# Moving Forward with the IEEE P802.3ct Project

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Joint IEEE P802.3cn / IEEE P802.3ct Task Force Interim Teleconference Meeting,
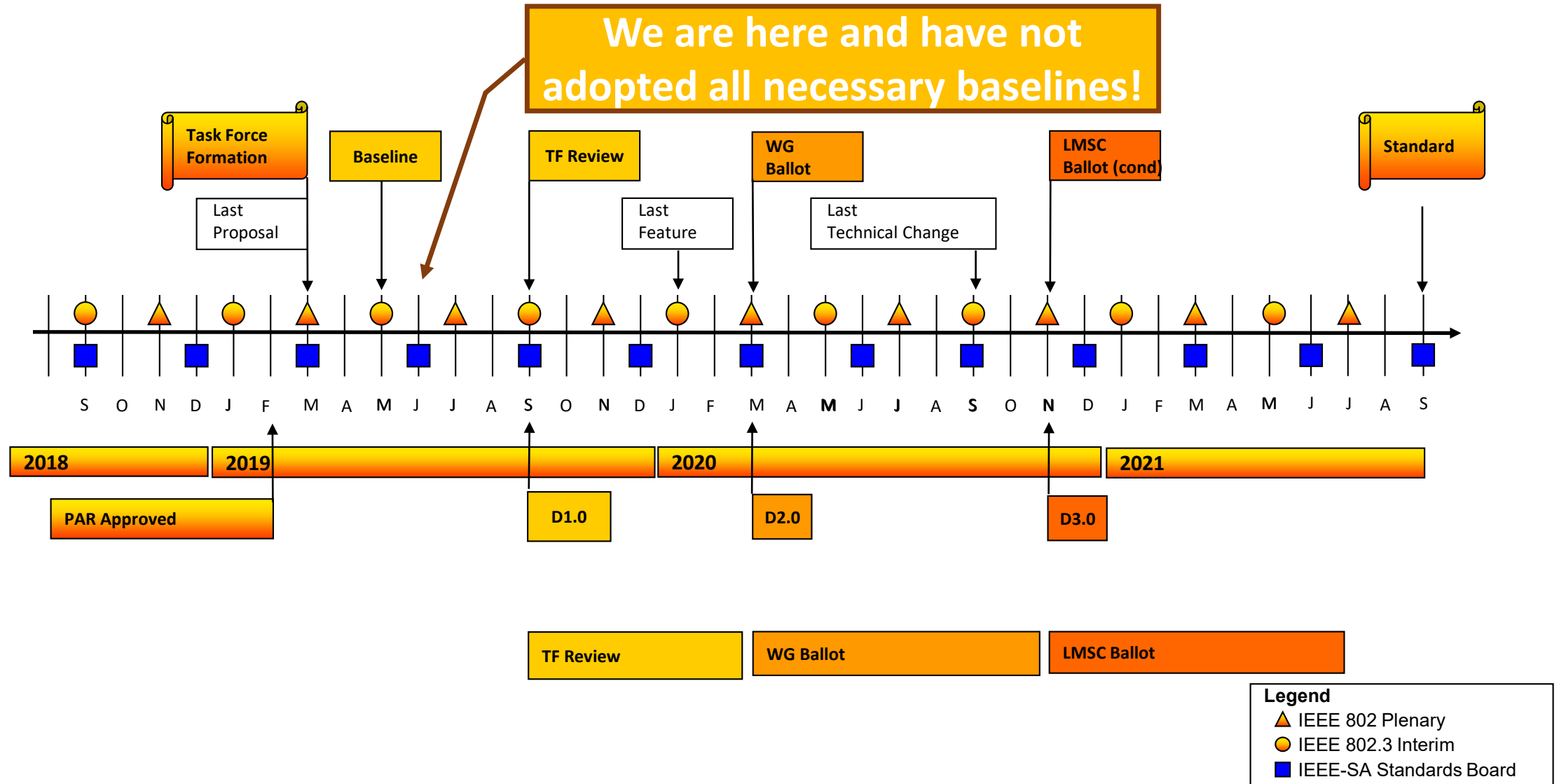
June 6, 2019

