



Joint ITU/IEEE Workshop on Ethernet - Emerging Applications and Technologies

(Geneva, Switzerland, 22 September 2012)

Status Update on 802.3 40 Gb/s and 100 Gb/s Fiber Optic Task Force

**Daniel Dove
Sr. Director of Technology
Applied Micro
ddove@apm.com**

Geneva, Switzerland, 22 September 2012





IEEE 802.3 Standards



■ IEEE 802.3bm

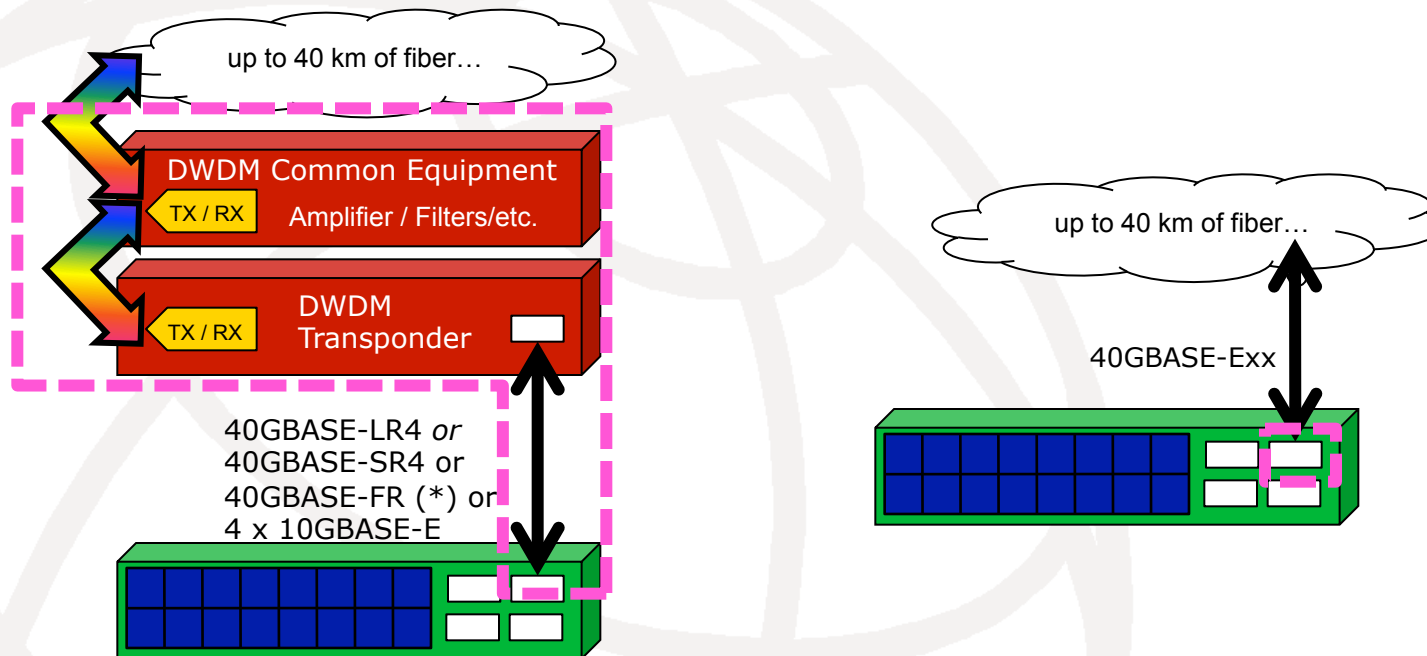
- Next Generation 40 Gb/s and 100 Gb/s Optical Ethernet
 - Defining 40GBASE-ER4 (40km) solution
 - Defining 100GBASE-SR4 solution
 - Defining 100GBASE-nR4 solution
 - Defining a 4x25G Electrical Interface CAUI-4

■ Industry Connections (at the end of presentation)

- Bandwidth Assessment Ad hoc
 - Identified industry trends and bandwidth growth
- Consensus Building for Higher Speed of Ethernet
 - Forum for building consensus towards an 802.3 Call For Interest

- Plan to modify Clause 87 to enable 40 km reach
 - Allow low cost 40G adoption in metropolitan applications
 - CWDM grid leveraged from 40GBASE-LR4
 - Anticipate early baseline proposal to allow industry adoption with low risk of change
 - Anticipate stable parameters early in 2013

A 40km 40GBASE standard can simplify networks



Existing Solution – bulky & costly

- Requires sophisticated user base
- Requires additional equipment
- Optimized for '00s to '000s of km

Proposed Solution – simple...

