IEEE P802.3cn Task Force:
50 Gb/s, 100 Gb/s, 200 Gb/s, and 400 Gb/s over Single-Mode Fiber and DWDM

Closing Report

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IEEE P802.3cn Task Force Project information

Task Force Organization
John D'Ambrosia, Chair, IEEE P802.3cn Task Force

Editorial Team (So far…)
➢ Pete Anslow – 40Km Objectives Supporting Clauses
➢ Peter Stassar – 40km Optical PHY Clauses

Task force web and reflector information
➢ Reflector: http://www.ieee802.org/3/cn/reflector.html
➢ Home page: http://www.ieee802.org/3/cn/index.html

Project Documentation
➢ PAR :   http://www.ieee802.org/3/cn/P802.3cn_PAR.pdf
➢ *CSD*:   https://mentor.ieee.org/802-ec/dcn/18/ec-18-0166-00-ACSD-802-3cn.pdf
➢ Objectives: http://www.ieee802.org/3/B10K/project_docs/Objectives_180712.pdf
➢ Timeline   None Adopted

Ad Hoc page   http://www.ieee802.org/3/cn/public/adhoc/index.html

Private Area   None Yet

This Week's Accomplishments

➢ 14 technical presentation

➢ Liaisons

    ➢ COBO – No Input

    ➢ ITU-T SG15 to IEEE 802.3: <u>ITU-T SG15 to IEEE 802.3 regarding SG15 work on G.709.3 and G.698.2:</u> Deferring response to January 2019

    ➢ OIF: 400ZR Interop: Deferring response to January 2019

➢ Decisions

    ➢ Defined nomenclature: Results y/n/a: 48 / 0 / 3

- 50GBASE-ER   50 Gb/s operation over at least 40 km of SMF
- 200GBASE-ER4   200 Gb/s operation over four wavelengths capable of at least 40 km of SMF
- 400GBASE-ER8   400 Gb/s operation over eight wavelengths capable of at least 40 km of SMF
- 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

This Week's Accomplishments

- Adopted Baselines
  - 50GbE for 40km   Results y/n/a: 57 / 0 / 3
  - 200GbE for 40km   Results y/n/a: 61 / 0 / 3
  - 400GbE for 40km   Results y/n/a: 63 / 0 / 7
- For 400GbE / 80km Related
  - Adopted DP-16QAM modulation format for the 400 GbE 80km objective
        Results y/n/a: 65 / 0 / 7
  - Adopted FEC proposal made in lyubomirsky_3cn_02a_1118 (CFEC)
        Results y/n/a: 51 / 0 / 15
- Agreed to split project into two projects (P802.3cn / P802.3ct)
        Results y/n/a: 51 / 5 / 19
  - Adopted objectives for both projects   Results y/n/a: 62 / 1 / 7
  - Adopted PARs / CSDs for both   Results y/n/a: 43 / 0 / 1

Summary of Project Division

	50 GbE / 40km	200GbE / 40km	400GbE / 40km	100GbE / 80km	400GbE / 80 km	TDECQ Existing 200GbE / 400 GbE
P802.3cn	√	√	√	√	√	√
P802.3cn mod	√	√	√			√
P802.3ct				√	√	

Summary of Project Documents

IEEE P802.3cn Project Documentation Modification

- Objectives - http://www.ieee802.org/3/cn/proj_doc/3cn_Objectives_181113.pdf
- PAR - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0222-00-00EC-ieee-p802-3cn-draft-par-modification-request.pdf
- CSD - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0223-00-00EC-ieee-p802-3cn-draft-csd-modifications.pdf

IEEE P802.3ct Project Documentation

- Objectives - http://www.ieee802.org/3/cn/proj_doc/3ct_Objectives_181113.pdf
- PAR - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0225-00-00EC-ieee-p802-3ct-draft-par.pdf
- CSD - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0226-00-00EC-ieee-p802-3ct-draft-csd.pdf

IEEE P802.3cn (mod) Adopted Objectives

Support full-duplex operation only*
Preserve the Ethernet frame format utilizing the Ethernet MAC*
Preserve minimum and maximum FrameSize of current Ethernet standard*
Provide appropriate support for OTN*

50 Gb/s Ethernet
> **Support a MAC data rate of 50 Gb/s***
> **Support a BER of better than or equal to 10^-12 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 50 Gb/s***
> **Provide a physical layer specification which supports 50 Gb/s operation over at least 40 km of SMF***