# Introduction

- This presentation reviews status of IEEE P802.3ct project and associated needed baselines, and discusses path forward

# The Role of the Chair

- Per the IEEE 802.3 Ethernet WG Operations Manual (http://www.ieee802.org/3/rules/P802_3_rules.pdf)
  - The operation of the TF has to be balanced between democratic procedures that reflect the desires of the TF members and the TF Chair's responsibility to produce a draft standard, recommended practice, or guideline in a reasonable amount of time for review and approval by the WG. Robert's Rules of Order shall be used in combination with these operating rules to achieve this balance.
  - The full responsibilities of the chair are specified in 3.4.3 Task Force Chair's Responsibilities.
- Reminder - individual standards activities within the WG are, at the discretion of the WG, carried out by Task Forces (TF) operating under, and reporting to, the WG.

# IEEE P802.3ct Adopted Timeline

**We are here and have not adopted all necessary baselines!**

Task Force Formation

Baseline

TF Review

WG Ballot

LMSC Ballot (cond)

Standard

Last Proposal

Last Feature

Last Technical Change

S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S

2018 | 2019 | 2020 | 2021

PAR Approved

D1.0

D2.0

D3.0

TF Review

WG Ballot

LMSC Ballot

**Legend**
△ IEEE 802 Plenary
● IEEE 802.3 Interim
■ IEEE-SA Standards Board

# Status - High Level Decisions

| | 100GbE | 400 GbE |
|---|---|---|
| **Channel Model** | stassar_3ct_01a_0519.pdf | stassar_3ct_01a_0519.pdf<br>zhang_3ct_01a_0519.pdf |
| **# of Channels** | ? | ? |
| **Channel Spacing** | 100 GHz | 100 GHz |
| **Modulation Format** | DP-DQPSK | DP-16QAM |
| **Frame Assumption** | Same as OTN uses for 100G-DP-DQPSK | 400GBASE-ZR PCS/PMA |
| **FEC** | Staircase (ITU-T G.709.2) | CFEC |
| **Tx Metric** | stassar_3ct_01a_0519.pdf | stassar_3ct_01a_0519.pdf<br>zhang_3ct_01a_0519.pdf |
| **AUI Attachment** | Inverse RS-FEC Sublayer | 400G XS |

# Other Input (1/2)

- Per zhang_3ct_01a_0519.pdf

  - Point 1 - "We propose to keep as intact as possible the OIF 400ZR Rx specs (lyubomirsky_3ct_01a_0319.pdf) which captures measurable individual impairment tolerance spec [as opposed to the minimum OSNR spec in stassar_3ct_01_0319.pdf]"

  - Point 2 – "We therefore propose the 400GBASE-ZR line system operators comply to the black link table, and the transceiver suppliers comply to the Tx and Rx spec tables."

# Other Input (2/2)

- May 2019 .3ct Strawpolls
  - Straw poll #1
    - I support using a common optical specification methodology for 100 Gb/s and 400 Gb/s in P802.3ct:
    - **Results**         Y: 25      N: 0       Need more information: 3

  - Straw poll #2
    - As the basis of the 100GBASE-ZR and 400GBASE-ZR optical spec baselines I support:
    - A) the tables and listed parameters on slides 5 –7 from stassar_3ct_01a_0519
    - B) individual measurable Rx impairment compliance as per zhang_3ct_01_0519
    - **Results**         A:8        B: 9       Need more information: 10

# RE: Points Raised in zhang_3ct_01a_0519.pdf

- Point #1 –
  - Different SDO's and organizations have different procedures to their standards / specifications
    - IEEE 802 – IEEE-SA standards-based (subsequent submission to ISO/IEC JTC1 SC6)
    - ITU-T – recommendations
    - CableLabs – defines device interface specifications (subsequent submission to SCTE for adoption as an ANSI standlard)
    - OIF – "Implementation Agreements" based (may be leveraged by other standards organizations)
  - These groups may have different technical approaches to writing their specifications