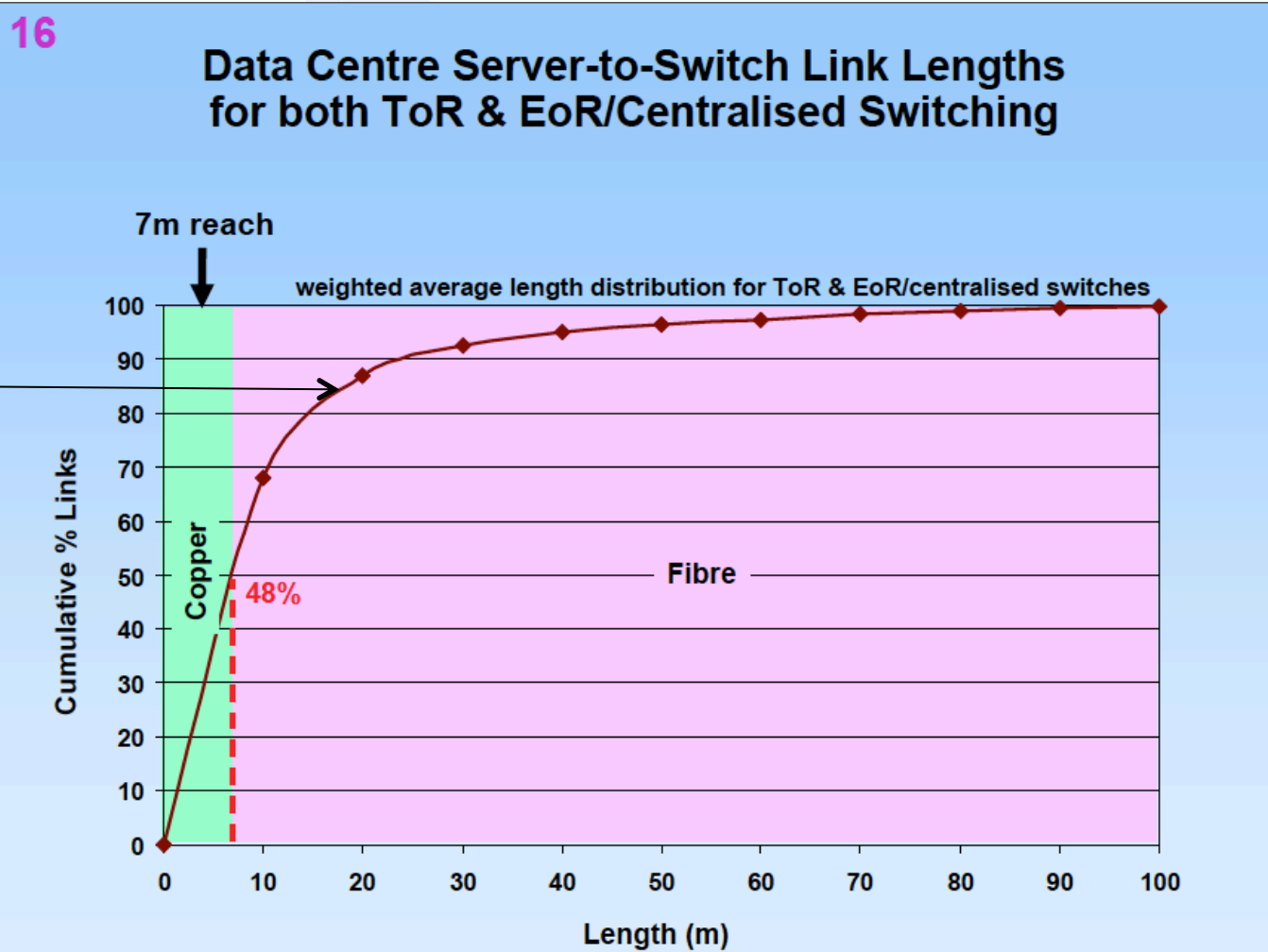
- New PMD only
- Lack of point to point definition in telecom allows for additional Ethernet application

* Added 40GBASE-FR

Ref: cfi_0312_2.pdf

- **100G (C) Attachment Unit Interface**
 - Four lanes @ 25G data rate
 - Reduces width/cost/power of I/O to module
 - Potentially will leverage OIF CEI-VSR-28G
 - Common electrical channel with 802.3bj
 - Single host budget for copper cables, optics
- **Fundamental to reducing cost/power and increasing density of 100G optics**
 - Eliminates need for 10:4 mux/demux (aka: Gearbox) in optical modules

