Mar 2024: P802.3dj Optics Introduction

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Main topics this week (and things to consider)

1) Baseline proposal for recently adopted 20 km objective
   - Task Force adopted new objective in January meeting
   - Work Group approval planned for this week
   - Justification, technical feasibility and proposed objective all in cheng_3dj_01b_2401.pdf
   - Next step: adopt a logic and optical baseline for new objective
     - cheng_3dj_01_2403 proposed
     - Includes some proposed modifications for 40km baseline which will be considered separately
   - There is little IEEE 802.3 precedent for 20km channel model
     - Info and proposal in Stassar_3dj_01_2403
   - Some alternative perspectives in maniloff_3dj_01_2403

Main topics this week (and things to consider)

2) Channel models for our SMF PMDs

- Recent ad hoc had 5 presentations related to this topic
- 3 more presentations this week.
- Multiple considerations going on here (see next slide)

Guide to Channel Models discussions

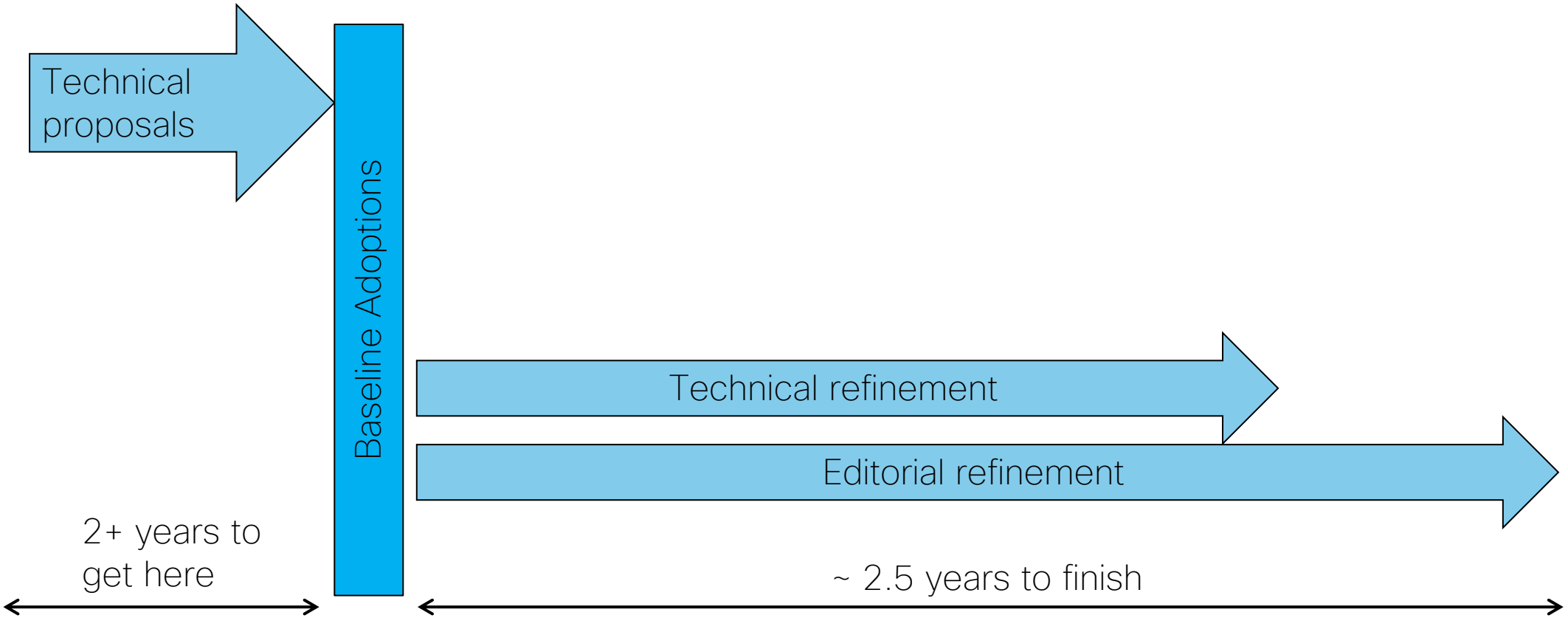
CM_1	CM_2	$CM_{1.1}$
Adoptable "soon"	Adoptable when consensus exists	Adoptable when consensus exists
• Based on ITU interactions & liaison activity • Based on length statistics around multiple fiber segments in cable length • Based on confidence level statistics • Adopted IEEE CM_1 can evolve through review cycles as ITU updates its work	Statistical approach to potential define optimized channel model specifications. Considerations include: • Knowledge of the distributions of fiber & cable properties for the user applications (data center application) • Include transceiver parameters in analysis • Understanding application space requirements – reach and connector distribution data All of this is contribution driven. Further analysis wanted and expected. Requests for data are acceptable but may not be available.	• Update CM_1 with learnings from CM_2 work
 Prime impact to 10km and above PMDs but applicable to all SMF PMDs	 Potential impact to shorter reach PMDs (and future PMDs beyond 802.3dj)	 Improvements to CM_1

