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100 Gbps Panel

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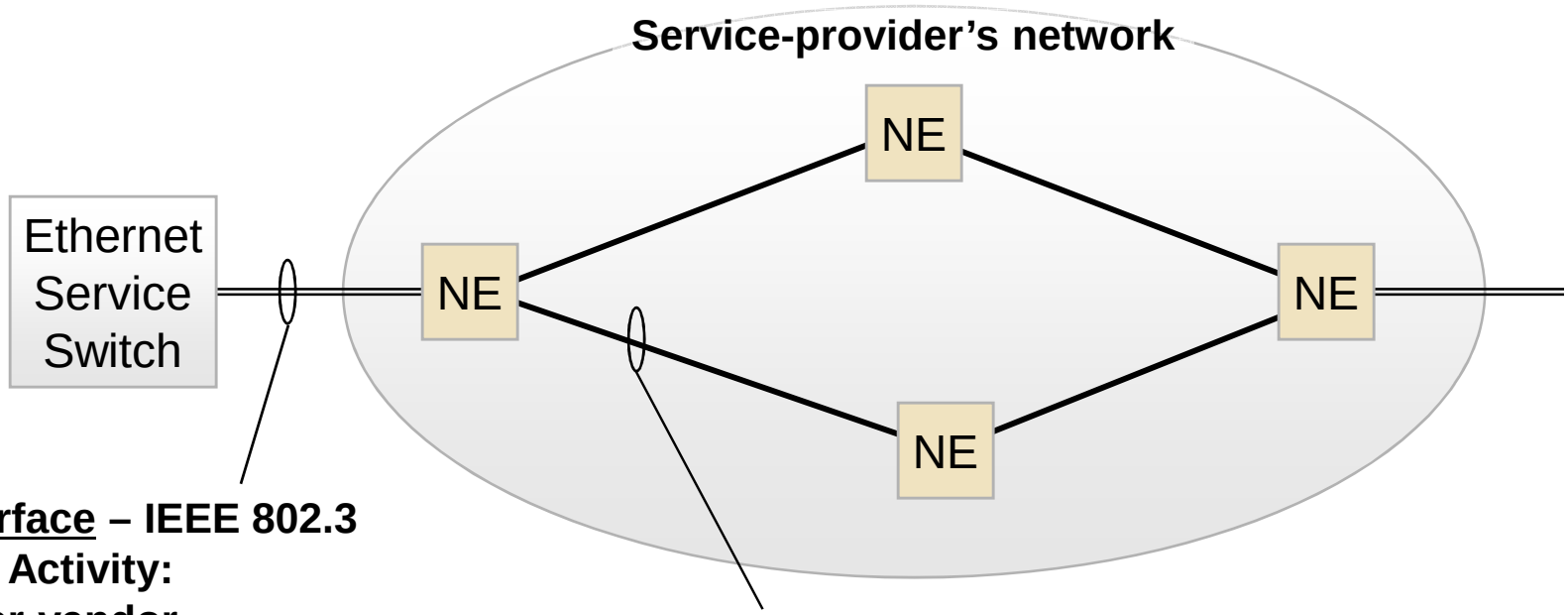
Client & Network-side Interfaces



<u>Client Interface</u> – IEEE 802.3 Standards Activity:

- **Inter-vendor interoperable**
- **Lower performance, shorter distance**
- **Higher volume**
- **Lower cost**
- **Link status**

<u>Network-side Interface</u> – ITU and OIF Standards activity:

- **High performance, longer distance**
- **Minimize wavelength consumption**
- **Higher performance FEC**
- **MSA agreements to reduce component cost**
- **Not necessarily inter-vendor interoperability**

IEEE 802.3ba Objectives

40GE and 100GE Ethernet Standards

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- Preserve the 802.3 / Ethernet frame format and existing min/max frame sizes.
- Provide appropriate support for OTN.
- Provide Physical Layer specifications which support 40 Gb/s operation over:
  - at least 10km on SMF
  - at least 100m on OM3 MMF
  - at least 10m over a copper cable assembly
  - at least 1m over a backplane
- Provide Physical Layer specifications which support 100 Gb/s operation over:
  - at least 40km on SMF
  - at least 10km on SMF
  - at least 100m on OM3 MMF
  - at least 10m over a copper cable assembly
- Appears to be staying on-schedule

