The IEEE P802.3df Project – An Overview

IEEE P802.3df Task Force
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Interim Session

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IEEE P802.3 df Objectives

- **Non-Rate Specific**
  - Support full-duplex operation only
  - Preserve the Ethernet frame format utilizing the Ethernet MAC
  - Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
  - Support a BER of better than or equal to 10 -13 at the MAC/PLS service interface (or the frame loss ratio equivalent)
  - Provide support to enable mapping over OTN
- **200 Gb/s Related**
  - Support a MAC data rate of 200 Gb/s
  - Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 200 Gb/s operation:
    - over 1 pair of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 1 pair of SMF with lengths up to at least 500 m
    - over 1 pair of SMF with lengths up to at least 2 km
- **400 Gb/s Related**
  - Support a MAC data rate of 400 Gb/s
  - Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 400 Gb/s operation:
    - over 2 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 2 pairs of SMF with lengths up to at least 500 m

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IEEE P802.3 df Objectives

- **800 Gb/s Related**
  - Support a MAC data rate of 800 Gb/s
  - Support optional eight-lane 800 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Support optional four-lane 800 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 800 Gb/s operation:
    - over 4 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over eight lanes of twin axial copper cables with a reach up to at least 2 meters
    - over eight lanes over electrical backplanes supporting an insertion loss ≤ 28dB at 26.56GHz
    - over 8 pairs of MMF with lengths up to at least 50 m
    - over 8 pairs of MMF with lengths up to at least 100 m
    - over 8 pairs of SMF with lengths up to at least 500 m
    - over 8 pairs of SMF with lengths up to at least 2 km
    - over 4 pairs of SMF with lengths up to at least 500 m
    - over 4 pairs of SMF with lengths up to at least 2 km
    - over 4 wavelengths over a single SMF in each direction with lengths up to at least 2 km
    - over a single SMF in each direction with lengths up to at least 10 km
    - over a single SMF in each direction with lengths up to at least 40 km

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IEEE P802.3 df Objectives

- **1.6 Tb/s Related**
  - Support a MAC data rate of 1.6 Tb/s
  - Support optional sixteen-lane 1.6 Tb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Support optional eight-lane 1.6 Tb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
  - Define a physical layer specification that supports 1.6 Tb/s operation:
    - over 8 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
    - over 8 pairs of SMF with lengths up to at least 500 m
    - over 8 pairs of SMF with lengths up to at least 2 km

Adopted Physical Layer Objectives

Ethernet Rate	Assumed Signaling Rate	AUI	BP	Cu Cable	MMF 50m	MMF 100m	SMF 500m	SMF 2km	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s	Over 1 lane		Over 1 pair			Over 1 Pair	Over 1 Pair		
400 Gb/s	200 Gb/s	Over 2 lanes		Over 2 pairs			Over 2 Pair			
800 Gb/s	100 Gb/s	Over 8 lanes	Over 8 lanes	Over 8 pairs	Over 8 pairs	Over 8 pairs	Over 8 pairs	Over 8 pairs		
	200 Gb/s	Over 4 lanes		Over 4 pairs			Over 4 pairs	1) Over 4 pairs 2) Over 4 λ's		
	TBD								Over single SMF in each direction	Over single SMF in each direction
1.6 Tb/s	100 Gb/s	Over 16 lanes								
	200 Gb/s	Over 8 lanes		Over 8 pairs			Over 8 pairs	Over 8 pairs		

Making it all work together

Technology Reuse

Leverage existing or work-in-progress 100 Gb/s per lane (e.g. 3cu, 3ck, 3db) to higher lane counts

Develop 200 Gb/s per lane electrical signaling for 1/2/4/8 lane variants of AUIs and electrical PMDs

Develop 200 Gb/s per optical fiber for 1/2/4/8 fiber based optical PMDs and 4 lambda WDM optical PMD