Main topics this week (and things to consider)

3) Optical Auto Configuration & Link training

- Two presentations this week
- Task Force should make a decision on whether this capability should be adopted in the draft to initiate its review and scrutiny. Two presentations:
  - Basic OAN proposal – brown_3dj_03_2403
  - Extended Link training (OLT) possibilities - ghiasi_3dj_02_2403
- Step 1 for Task Force: do we want this basic capability in draft or not?

Schedule considerations



Backup

Example P802.3 channel specification methodology

Table 151–13—Fiber optic cabling (channel) characteristics

Description	400GBASE-FR4	400GBASE-LR4-6	Unit
Operating distance (max)	2	6	km
Channel insertion loss[a, b] (max)	4	6.3	dB
Channel insertion loss (min)	0	0	dB
Positive dispersion[b] (max)	6.6	19.9	ps/nm
Negative dispersion[b] (min)	–11.7	–35.2	ps/nm
DGD_max[c]	2.3	4	ps
Optical return loss (min)	25	22	dB

[a] These channel insertion loss values include cable, connectors, and splices.
[b] Over the wavelength range 1264.5 nm to 1337.5 nm for 400GBASE-FR4 and 400GBASE-LR4-6.
[c] Differential Group Delay (DGD) is the time difference at reception between the fractions of a pulse that were transmitted in the two principal states of polarization of an optical signal. DGD_max is the maximum differential group delay that the system is required to tolerate.

151.11 Characteristics of the fiber optic cabling (channel)

The 400GBASE-FR4 and 400GBASE-LR4-6 fiber optic cabling shall meet the specifications defined in Table 151–13. The fiber optic cabling consists of one or more sections of fiber optic cable and any intermediate connections required to connect sections together.

Example P802.3 channel specification methodology

151.11.1 Optical fiber cable

The optical fiber cable requirements are satisfied by cables containing ITU-T G.652.B (dispersion unshifted), type G.652.D (low water peak, dispersion unshifted), or type G.657.A1, or type G.657.A2 (bend insensitive) fibers, or the requirements in Table 151–14 where they differ.

Table 151–14—Optical fiber and cable characteristics

Description	Value	Unit
Nominal fiber specification wavelength	1310	nm
Cabled optical fiber attenuation (max)	0.47[a] or 0.5[b]	dB/km
Zero dispersion wavelength (λ_0)	$1300 \le \lambda_0 \le 1324$	nm
Dispersion slope (max) (S_0)	0.092	ps/nm^2 km

[a] The 0.47 dB/km at 1264.5 nm attenuation for optical fiber cables is derived from Appendix I of ITU-T G.695.
[b] The 0.5 dB/km attenuation is provided for Outside Plant cable as defined in ANSI/TIA 568-C.3.