10GBASE-T ad hoc output

9/16/2008   Gavin Parnaby,

Solarflare Communications

Seoul, Korea

Ad hoc meetings

- Face to face meeting August 12th, 2008
  - **Irvine, CA**

- Two phone conference calls since Denver

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Face-to-face ad hoc attendees

- Attendees
  - **Gavin Parnaby (Solarflare)**

  - **George Zimmerman (Solarflare)**

  - **Brett McClellan (Solarflare)**

  - **Jose Tellado (Teranetics)**

  - **Mike Grimwood (Broadcom)**

  - **Rick Tidstrom (Broadcom)**

  - **Jim Graba (Broadcom)**

  - **Hossein Sedarat (Aquantia)**

  - **Sean Lundy (Aquantia)**

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Presentations

- "Filling the 10GBASE-T TBDs: WAKE and SLEEP" – George Zimmerman, Solarflare

- "Energy Efficient Ethernet: 10GBASE-T LPI Frequency Stability" – Mike Grimwood, Broadcom

- "Energy Efficient Ethernet: 10GBASE-T LPI State Machines" – Rick Tidstrom, Broadcom

- "10GBASE-T EEE Specifications, Refresh, Quiet, Alert" – Hossein Sedarat, Aquantia

- "Alert signal for 10GBASE-T" – Dimitry Taich, Jose Tellado, Teranetics

- Presentations are available on the working group web site at http://www.ieee802.org/3/az/public/adhoc/aug08/index.html

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Outputs – Wake and Sleep signaling

- Ad hoc presentation from George Zimmerman will be presented in Seoul

- Summary:

  - **Wake signal is N_IDLE encoded into DSQ**

  - **Sleep is LP_IDLE encoded into DSQ**

  - **Valid Sleep is 1 64/65B block of LP_IDLE; SLEEP is at least 9 frames long**

  - **Valid Wake is 1 64/65B block of N_IDLE or Local Fault [for error]**

  - **Granularity of sleep and wake is PHY frames; exact length vendor dependent**

  - **Updated ad hoc presentation is in http://www.ieee802.org/3/az/public/adhoc/aug08/zimmerman_02_0808.pdf**

  - **Seoul presentation is in http://www.ieee802.org/3/az/public/sept08/zimmerman_01_0908.pdf**

- TBDs:

  - **Maximum T_w and T_s are for further study (system vendor feedback is requested)**

    - These parameters govern the minimum LP_IDLE time

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Outputs – Frequency Stability

- Mike Grimwood presented grimwood_01_0808.pdf which discusses frequency stability and some aspects of testing

- Summary:

  - **Allowable Tq, Tr times dependent upon frequency/phase drift during quiet time**

  - **Resolved to ask for system vendor feedback re: stability requirements (done 3rd September 2008)**

  - **Also discussion on low frequency jitter requirements**

  - **Discussion on testing requirements**

  - **Ad hoc group believes we need to make progress on this in order to specify limits on the Tq, Tr parameters**

  - **Ad hoc presentation is in http://www.ieee802.org/3/az/public/adhoc/aug08/grimwood_01_0808.pdf**

- TBDs:

  - **What additional phase, coherence or low frequency jitter specifications are needed?**

  - **Is 0.17 ppm/sec too constraining for frequency drift ? - solicit system feedback.**

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Outputs - Refresh and Quiet signaling

- Updated "Refresh and Quiet signaling" presentation from Hossein Sedarat will be presented in Seoul – retargeted at quiet/refresh only, alert signaling presentation is separate

- Summary:
    - **Use PAM-2 THP as basis for refresh signaling, LFSR generated sequence**
    - **The group recommends the use of staggered out-of-phase refresh signaling for maximum power savings**
    - **Tq and Tr values subject to further study**
    - **Further work needed on relation to alert signaling and corner cases**
    - **Updated ad hoc presentation is in**
      http://www.ieee802.org/3/az/public/adhoc/aug08/sedarat_02_0808.pdf
    - **Seoul presentation is in**
      http://www.ieee802.org/3/az/public/sept08/sedarat_01_0908.pdf

- TBDs:
    - **Tq, Tr, some aspects of timing synchronization**
    - **M,N resolution**
    - **Further study on asymmetric modes of operation may be needed**

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Outputs - Alert signaling

- Ad hoc saw presentations from Hossein Sedarat and Jose Telado which addressed alert signaling

- New presentations in Seoul

- Summary:
  - **Alert signaling is dependent upon the quiet/refresh scheme chosen**
    - **Alert schemes have been updated after the staggered, out-of-phase quiet/refresh signaling was discussed**
  - **Ad hoc is investigating out-of-band alert signaling using PAM-2**
    - **Provides low latency detection, but requires new signal detection blocks**
    - **In the staggered case need to investigate corner cases where alert is signaled as the transmit pair changes**
  - **Ad hoc presentations are in http://www.ieee802.org/3/az/public/adhoc/aug08/sedarat_02_0808.pdf and http://www.ieee802.org/3/az/public/adhoc/aug08/tellado_01_0808.pdf**

- TBDs
  - **Alert Length, Ta**
  - **Exact signal structure**

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Outputs – State Machines

- Ad hoc saw state machine contributions from Rick Tidstrom

- Summary:

  - **Added error detection states to transmit and receive**

  - **Split state machines into EEE Tx (PCS), EEE Rx (PMA), 64/65B Tx and 64/65B Rx**

  - **Ad hoc document is http://www.ieee802.org/3/az/public/adhoc/aug08/tidstrom_01_0808.pdf**

  - **The update from tidstrom_01_0808.pdf was included as part of editor's notes in draft 0.9**

  - **May require further modification with Quiet/Refresh and Alert changes**

  - **Intend to add ALERT exit condition to ALIGN_QUIET state, if ALIGN_QUIET is required in forthcoming quiet/refresh/alert schemes, following discussion in ad hoc conference call**

- TBD:

  - **Corner cases; 1) both PHYs enter at same time, 2) one leaves as the other enters**

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Summary

- Made decent progress

- Found common ground on signaling schemes

  - **XGMII codewords for WAKE/SLEEP**

  - **PAM-2 THP for Refresh**

  - **Staggered out-of-phase refresh scheme for maximum power saving**

- Still need to select Tq, Tr parameters;

  - dependent upon frequency stability / low frequency jitter requirements

  - Have not yet managed to narrow parameter ranges

- **Working on alert signaling**

- New sleep/wake signaling, quiet/refresh, alert presentations at this meeting

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