Potential for either direct detect and / or coherent signaling technology

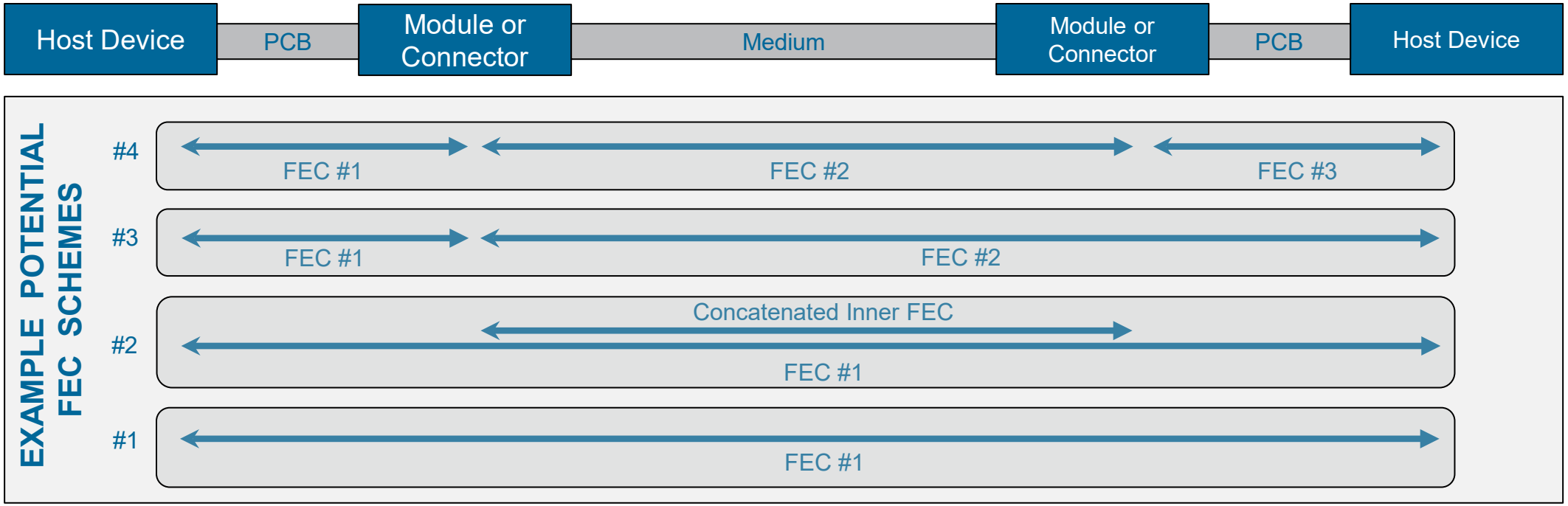
Technical Framing & Overview

- At 18 Jan 2022 Meeting, further technical insight will be provided by Track Chairs –
  - Architecture and Logic Overview, Gustlin
  - Optical PMDs Overview, Nowell
  - Electrical PMDs and AUIs Overview, Lusted

Development of Architecture & FEC Schemes

ARCHITECTURE

May need to enable one or more FEC schemes and apply to project's other Ethernet rates

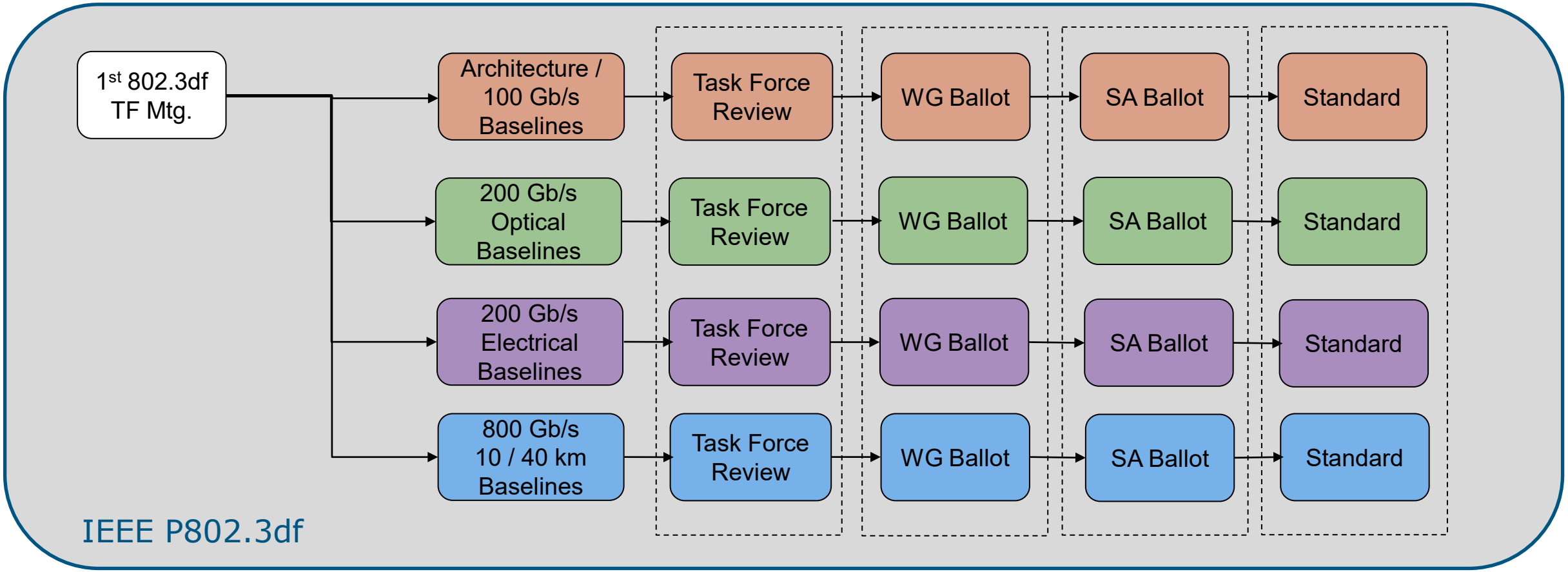


Organization of Project Work

Logic	Electrical	Optical
• Amendments to MAC, RS, and MAC PHY interfaces • RS and MII • Extender Sublayers? • PCS functions • PMA functions • Provide support to enable mapping over OTN	• Extender Sublayer? • C2C AUIs • C2M AUIs • Copper PMDs • Channel characteristics for electrical interfaces and PMDs	• Optical PMDs • MDIs? • Media Characteristics
FEC Architecture and Budget		
• Overall Architecture	• FEC related to electrical interfaces and PMDs	• FEC related to Optical PMDs
• Management related to Logic functions (Clauses 30, 45, etc.)	• Management related to electrical interfaces and PMDs (Clauses 30, 45, etc.)	• Management related to Optical PMDs (Clauses 30, 45, etc.)