- 4x25G optical interface for MMF
 - Compatible with new 25G I/O
 - Reduce cost, power of transceivers, solution
 - Reduce # of fibers per link
 - Focus on Data Center application
 - May be a single PMD capable of >100m
 - May be two PMDs, one shorter reach (>20m) cost-focused and one >100m
 - Task Force will decide based on cost/performance difference between longer/shorter reach alternatives



Ref: flatman_01_0311_NG100GOPTX.pdf

■ Areas for consideration

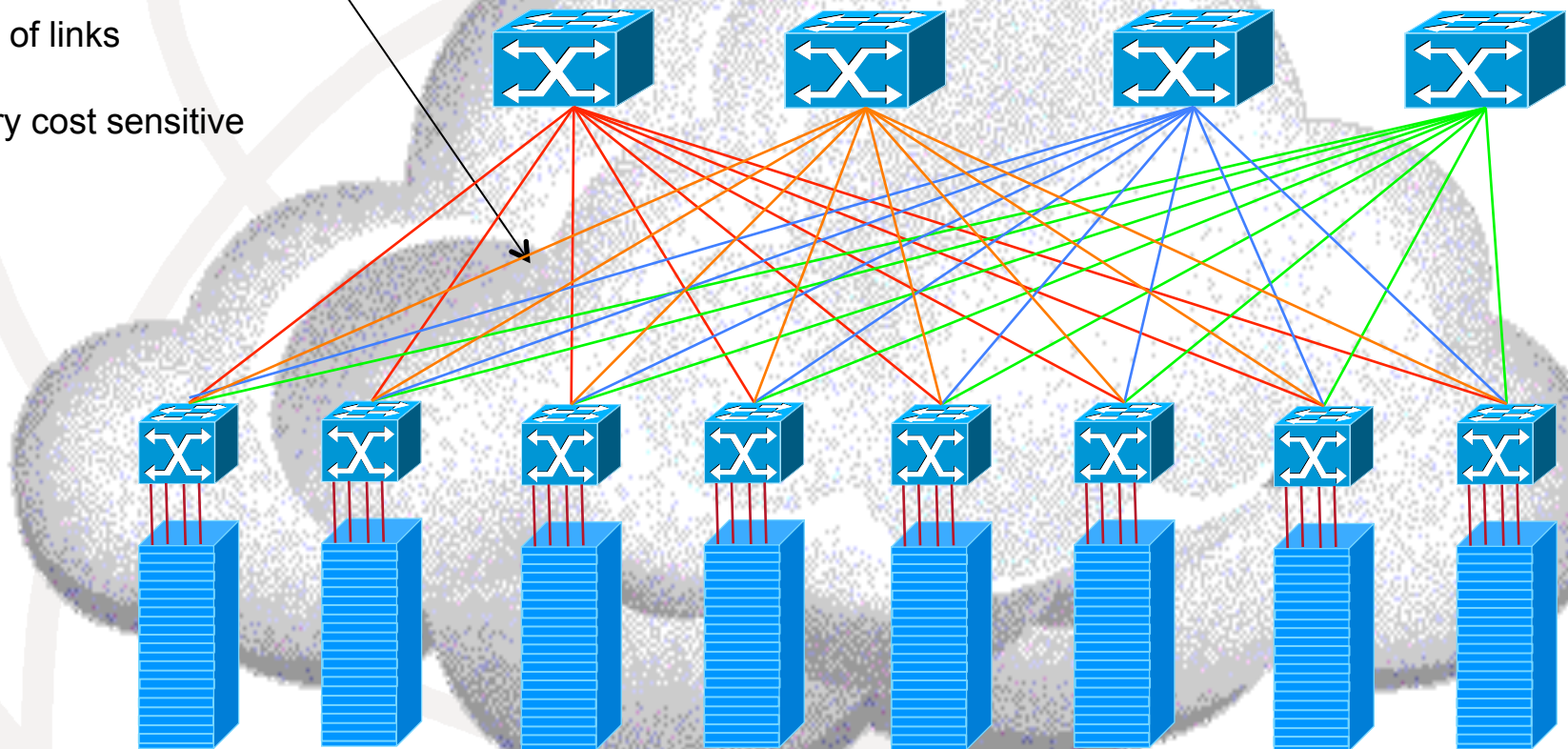
- Equalization; To compensate for BW limitations of VCSELs, PDs, TIAs, traces
- Forward Error Correction (FEC); To increase reach while maintaining BER
- Mode Partition Noise – Effects of higher speed links on existing channel models
- Re-timed vs Un-retimed interfaces