IEEE Timeline

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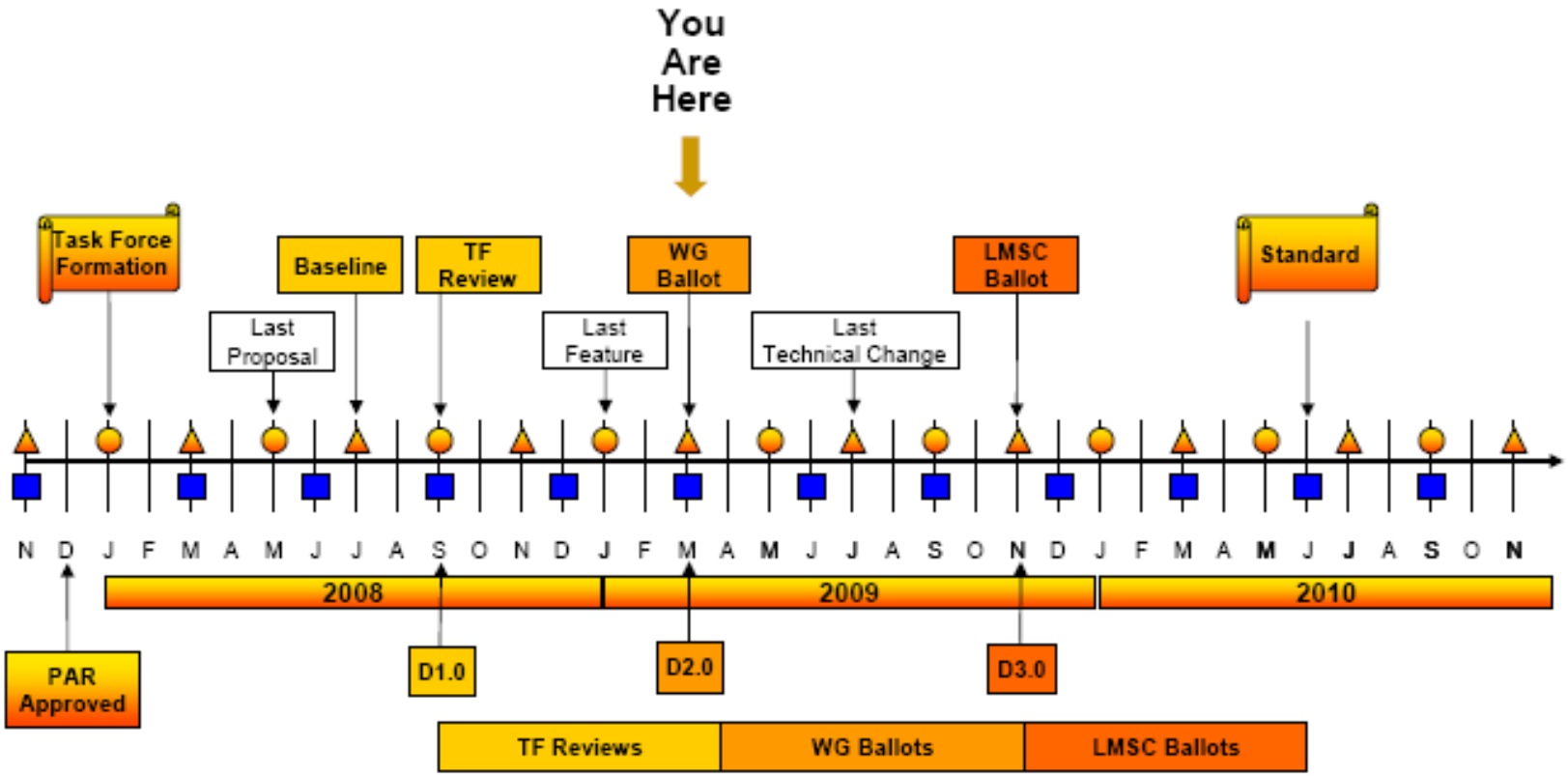
IEEE P802.3ba Task Force Timeline



* Adopted by IEEE P802.3ba TF at March 08 Plenary

OIF – 100G DWDM Standards

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- **OIF framework: Draft document, comment resolution is planned April 21.**
  - Original plan was to do straw ballot and principal ballot in 4Q08.
- **OIF 100G Integrated Tx/Rx:**
  - Rx area is working on a baseline text.
  - Tx area: hope to have a baseline text after the April meeting, or one cycle later.
  - The Rx IA has the potential to stay on schedule with a completion target of 3Q'09.
- **OIF 100G FEC:**
  - External FEC (external to the transponder), is likely to be a Hard-Decision FEC with overhead of 7% (if ITU-T FEC), or somewhat higher (if OIF FEC).
  - For ULH 100G there is a performance gap between desired reach and practically feasible reach without technologies such as Raman, etc. Therefore, OIF wants a stronger FEC.
  - The strongest FEC would be Soft-Decision, which would have to be inside the transponder, close to, or integrated with the DSP due to very high SD symbol bandwidth. In that case the external FEC could be disabled.
  - The FEC project was scheduled to be completed in 4Q'09.
- **OIF 100G Transponder MSA Electro-Mechanical**
  - In discussion stage, and not bound to one particular modulation format.
  - This project is planned to have a document in straw ballot by 4Q'09 and be completed by the end of 1Q'10.

