OTN Support for 25GbE

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Does 25GbE Need an
OTN Support Objective?

- New Ethernet rates tend to see wide adoption beyond their originally envisioned application:
  - Example: Migration of 40GbE from a server interconnect interface to use in switch-to-switch applications – see barbieri_01_0108.pdf and subsequent ad hoc activity and later addition of a 10km SMF PMD followed by 40km SMF PMD in P802.3bm
- New Ethernet rates and formats impact rates and formats selected elsewhere in the ecosystem
  - Example: reuse of 64B/66B, 256B/257B, RS-FEC by Fibre Channel
  - Example: Choice of 100G for the ITU-T OTN OTU4 rate rather than some early proposals to use 3x or 4x the OTU3 rate
- Even the 25GbE Study Group has already seen sufficient interest to charter an Optical ad hoc!
- Three contributions on transport of 25GbE over OTN received at ITU-T Q11/15 meeting in Suzhou, China week of 25 August 2014

Key areas where ITU-T could care about 25GbE

- Expected that transport of 25GbE over OTN networks will be required

- Possible emergence of 25G rates elsewhere in the ecosystem as 25G affects the component supply chain

Transport of 25GbE over Optical Transport Networks

- Existing networks could transport 25GbE as a client of ODU3 (40G) or ODU4 (100G) line interfaces

- Early discussion in the 25GbE Study Group indicates that interfaces are likely to use FEC. Since the FEC is selected to correct single-link errors rather than double-link errors, expected that OTN mapper would need to terminate the FEC (correcting errors), and the FEC will be regenerated by the demapper on the egress link

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Mapping Efficiency of 25GbE into Current OTN Networks

- Mapping into 20 tributary slots of OPU4 or 21 tributary slots of OPU3 is straightforward as long as the encoded bit-rate of 25GbE without FEC does not exceed 26.033 Gb/s

- 25GbE does not fit into 20 (of 32) tributary slots of OPU3 even if 256B/257B encoded. Not a significant issue since you can't fit two 25GbE into 40G

- It <u>would be an issue </u>if four 25GbE would not fit into OPU4

Mapping Efficiency of 25GbE into "Beyond 100G" OTN Networks

- ITU-T SG15 is working on a new signal structure for "Beyond 100G" (B100G) rather than a simple extension to OTU5.

- Current working assumption is that B100G will use a tributary slot size of 10G.

- Mapping of 25GbE into three 10G tributary slots would support up to thirteen 25GbE clients over a 400G line side interface (rather than the expected sixteen)

- Whether this inefficiency is acceptable depends on the penetration of 25GbE over transport networks. However, this could create a perception problem (e.g., claims that OTN doesn't efficiently transport Ethernet) even if this doesn't end up being important in many real networks.

- Changing to a 5G tributary slot size to allow efficient transport of 10G, 25G, 40G, 100G clients could require significantly more gates in devices.

- Considerable interest after discussion in Suzhou to investigate a 5G granularity for efficient transport of 25GbE.

Possible proliferation of 25G to other parts of the ecosystem

- This is purely speculative since it depends on contributions received. But possible areas for 25G proliferation include:
  - Recommendation G.metro will specify low-cost DWDM interfaces where the tail end ports can adapt their frequency to that of the multiplexer port. The initial version of the Recommendation targets up to 10G interfaces. 25G might be a feasible upgrade path, where 40G is likely not in the near term.
  - 25G line side interfaces have been proposed in the past and have not been agreed. The landscape for reconsidering these kinds of proposals could be different given the existence of a 25G client interface.

Merits of an "OTN support" objective for 25GbE

- Not clear there is much that would happen differently with or without an objective
- Only "constraints" currently seen are:
  - That the top-line encoded bit-rate of the 25GbE signal that might need to be transported over OTN does not exceed 26.033 Gb/s without FEC (which is not likely to be exceeded anyway);
  - That EEE "deep sleep" mode cannot be used for any 25G optical interfaces that are OTN clients (as per current 40G and 100G optical interfaces) to avoid interference with an OTN mapper
- On the other hand, no significant cost or restriction to a 25GbE project by adopting an "OTN support" objective other than being cognizant of the 26.033 Gb/s limit, avoiding "deep sleep" for any 25GbE optical interfaces, and keeping ITU-T SG15 informed of 25GbE decisions

THANKS!