- 4x25G optical interface for SMF
 - Reduce cost, power of transceivers, solution
 - Focus on Data Center application
 - May be a new PMD capable of $\geq 500\text{m}$
 - May be LR4 with 4x25G electrical interface
 - Decision to add a new PMD will be based on cost
 - Alternatives under consideration
 - Multi-pair (4x25G) SMF (eliminate TEC, optical mux/demux)
 - Complex Modulation (reduce optics, move \$ to DSP)
 - CWDM grid spacing (eliminate TEC)

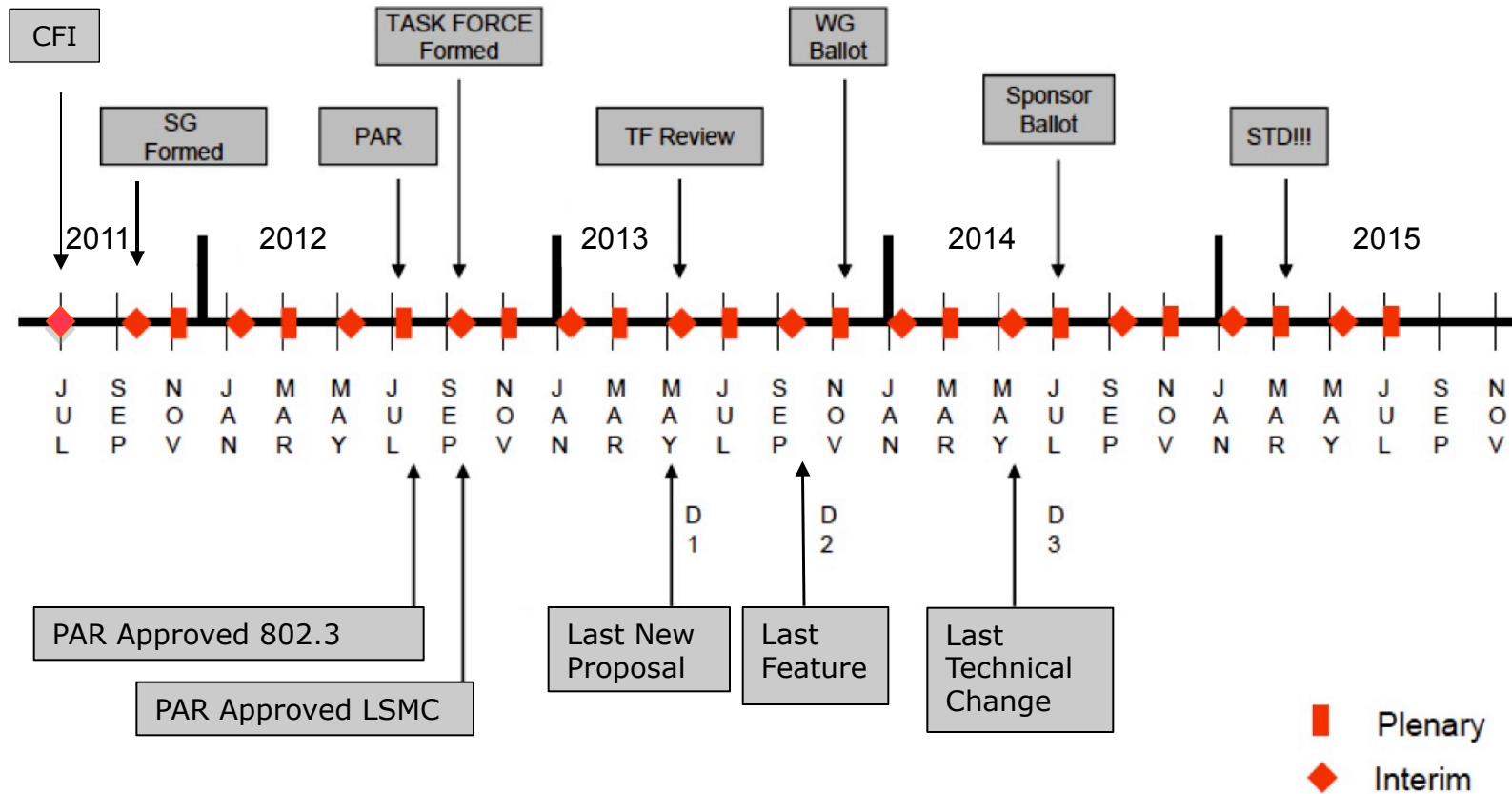
For Massive Data Centers, these links are anticipated to be between 30m and 500m

Lot of links

Very cost sensitive



P802.3bm Schedule (tentative)





Thank You