- Point #2 – Compliance or Conformance?
  - Consider market conditions today
  - Reviewing PAR 5.2.b Scope -  "Define
    - physical layer specifications and management parameters for the transfer of Ethernet format frames at 100 Gb/s and 400 Gb/s at reaches greater than 10 km over DWDM systems."
      - Writing conformance specifications not in scope
    - 7.4  Does the sponsor foresee a longer term need for testing and/or certification services to assure conformity to the standard?:
      Additionally, is it anticipated that testing methodologies will be specified in the standard to assure consistency in evaluating conformance to the criteria specified in the standard?
      - P802.3ct Response – No (all IEEE 802.3 projects currently underway – No)
      - Historical review with our WG Chair – "So in summary it looks like this only got as far as AUI cable and the 10BASE-T MAU, no technical work was performed on the standards after 1993, and they were withdrawn in 2007. "
      - Only Ethernet certification testing I am aware of is Ethernet Alliance PoE Certification Program, which uses its own test specification

# Status – Relevant Industry Specifications

- 100 Gb/s
  1. CableLabs – P2P Coherent Optics Physical Layer 1.0 Specification
     - Released June 29, 2018 (http://bit.ly/31fiaTt)
     - Dec 19, 2018 – (http://bit.ly/2MwZjjd)
       - First 100G P2P Coherent Optics Interop
       - Participants included 9 manufacturers from coherent optics space, including both silicon and module/system makers (each brought a module)
     - Jan 2019 Interim – submitted to IEEE 802.3cn Project (http://www.ieee802.org/3/cn/public/19_01/index.html)
  2. ITU-T G.698.2 – Consented version shared with IEEE 802.3 Nov 2018
     - Published 11 Feb 2019, available on ITU-T webpage (https://www.itu.int/rec/T-REC-G.698.2-201811-I/en)

- 400 Gb/s
  1. OIF 400ZR
     - oif2019.161.03 forwarded to IEEE P802.3ct May 2019 Interim
     - Per liaison (http://www.ieee802.org/3/minutes/may19/incoming/OIF_to_IEEE_802.3_400ZR_May_2019.pdf) –
       - EVM specifications, currently in an informative annex
       - Verification of test algorithms and pass criteria will require actual silicon to complete
       - EVM specifications intended for future integration to normative sections of IA.
     - Target date for completion?

# My Optical Baseline Proposal Perspective



IEEE P802.3ct
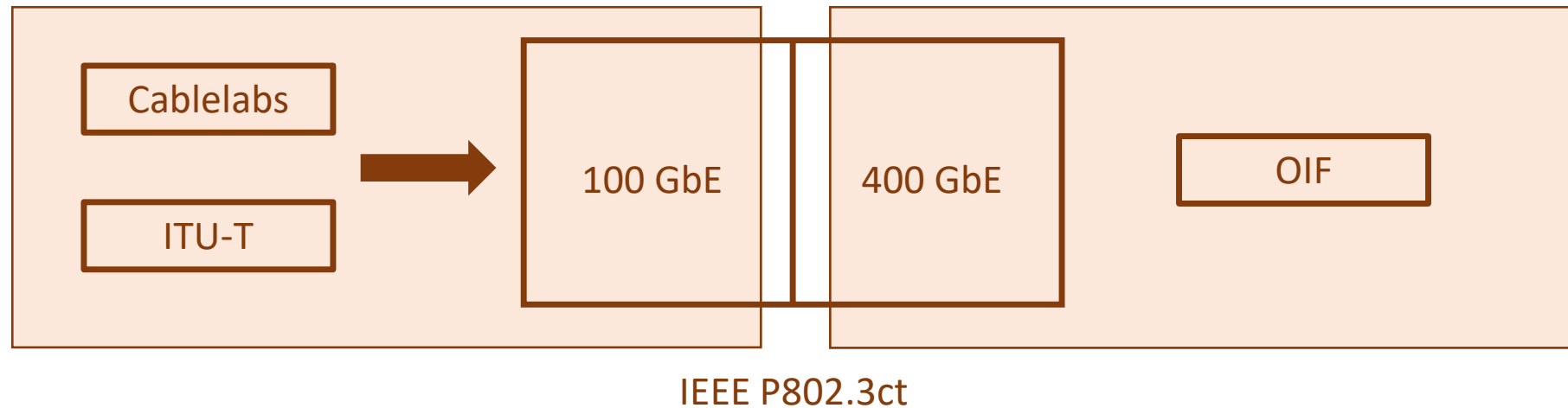
- 1 standard and 1 specification released
- Consensus baseline presentation from participants from both organizations
- Alignment with "traditional" IEEE optical specification approach