ITU – OTN Standards

(43 Gbps, 112 Gbps, multi payload types)

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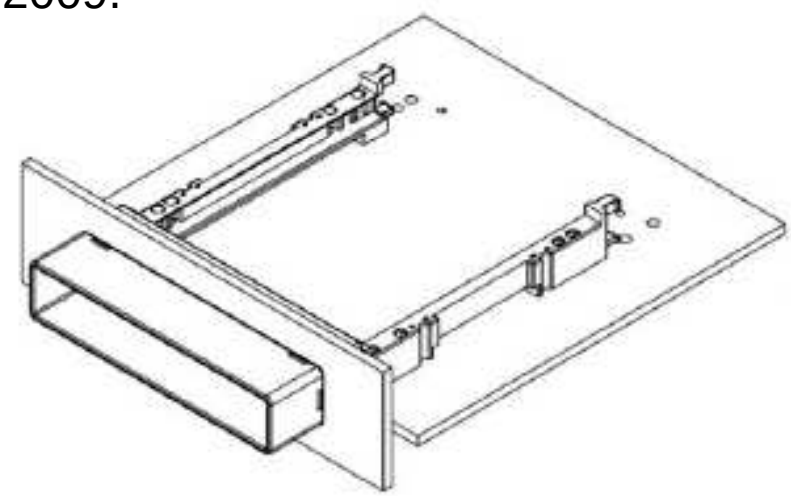
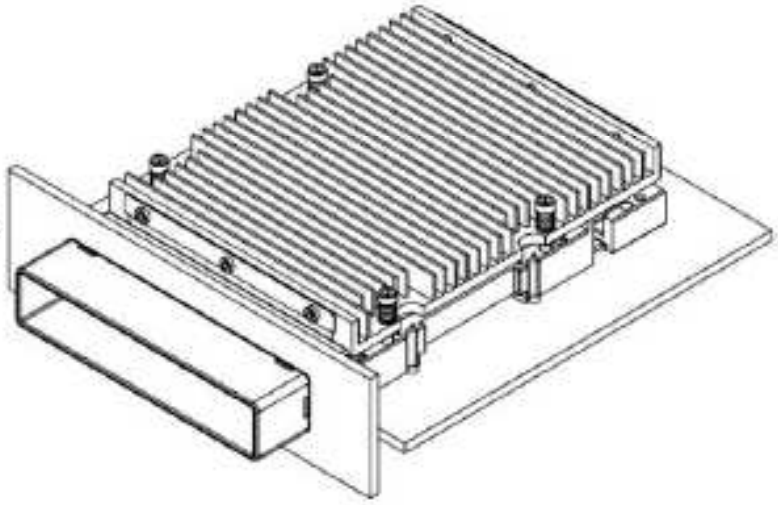
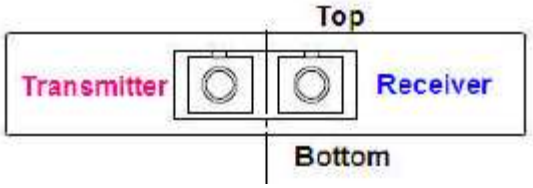
- **ITU SG 15 Q11 G.709 OTN recommendation.**
  - Plenary meeting in October 2009.
  - Expect amendment 4 to G.709 to be consented.
  - The AAP comment process usually takes about 3 – 4 months to complete at which time the Recommendation or Amendment becomes an ITU standard.
- **Amendment 4 adds**
  - OTU3 (43 Gbps) and OTU4 (112 Gbps) mappings.
  - 40GE and 100GE payload types.
  - Additional Fiber Channel and ODU0 (1 GE semi-transparent) mappings
  - Cleans up various semi-transparent 10GE mappings.
  - Additional multiplex methods
- **Amendment 4 may or may not include a new 100G OTU4 FEC.**
  - May not converge on just one solution- in which case there could be multiple options.
- **ITU-T SG15 Q6 G.959.1 OTN optical interface recommendation**
  - Additional interface specifications under discussion
  - Reuse of 100GbE modules (4 x 25 Gbps at 800GHz spacing) for transporting OTL4.4
  - Expect revised G.959.1 to be consented in October 2009

Implementation Status

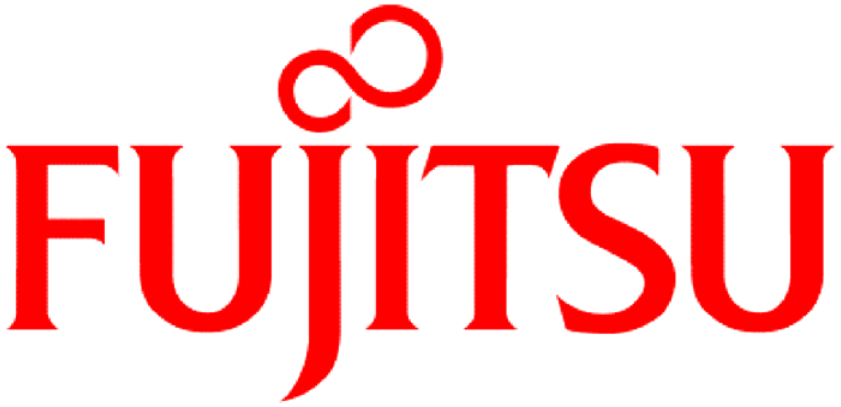
- Draft 2.0 of IEEE 802.3ba is being voted. Lot of comments will need to be resolved before successful ballot.
- MSA has been announced, website launched, drafts of documents posted.
- Early MSA products appear focused on CWDM and parallel-fiber realizations of the IEEE draft document. 100GE / 4 x 25G CWDM unit shown at OFC 2009.







www.cfp-msa.org



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