~~100 Gb/s Ethernet~~
> ~~**Support a MAC data rate of 100 Gb/s ****~~
> ~~**Support a BER of better than or equal to 10^-12 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s ****~~
> ~~**Provide a physical layer specification supporting 100 Gb/s operation on a single wavelength capable of at least 80 km over a   DWDM system. ****~~

200 Gb/s Ethernet
> **Support a MAC data rate of 200 Gb/s ****
> **Support a BER of better than or equal to 10^-13 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 200 Gb/s ****
> **Provide a physical layer specification supporting 200 Gb/s operation over four wavelengths capable of at least 40 km of SMF****

400 Gb/s Ethernet
> **Support a MAC data rate of 400 Gb/s *****
> **Support a BER of better than or equal to 10^-13 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 400 Gb/s *****
> **Provide a physical layer specification supporting 400 Gb/s operation over eight wavelengths capable of at least 40 km of SMF* ****
> ~~**Provide a physical layer specification supporting 400 Gb/s operation on a single wavelength capable of at least 80 km over a   DWDM system.*****~~

IEEE P802.3ct Adopted Objectives

Support full-duplex operation only*
Preserve the Ethernet frame format utilizing the Ethernet MAC*
Preserve minimum and maximum FrameSize of current Ethernet standard*
Provide appropriate support for OTN*

~~50 Gb/s Ethernet~~
- ~~Support a MAC data rate of 50 Gb/s*~~
- ~~Support a BER of better than or equal to 10^-12 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 50 Gb/s*~~
- ~~Provide a physical layer specification which supports 50 Gb/s operation over at least 40 km of SMF*~~

100 Gb/s Ethernet
- Support a MAC data rate of 100 Gb/s **
- Support a BER of better than or equal to 10^-12 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s **
- Provide a physical layer specification supporting 100 Gb/s operation on a single wavelength capable of at least 80 km over a   DWDM system. **

~~200 Gb/s Ethernet~~
- ~~Support a MAC data rate of 200 Gb/s **~~
- ~~Support a BER of better than or equal to 10^-13 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 200 Gb/s **~~
- ~~Provide a physical layer specification supporting 200 Gb/s operation over four wavelengths capable of at least 40 km of SMF**~~

400 Gb/s Ethernet
- Support a MAC data rate of 400 Gb/s ***
- Support a BER of better than or equal to 10^-13 at the MAC/PLS service interface (or the frame loss ratio equivalent) for 400 Gb/s ***
- ~~Provide a physical layer specification supporting 400 Gb/s operation over eight wavelengths capable of at least 40 km of SMF* **~~
- Provide a physical layer specification supporting 400 Gb/s operation on a single wavelength capable of at least 80 km over a   DWDM system.***

IEEE P802.3cn PAR (mod)
IEEE P802.3ct PAR

2.1 Title

P802.3cn (mod): Standard for Ethernet Amendment: Physical Layers and Management Parameters for 50 Gb/s, ~~100 Gb/s,~~ 200 Gb/s, and 400 Gb/s Operation over Single-Mode Fiber ~~and DWDM (dense wavelength division multiplexing) systems~~

P802.3ct: Standard for Ethernet Amendment: Physical Layers and Management Parameters for ~~50 Gb/s,~~ 100 Gb/s~~, 200 Gb/s,~~ and 400 Gb/s Operation over ~~Single-Mode Fiber and~~ DWDM (dense wavelength division multiplexing) systems

4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:

P802.3cn (mod): ~~07/2020~~ 11/2019

P802.3ct: 7/2020

4.3 Projected Completion Date for Submittal to RevCom

P802.3cn (mod): ~~02/2021~~ 5/2020

P802.3ct: 2/2021

5.2.b. Scope of the project

P802.3cn (mod): Define physical layer specifications and management parameters for the transfer of Ethernet format frames at 50 Gb/s, ~~100 Gb/s,~~ 200 Gb/s, and 400 Gb/s at reaches greater than 10 km over single-mode fiber ~~and DWDM systems~~. Make TDECQ (Transmitter and dispersion eye closure for PAM4) related changes to existing 200 Gb/s and 400 Gb/s physical medium dependent sublayers over single-mode fiber.

