IEEE 802.3
Physical Layers for increased-reach Ethernet optical subscriber access (Super-PON) Study Group
Closing Report

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Google

Bangkok, Thailand

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IEEE 802.3 Super-PON Study Group
Project Information

Study Group Organization

Claudio DeSanti, IEEE 802.3 Super-PON Study Group Chair

Duane Remein, IEEE 802.3 Super-PON Study Group Secretary

Study Group web and reflector information

Reflector information: http://www.ieee802.org/3/SUPER_PON/reflector.html

Home page: http://www.ieee802.org/3/SUPER_PON/index.html

Project documentation – adopted by the Study Group

Draft PAR: https://mentor.ieee.org/802-ec/dcn/18/ec-18-0177-02-00EC-ieee-p802-3cs-draft-par.pdf

Draft CSD: https://mentor.ieee.org/802-ec/dcn/18/ec-18-0178-01-00EC-ieee-p802-3cs-draft-csd.pdf

Draft objectives: http://www.ieee802.org/3/SUPER_PON/Super-PON_Objectives.pdf

Timeline: N/A

IEEE 802.3 Super-PON Study Group
Accomplishments in this week

Two presentations

- Quasi-Coherent Detection for Super-PON
- Super-PON Economic Feasibility

Reviewed and resolved comments submitted against project documentation

- Draft PAR and draft CSD were pre-submitted for 802 review
- Summary/Response: http://www.ieee802.org/3/SUPER_PON/public/201811/Super-PON_Response_to_Comments.pdf

Adopted updated PAR

- Approved 25/0/0

Adopted updated CSD

- Approved 25/0/0

IEEE P802.3cs Project Documentation

Objectives

- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Support a BER of better than or equal to 10^{-12} at the MAC/PLS service interface (or the frame loss ratio equivalent)
- Support a passive point-to-multipoint ODN with a reach of at least 50 km with at least 1:64 split ratio per wavelength pair
- Support at least 16 wavelength pairs for point-to-multipoint PON operation
- Support the MAC data rate of 10Gb/s downstream
- Support the MAC data rates of 2.5Gb/s and 10Gb/s upstream
- Leverage existing EPON PCS and PMA to support the above MAC data rates
- Support tunable transmitters

Updated Objectives

- Provide Physical Layer specifications that:
  - Preserve the Ethernet frame format utilizing the Ethernet MAC
  - Support a BER of better than or equal to 10^{-12} at the MAC/PLS service interface (or the frame loss ratio equivalent)
  - Support a passive point-to-multipoint ODN with a reach of at least 50 km with at least 1:64 split ratio per wavelength pair
  - Support at least 16 wavelength pairs for point-to-multipoint PON operation
  - Support the MAC data rate of 10Gb/s downstream
  - Support the MAC data rates of 2.5Gb/s and 10Gb/s upstream
  - Leverage existing EPON PCS and PMA to support the above MAC data rates
  - Support tunable transmitters

WG Motion #1

Move that the IEEE 802.3 Working Group approve the IEEE P802.3cs Super-PON objectives, as per slide 6 of 1118_spon_close_report.pdf

M: Claudio DeSanti, S: Mark Laubach

(Technical ≥ 75%)

Y: N: A:

Motion passes by voice

IEEE P802.3cs PAR

2.1 Title: Standard for Ethernet
Amendment: Physical Layers and management parameters for increased-reach point-to-multipoint Ethernet optical subscriber access (Super-PON)

5.2.b. Scope of the project: ~~The scope of this project is to amend IEEE Std 802.3 to add~~ This amendment adds physical layer specifications and management parameters for optical subscriber access supporting point-to-multipoint operations using wavelength division multiplexing over an increased-reach (up to at least 50 km) passive optical network (PON).

5.5 Need for the Project: This project is needed to increase the coverage and reach of PONs to serve more subscribers at a greater distance from the Optical Line Terminal (OLT) location.

5.6 Stakeholders for the Standard: Fixed access providers, wireless access providers, municipal and independent operators, communication systems vendors, communication components and optical device manufacturers, and subscribers.

WG Motion #2

Move that the IEEE 802.3 Working Group approve the IEEE P802.3cs Super-PON PAR, in https://mentor.ieee.org/802-ec/dcn/18/ec-18-0177-02-00EC-ieee-p802-3cs-draft-par.pdf

M: Claudio DeSanti, S: Marek Hajduczenia

(Technical ≥ 75%)

Y: 77, N: 0, A: 2

Motion passes

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**cs** 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.

In addition, it is expected that the protocol-specific definition of managed objects will be added in a future amendment to IEEE Std 802.3.2 for Ethernet YANG Data Model Definitions.

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.

Subscriber access providers have expressed interest in this project to simplify their network topology and reduce the number of Optical Line Terminal (OLT) locations in order to provide services such as:

- Fiber to the Building
- Fiber to the Business
- Fiber to the Home
- Fiber to the Wireless

Multiple vendors of optical sub-assemblies, components, modules, and systems are interested in supporting this technology.

There are multiple potential user groups, especially in countries that are now developing their optical access network infrastructure, including:

- Traditional telco and cable system operators
- Municipal and independent operators
- Wireless infrastructure providers
- Subscribers

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.

The proposed amendment will conform to the IEEE Std 802.3 MAC.

The project will include a protocol independent specification of managed objects.

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.

The project intends to define the use of wavelength multiplexing techniques to carry multiple instances of PON over a single Optical Distribution Network (ODN).

No existing IEEE 802 LMSC standards or approved projects have similar scope.

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.

System feasibility

The basic technology for 10 Gb/s PON systems is well established

Proven similar technology

Multiple vendors provide NG-PON2 equipment, which is a similar technology

Confidence in reliability

This technology has been extensively tested and there have been no issues reported

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.

This project is intended to simplify the network topology by reducing the number of OLT locations and the associated costs.

Cooled/tunable lasers are a known cost factor that can be mitigated by larger volumes and innovative designs.

Construction and facilities operational costs are expected to be lower than current technologies.

WG Motion #3

Move that the IEEE 802.3 Working Group approve the IEEE P802.3cs Super-PON CSD “Managed Objects”, “Coexistence”, “Broad Market Potential”, “Compatibility”, “Distinct Identity”, “Technical Feasibility”, and “Economic Feasibility” responses, in https://mentor.ieee.org/802-ec/dcn/18/ec-18-0178-01-00EC-ieee-p802-3cs-draft-csd.pdf

M: Claudio DeSanti, S: Frank Effenberger

(Technical ≥ 75%)

Y: 76, N: 0, A: 4

Motion passes

WG Motion #4

Move that the IEEE 802.3 Working Group request the first re-chartering of the IEEE 802.3 Physical Layers for increased-reach Ethernet optical subscriber access (Super-PON) Study Group

M: Claudio DeSanti, S: John D'Ambrosia

(> 50%)

Y: 77, N: 0, A: 1

Motion passes

Next Steps

Possible socialization teleconference on December 19, 2018

January interim

- Long Beach, CA, USA
- Week of January 14, 2019

Questions?

Thank you!