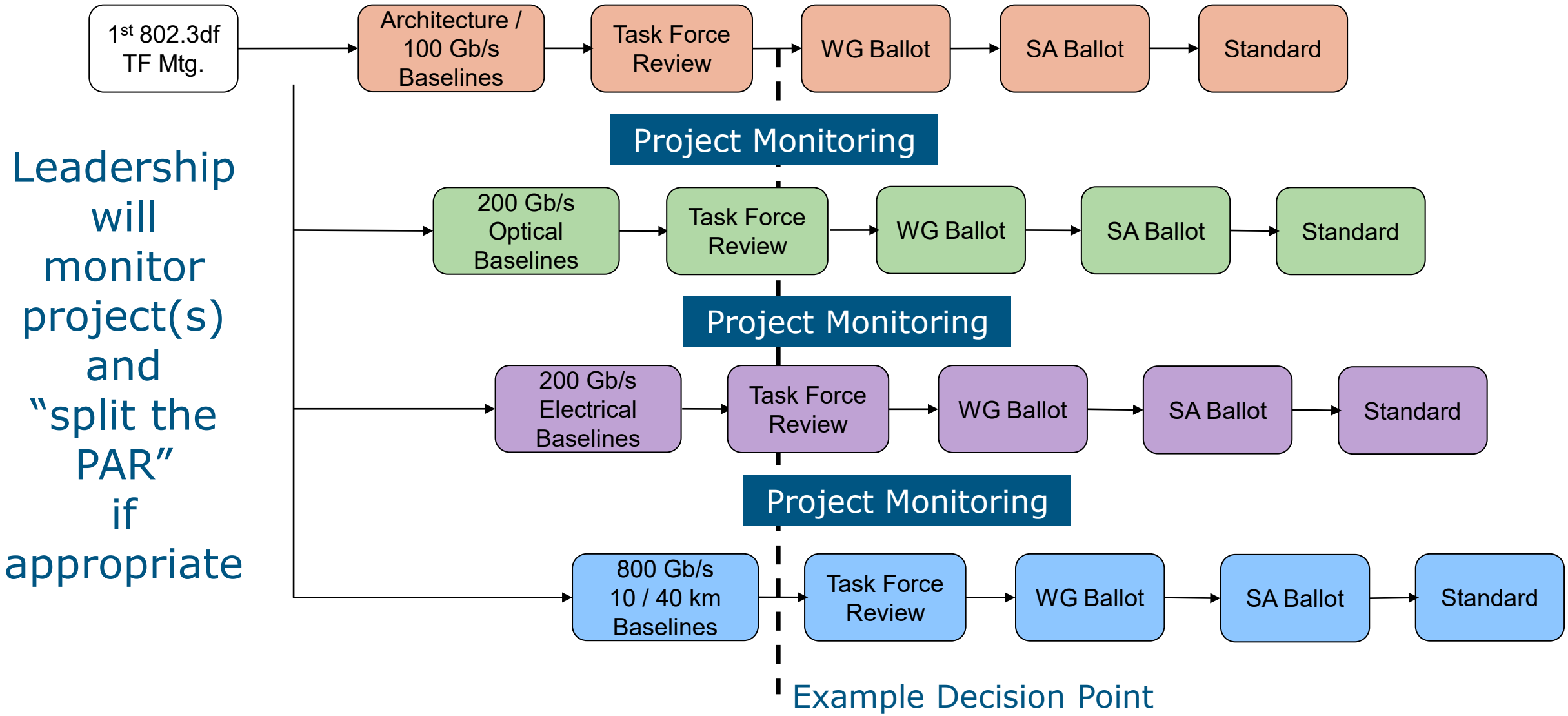
Further insight to be provided by Track Leadership @ 18 Jan 2022 Meeting

Project Flow – Ideal Circumstances



Under "ideal circumstances" the various technology branches will align.

Project Flow – Potential Reality



Leadership will monitor project(s) and "split the PAR" if appropriate

Moving Forward

- The development of the overall architecture is key.
- Timelines for different technology branches are unknown at this point, but TF leadership will monitor to progress the project.
- "Splitting the PAR" is a known process in IEEE 802
  - PER IEEE 802 Operations Manual, Section 9.2 IEEE 802 LMSC approval

    At the discretion of the IEEE 802 LMSC Chair, PARs for ordinary items (e.g., Maintenance PARs) and PAR changes essential to the orderly conduct of business (e.g., division of existing work items or name changes to harmonize with equivalent ISO JTC-1 work items) may be placed on the IEEE 802 LMSC agenda if delivered to IEEE 802 LMSC members 48 hours in advance