P802.3ct: Define physical layer specifications and management parameters for the transfer of Ethernet format frames at ~~50 Gb/s,~~ 100 Gb/s~~, 200 Gb/s,~~ and 400 Gb/s at reaches greater than 10 km over ~~single-mode fiber and~~ DWDM systems. ~~Make TDECQ (Transmitter and dispersion eye closure for PAM4) related changes to existing 200 Gb/s and 400 Gb/s physical medium dependent sublayers over single-mode fiber.~~

5.5 Need for the Project:

P802.3cn (mod): Optical solutions targeting greater than 10 km over single-mode fiber will address the bandwidth requirements of mobile backhaul networks fueled by consumer video. ~~Optical solutions targeting greater than 10 km over a DWDM system will address the bandwidth growth and reach requirements of Cable/MSO (multiple system operator) distribution networks, mobile backhaul networks, and interconnect for distributed data centers where reaches greater than 10 km are required, or where fiber availability drives the need for multiple instances of Ethernet over a DWDM system.~~

P802.3ct: ~~Optical solutions targeting greater than 10 km over single-mode fiber will address the bandwidth requirements of mobile backhaul networks fueled by consumer video.~~ Optical solutions targeting greater than 10 km over a DWDM system will address the bandwidth growth and reach requirements of Cable/MSO (multiple system operator) distribution networks, mobile backhaul networks, and interconnect for distributed data centers where reaches greater than 10 km are required, or where fiber availability drives the need for multiple instances of Ethernet over a DWDM system.

5.6 Stakeholders for the Standard:

P802.3cn (mod): Users and producers of systems and components for mobile backhaul networks, ~~cable/multi-service operator (MSO) distribution networks, data center interconnect networks~~, and any other networks needing reaches in excess of 10 km over single-mode fiber ~~or DWDM systems~~.

P802.3ct: Users and producers of systems and components for mobile backhaul networks, cable/multi-service operator (MSO) distribution networks, data center interconnect networks, and any other networks needing reaches in excess of 10 km over ~~single-mode fiber or~~ DWDM systems.

7.1 Are there other standards or projects with a similar scope?: Yes If Yes please explain:

P802.3cn: Yes If Yes please explain: While there are no other IEEE standards or projects with a similar scope, the IEEE 802.3 Working Group has received liaisons from two organizations indicating that the respective groups have related efforts underway. ITU-T Study Group 15 has communicated that it is revising Recommendation ITU-T G.698.2 to include multi-vendor interoperable 100 Gb/s single channel optical interfaces that operate over a DWDM system for approximately 80 km distances. The Optical Internetworking Forum (OIF) has communicated that it is developing the 400ZR Implementation Agreement (IA), which is targeted at (passive) single channel and (amplfied) short-reach DWDM (dense wavelength division multiplexing) / DCI (data center interconnect) pluggable modules with distances supported from 80-120 km. The effort will support 400 Gb/s Ethernet via the 400GAUI-8 interface that is defined by IEEE 802.3. Stakeholders have expressed the desire for this project, as it will define physical layer specifications and Protocol Implementation Conformance Statements (PICS) for 100 Gb/s and 400 Gb/s Ethernet operation over DWDM systems that are consistent and completely integrated with existing IEEE 802.3 Ethernet specifications.

and answer the following

- Sponsor Organization: ITU-T SG15 and OIF
- Project/Standard Number: Recommendation ITU-T G.698.2 and OIF 400ZR Implementation Agreement
- Project/Standard Date:
- Project/Standard Title: Recommendation ITU-T G.698.2 Amplified multichannel dense wavelength division multiplexing applications with single channel optical interfaces and OIF 400ZR Implementation Agreement

P802.3cn (mod): No

P802.3ct: Use Current P802.3cn Response

8.1 Additional Explanatory Notes:

P802.3cn (mod):

- It became apparent to the IEEE 802.3 Working Group that the 50 Gb/s, 200 Gb/s, and 400 Gb/s Operation over Single-Mode Fiber portion of the IEEE P802.3cn project, which is an extension of existing IEEE 802.3 specifications, could be developed on a faster timeline than the DWDM portion of the IEEE P802.3cn project. As a result the 100Gb/s and 400 Gb/s Operation over DWDM Systems portion of the project has been removed from the IEEE P802.3cn PAR and placed in the new IEEE P802.3ct amendment PAR.
- Item 5.2b: PAM4 expands to 4-level pulse amplitude modulation
- ~~Item 7.1 Project/Standard date: Recommendation ITU-T G.698.2 anticipated 'consent' date of 19th Oct 2018~~
- ~~Item 7.1 Project/Standard date: OIF 400ZR Implementation Agreement project start date 3rd Nov 2016~~

