aggressor for compatibility in both 10GE and 1000M modes

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Other Considerations

Interfacing with conventional GE parts must be done w/ 1000BASE-T

- GE mode in 10GEEE is downshift only; it does not stand alone
- "Distinct Identity" and "Creating a new PHY" questions need to be discussed

Does 10GEEE also need a separate 100M mode?

- Or, is one-decade speed shift sufficient at the systems level?

Is there benefit to a separate mode within 1000BASE-T pairs that downshifts to 100M?

- Perhaps shifting between 1000BASE-T and 100BASE-T is sufficiently fast
- This question not addressed in this presentation

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Revised Objectives

Define the means for a 10GBASE-T PHY to rapidly shift from 10G operation to 1000M and back, without loss of link

Define the means for a 1000BASE-T PHY to rapidly shift from 1000M operation to 100M and back, without loss of link

Discussion