40GE OTN-Support Options

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Goals of This Presentation

- Identify OTN-support degrees
  - PMD transparency
  - PHY transparency
  - MAC transparency
- Identify 40GE OTN-support options
  - WAN-PHY only
  - LAN-PHY only
  - LAN-PHY and OTN-PHY
- Encourage 40GE trans-coding discussions in IEEE

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OTN-Support Objective

- HSSG has adopted an objective
  - Provide appropriate support for OTN
- 10GE has missed “appropriate support ” for WAN
  - IEEE802.3ae WAN-PHY (9.95G) provides edge-to-edge bit transparency over ITU-T G.707 SDH/SONET, but has failed to provide end-to-end LAN-PHY (10.3G) transparency
  - ITU-T G.709 OTN with G.7041 GFP allows end-to-end 10G MAC-frame-level transparency over WAN, but
  - ITU-T has recently published a supplement G.sup43 to support bit-transparent LAN-PHY transport by overclocked OTU2e
- What we learned here:
  - Require end-to-end LAN-PHY transparency over WAN
  - Require more than MAC transparency
    - We are not living in a perfect world…. See p.6 in duelk_01_0707.pdf

OTN-Support Degrees

- PMD transparency
  - Transport every single bit as it is
  - Perfect transparency (including clock!)
    - Far beyond Ethernet requirements
- PHY transparency
  - Transport every PCS/AUI code block (e.g. 64/66)
  - Some IPG idle blocks may be inserted/deleted
    - for Ethernet +/- 100ppm CLK tolerance compensation
  - May be trans-coded for PCS-rate reduction
    - e.g. 512b/513b - trowbridge_01_0707.pdf
- MAC Transparency
  - Transport every MAC frame, without IPG nor preamble
  - 10GE has proved that this is not a enough solution

Recommendation: support at least PHY transparency

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40GE OTN-Support Options

- To support PMD transparency
  - (1) WAN-PHY only
    - 40GE picks 4 x 9.995G PMD (i.e. optimized for WAN)
    - Existing OPU2-4v will support this PMD transparency
  - (2) LAN-PHY only
    - 40GE picks 4 x 10.3125G PMD (i.e. optimized for LAN)
    - ITU-T needs to revise OTN to support overclocked ODU2e

- To support PHY transparency
  - (3) LAN-PHY and OTN-PHY
    - 40GE picks 4 x 10.3125G LAN-PHY, and
    - IEEE or ITU-T defines trans-coding for serial OTN-PHY
      - e.g. 64/66 to 512/513 will reduce PCS rate to 40.08G (<OPU3)

Recommendation: allow trans-coding

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Who Defines Trans-Coding?

- Case 1: IEEE
  - Easy to keep consistency with 64/66
  - Could assure Ethernet link quality over OTN
    - Trans-coding will affect bit-error sensitivity on the link quality
  - Scenario examples;
    - 40GE defines serial OTN-PHY
    - 40/100GE requires FEC option stronger than 802.3ap 10G BASE-KR that uses 64/65 trans-coding

- Case 2: ITU-T, or else
  - Minor risks exist
    - Future revision on 64/66 may break trans-codability
    - Transparent Ethernet Link quality over OTN may be degraded

Recommendation: discuss trans-coding in IEEE

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Summary

- For 40GE OTN-support options;
  - Support at least PHY transparency
  - Allow LAN-PHY to OTN-PHY trans-coding
  - Discuss trans-coding in IEEE