P802.3ct:

- ~~Item 5.2b: PAM4 expands to 4-level pulse amplitude modulation~~
- Item 7.1 Project/Standard date: Recommendation ITU-T G.698.2 ~~anticipated~~ 'consent' date of 19th Oct 2018
- Item 7.1 Project/Standard date: OIF 400ZR Implementation Agreement project start date 3rd Nov 2016

IEEE 802.3 Criteria for Standards Development (CSD)

The IEEE 802 Criteria for Standards Development (CSD) are defined in Clause 14 of the IEEE 802 LAN/MAN Standards Committee (LMSC) Operations Manual. The criteria include project process requirements ("Managed Objects") and 5 Criteria (5C) requirements. The 5C are supplemented by subclause 7.2 'Five Criteria' of the 'Operating Rules of IEEE Project 802 Working Group 802.3, CSMA/CD LANs'.

The following are the CSD Responses in relation to the IEEE P802.3**cn** PAR

Items required by the IEEE 802 CSD are shown in Black text and supplementary items required by IEEE 802.3 are shown in **blue** text.

Managed Objects

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:
   a) **The definitions will be part of this project.**
   b) **The definitions will be part of a different project and provide the plan for that project or anticipated future project.**
   c) **The definitions will not be developed and explain why such definitions are not needed.**

- The definition of protocol independent managed objects, to be included in Clause 30 of IEEE Std 802.3, will be part of this project.

Coexistence

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

    a) **Will the WG create a CA document as part of the WG balloting process as described in Clause 13?**

    b) **If not, explain why the CA document is not applicable**

- A CA document is not applicable because the proposed project is not a wireless project.

Broad Market Potential

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:
   a) **Broad sets of applicability.**
   b) **Multiple vendors and numerous users.**

- Ethernet is being adopted in new application areas that require longer transmission distances than currently specified by the IEEE 802.3 Ethernet standard for 50 GbE, ~~100 GbE,~~ 200 GbE, and 400 GbE. ~~Mobile backhaul, Cable / MSO, and interconnect for distributed data centers are all looking to deploy an optical Ethernet infrastructure based on physical solution ranges of 40 km to 80 km.~~

  - Optical solutions targeting 40 km over single-mode fiber will address the bandwidth requirements of the access layers of mobile backhaul networks, in particular in China, as forecasted bandwidth data indicates demand fueled by consumer video in excess of other world regions.

  - ~~Optical solutions targeting 80 km over DWDM systems will address the bandwidth growth and reach requirements of Cable/MSO distribution networks, mobile backhaul networks and interconnect for distributed data centers where reaches in excess of 40 km are required or where fiber availability drives the need for multiple instances of Ethernet over a DWDM system.~~

- This project will provide upgrade paths for existing application areas that need greater bandwidth at the reaches specified. ~~Existing industry solutions that currently do not have an upgrade path are:~~

  - Applications over 40 km single-mode fiber migrating from 25 GbE to 50 GbE or 100 GbE to 200 GbE / 400 GbE ***do not have an upgrade path***

  - ~~Applications over 80 km over DWDM systems migrating from 10 Gb/s~~

- ~~Two~~ ***A*** call~~s~~-for-interest for "Beyond 10 km Optical PHYs" **(**for 50 GbE / 200 GbE / 400 GbE ~~and then separately for 100 GbE)~~ had 103 ~~& 124~~ participants ~~respectively~~. ~~In each CFI, a~~***A***pproximately 60 individuals affiliated with at least 39 companies indicated that they would support the standardization process. It is anticipated that there will be sufficient participation to effectively complete the standardization process including individuals from end-users, equipment manufacturers and component suppliers.

Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.
   a) **Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?**
   b) **If the answer to a) is "no", supply the response from the IEEE 802.1 WG.**
   c) **Compatibility with IEEE Std 802.3**
   d) **Conformance with the IEEE Std 802.3 MAC**
   e) **Managed object definitions compatible with SNMP**

- As an amendment to IEEE Std 802.3 the proposed project shall comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q.