- 1 specification in development
- 2 competing baseline proposals
  - zhang_3ct_01a_0519 expressed desire to maintain alignment with OIF approach
    - Not aligned with "traditional" IEEE optical specification approach
  - stassar_3ct_01a_0519.pdf

# Regarding May Strawpolls

- Development of a common optical specification methodology for 100 Gb/s and 400 Gb/s in P802.3ct makes sense – but is it practical from a time perspective?
  - 100 Gb/s standards are done and in industry
  - 400ZR in development – validation of EVM awaiting real silicon, time frame?

- Additional debate on approach of specification methodology anticipated – more time
  - zhang_3ct_01a_0519.pdf
    - Not aligned with traditional IEEE optical specification methodology
    - Will "measurable individual impairment tolerance specs" lead to restrictive specifications, false negatives, and result in higher cost?

# Summary

- We are now behind schedule
  - 100G optical standard / specification look further ahead in terms of industry development
    - Any changes to current approaches could impact cost / deployment
    - Baseline aligned with traditional IEEE approach
  - 400G specification
    - 400G industry work in process
    - Competing baseline proposals
      - stassar_3ct_01a_0519.pdf – aligned with traditional approach
      - zhang_3ct_01a_0519.pdf – not aligned with traditional approach
    - Time needed for resolution of specification approach
- Should the 100G and 400G objectives be split into different projects due to different timelines?

# Summary 2

- # of channels still needs resolved
  - Is there a difference between the required number of channels for 100GbE and 400GbE application spaces?
  - What is cost impact of supporting ≈ all 48 channels or some subset?

- How will the specification be written so that users know which parts interoperate?
  - Potential for additional baselines dependent on decision here

# Backup

Joint IEEE P802.3cn / IEEE P802.3ct Task Force
Interim Teleconference Meeting, June 6, 2019

# # of Channels

| | Start Channel | End Channel | Y / N / Need more info / Abstain |
|---|---|---|---|
| **Mar Strawpoll #1** | **191.3 THz** | **196.1 THz** | **12 / 1 / 17 / 5** |
| **Mar Strawpoll #2** | **191.5 THz** | **196.1 THz** | **11 / 0 / 10 / 9** |

individuals who needed more information on Strawpoll #1 were asked for input on what they were looking for -

- What are cost factors for deploying around end frequencies?
- This is new territory for Ethernet, and some basis for the Task Force decision should be provided.
- Per TF 4/4 Ad hoc Conversation – what is the application need?

# Specification for Device Interoperability

- Traditionally, a PHY name in Ethernet has defined the characteristics, including the wavelength.
  - 100GBASE-ZR -100 Gb/s operation on a single wavelength capable of at least 80 km over a DWDM system
  - 400GBASE-ZR -400 Gb/s operation on a single wavelength capable of at least 80 km over a DWDM system

- For DWDM links these are the three key characteristics that need to match:
  - Transmit Frequency
  - Rx Oscillator Frequency
  - Ports on Mux (i.e. link wavelength)

- How will the specification be written so that users know which parts interoperate?
  - 48 PHY names is possible, but ugly!
  - For example, the ITU-T has an application code (similar to an Ethernet PHY name) and a frequency (transmit and Rx Oscillator Frequency) – which also indicates the link wavelength
  - We need to resolve before ending Task Force Review

Thanks to Pete Anslow