- As was the case in previous IEEE Std 802.3 amendments, new physical layers will be defined for 50 Gb/s, ~~100 Gb/s,~~ 200 Gb/s, and 400 Gb/s operation.

- As an amendment to IEEE Std 802.3, the proposed project will conform to the full-duplex operating mode of the IEEE 802.3 MAC.

- By utilizing the existing IEEE Std 802.3 MAC protocol, this proposed amendment will maintain compatibility with the installed base of Ethernet nodes.

- The definition of protocol independent managed objects, to be included in Clause 30 of IEEE Std 802.3, will be part of this project.

Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.

Substantially different from other IEEE 802.3 specifications / solutions.

- ~~While there are no other IEEE standards or projects with a similar scope, the IEEE 802.3 Working Group has received liaisons from two organizations indicating that the respective groups have related efforts underway. ITU-T Study Group 15 has communicated that it is revising Recommendation ITU-T G.698.2 to include multi-vendor interoperable 100 Gb/s single channel optical interfaces that operate over a DWDM system for approximately 80 km distances. The Optical Internetworking Forum (OIF) has communicated that it is developing the 400ZR Implementation Agreement (IA), which is targeted at (passive) single channel and (amplified) short-reach DWDM (dense wavelength division multiplexing) / DCI (data center interconnect) pluggable modules with distances supported from 80-120 km. The effort will support 400 Gb/s Ethernet via the 400GAUI-8 interface that is defined by IEEE 802.3.~~

  ~~Stakeholders have expressed the desire for this project, as it will define physical layer specifications and Protocol Implementation Conformance Statements (PICS) for 100 Gb/s and 400 Gb/s Ethernet operation over DWDM systems that are consistent and completely integrated with existing IEEE 802.3 Ethernet specifications.~~

- There is no IEEE 802.3 standard or project developing a standard that supports point-to-point Ethernet over 40 km of single-mode fiber cabling at a data rate of 50 Gb/s, 200 Gb/s, or 400 Gb/s ~~or 80 km over a DWDM system at a data rate of 100 Gb/s or 400 Gb/s~~.

Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:
   a) **Demonstrated system feasibility.**
   b) **Proven similar technology via testing, modeling, simulation, etc.**
   c) **Confidence in reliability.**

- The principle of building equipment that supports IEEE 802.3 networks operating up to 400 Gb/s Ethernet rates has been amply demonstrated by a broad set of product offerings.

- The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
  - The industry already has experience developing 50 Gb/s per wavelength, direct detect solutions for 50 Gb/s, 200 Gb/s and 400 Gb/s Ethernet ~~and 100 Gb/s and 400 Gb/s coherent detection solutions for metro and long-haul networks~~. Subcomponents or design experience from these can be leveraged for the proposed Physical Layer specifications.
  - The experience gained in the development and deployment of 25 Gb/s and 100 Gb/s optical solutions targeting 40 km is applicable to the development of specifications for components at 50 Gb/s per wavelength targeting 40 km over single-mode fiber. Feasibility data has been presented.
  - ~~The experience gained from the wide deployment of optical coherent detection solutions at single wavelength 100 Gb/s and higher over DWDM systems with much longer reaches than 80 km provides confidence in feasibility of 80 km solutions over a DWDM system.~~

- The reliability of Ethernet components and systems has been established in the target environments with a high degree of confidence.

Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

    a) **Balanced costs (infrastructure versus attached stations).**
    b) **Known cost factors.**
    c) **Consideration of installation costs.**
    d) **Consideration of operational costs (e.g., energy consumption).**
    e) **Other areas, as appropriate.**

- The cost factors for Ethernet components and systems are well known.

- Reasonable cost for the resulting performance will be achieved in this project as established by prior experience in the development of:

  - Ethernet direct detect optical specifications ranging from 50 Gb/s to 400 Gb/s based on the 50 Gb/s per wavelength PMDs

  - ~~Optical coherent detection solutions targeting reaches much longer than 80 km at 100 Gb/s and above that are expected to be cost reduced for 80 km reaches over DWDM systems.~~

- In consideration of installation costs, the project is expected to use proven and familiar media consistent with industry deployments.

- Extended reach optical solutions minimize the need for additional equipment to achieve the target reaches which lowers overall network power consumption.

- Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

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- As an amendment to IEEE Std 802.3, the proposed project will conform to the full-duplex operating mode of the IEEE 802.3 MAC.

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Substantially different from other IEEE 802.3 specifications / solutions.

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  Stakeholders have expressed the desire for this project, as it will define physical layer specifications and Protocol Implementation Conformance Statements (PICS) for 100 Gb/s and 400 Gb/s Ethernet operation over DWDM systems that are consistent and completely integrated with existing IEEE 802.3 Ethernet specifications.

- There is no IEEE 802.3 standard or project developing a standard that supports point-to-point Ethernet ~~over 40 km of single-mode fiber cabling at a data rate of 50 Gb/s, 200 Gb/s, or 400 Gb/s or 80 km~~ over ***an 80km*** DWDM system at a data rate of 100 Gb/s or 400 Gb/s.

Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

a) **Demonstrated system feasibility.**
b) **Proven similar technology via testing, modeling, simulation, etc.**
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- The principle of building equipment that supports IEEE 802.3 networks operating up to 400 Gb/s Ethernet rates has been amply demonstrated by a broad set of product offerings.

- The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.

  - The industry already has experience developing ~~50 Gb/s per wavelength, direct detect solutions for 50 Gb/s, 200 Gb/s and 400 Gb/s Ethernet and~~ 100 Gb/s and 400 Gb/s coherent detection solutions for metro and long-haul networks. Subcomponents or design experience from these can be leveraged for the proposed Physical Layer specifications.

  - ~~The experience gained in the development and deployment of 25 Gb/s and 100 Gb/s optical solutions targeting 40 km is applicable to the development of specifications for components at 50 Gb/s per wavelength targeting 40 km over single-mode fiber. Feasibility data has been presented.~~

  - The experience gained from the wide deployment of optical coherent detection solutions at single wavelength 100 Gb/s and higher over DWDM systems with much longer reaches than 80 km provides confidence in feasibility of 80 km solutions over a DWDM system.

- The reliability of Ethernet components and systems has been established in the target environments with a high degree of confidence.

Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

    a) Balanced costs (infrastructure versus attached stations).
    b) Known cost factors.
    c) Consideration of installation costs.
    d) Consideration of operational costs (e.g., energy consumption).
    e) Other areas, as appropriate.

- The cost factors for Ethernet components and systems are well known.
- Reasonable cost for the resulting performance will be achieved in this project as established by prior experience in the development of:
    - ~~Ethernet direct detect optical specifications ranging from 50 Gb/s to 400 Gb/s based on the 50 Gb/s per wavelength PMDs~~
    - Optical coherent detection solutions targeting reaches much longer than 80 km at 100 Gb/s and above that are expected to be cost reduced for 80 km reaches over DWDM systems.
- In consideration of installation costs, the project is expected to use proven and familiar media consistent with industry deployments.
- Extended reach optical solutions minimize the need for additional equipment to achieve the target reaches which lowers overall network power consumption.
- Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

WG Motion

Move that the IEEE 802.3 Working Group approve:

IEEE P802.3cn Project Documentation Modification

- Objectives - http://www.ieee802.org/3/cn/proj_doc/3cn_Objectives_181113.pdf
- PAR - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0222-00-00EC-ieee-p802-3cn-draft-par-modification-request.pdf
- CSD - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0223-00-00EC-ieee-p802-3cn-draft-csd-modifications.pdf

IEEE P802.3ct Project Documentation

- Objectives - http://www.ieee802.org/3/cn/proj_doc/3ct_Objectives_181113.pdf
- PAR - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0225-00-00EC-ieee-p802-3ct-draft-par.pdf
- CSD - https://mentor.ieee.org/802-ec/dcn/18/ec-18-0226-00-00EC-ieee-p802-3ct-draft-csd.pdf

M: John D'Ambrosia

S: Pete Anslow

Technical (>75%)

Results: Y: 90   N: 0   A: 2

Motion: Passes

Next Steps

- Pending approval of 802.3cn (mod) / 802.3ct request –
    - Develop draft based on adopted baselines for 40 km related objectives
- Teleconferences Anticipated, but not scheduled yet
    - 100 GbE Architecture
    - 400 GbE Logic
    - Compliance Metrics
- Next F2F meeting – Jan 2019 Interim, Long Beach CA, USA.

Questions?

Thank you!