

# IEEE 802 “*Network Enhancements for the Next Decade*”

## Industry Connections Activity (Nendica): Status

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# ICA Overview

- IEEE 802 “*Network Enhancements for the Next Decade*” Industry Connections Activity (ICA)
  - ICA: Industry Connections Activity
  - Authorized by IEEE SA
    - Through “Industry Connections Committee (ICCom)”
    - via an “Industry Connections Activity Initiation Document (ICAID)”, parallel to a PAR
    - “Industry Connections activities provide an efficient environment for building consensus and developing many different types of shared results. Such activities may complement, supplement, or be precursors of IEEE Standards projects, but they do not themselves develop IEEE standards.”

# Nendica History

- **Outgrowth of a recommendation of IEEE 802 5G Standing Committee of 2016**
  - Seeking “an external view into general 802 access network” to “support many 802 MACs and PHYs”
  - that view evolved during ICAID development
- **ICAID**
  - March 2017 - March 2019: original ICAID
  - March 2019 - March 2021: renewed ICAID
  - March 2021: ICAID extended through September 2021
  - July 2021: IEEE 802 submitted proposal to renew ICAID through September 2023
  - 15 September 2021: ICCom recommended ICAID renewal
  - 20 September 2021: IEEE SA Industry Engagement and Sector Strategies (IESS) Strategic Management and Delivery Committee (SMDC) considers renewal decision

# Nendica “Motivation and Goal”

- Expiring ICAID emphasizes contrast with IMT-2020
  - removed in current renewal proposal
- Proposed 2021 revision:
  - The goal of this activity is to document emerging requirements and directions for IEEE 802 networks, identify commonalities, gaps, and trends not currently addressed by IEEE 802 standards and projects, and facilitate building industry consensus towards proposals to initiate new standards development efforts. Encouraged topics include enhancements of IEEE 802 communication networks and vertical networks as well as enhanced cooperative functionality among existing IEEE standards in support of network integration. Topics concerning higher-layer applications related to new standards development in the IEEE 802.1 Working Group are also specifically expected and encouraged. Findings related to existing IEEE 802 standards and projects are forwarded to the responsible working groups for further considerations.
  - <https://mentor.ieee.org/802.1/dcn/21/1-21-0011-05-ICne.docx>

# Nendica Overview

- Web site
  - <https://1.ieee802.org/802-nendica/>
- Voting
  - organized under 802.1 WG
  - no members; anyone attending may vote on all motions
- Document storage –mentor
  - [https://mentor.ieee.org/802.1/documents?is\\_group=ICne](https://mentor.ieee.org/802.1/documents?is_group=ICne)
- Mailing List
  - [STDS-802-NEND@LISTSERV.IEEE.ORG](mailto:STDS-802-NEND@LISTSERV.IEEE.ORG)
- Organization
  - Work Items to develop Nendica Reports for publication
  - Study Items for less formal activity, or for proposing a Work Item

# Published Nendica Reports

- IEEE 802 Nendica Report: The Lossless Network for Data Centers (ISBN 978-1-5044-5102-4)
  - Editor: Paul Congdon
  - Published 2018-08-17
- IEEE 802 Nendica Report: Flexible Factory IoT — Use Cases and Communication Requirements for Wired and Wireless Bridged Networks (ISBN 978-1-5044-6229-7)
  - Editor: Nader Zein
  - Published 2020-04-17
- IEEE 802 Nendica Report: Intelligent Lossless Data Center Networks (ISBN 978-1-5044-7741-3)
  - Editor: Liang Guo and Paul Congdon
  - Published 2021-06-22

# Nendica Meetings

- Have been meeting Thursdays (09:00-11:00 ET)
- Authorized to add ad hocs if necessary
- 2021-09-23 agenda:
  - CTF
  - ELLA
  - synchronizing transmitter and receiver for Cyclic Queuing and Forwarding (CQF)

Date	Attendance
2021-09-16	20
2021-09-09	17
2021-09-02	12
2021-08-26	19
2021-08-19	10

Date	Attendance
2021-08-12	14
2021-08-05	23
2021-07-29	11
2021-07-22	13
2021-07-15	34

# Current Nendica Activity

- Study Item: “Cut-Through Forwarding in Bridges and Bridged Networks”
- Study Item: “Evolved Link Layer Architecture [ELLA]”
- New 802.1 Topics
  - ICAID renewal proposal says “Topics concerning higher-layer applications related to new standards development in the IEEE 802.1 Working Group are also specifically expected and encouraged.”
  - on July 20, 2021, the IEEE 802.1 WG Chair notified the 802.1 WG Opening Plenary Meeting of
    - “Migration towards vetting all new work in Nendica”
    - “Strong proposals can be directed to the TG/WG to initiate a PAR; Proposals needing more consensus can be further developed.”
  - Current thinking is that either of two approaches could be used:
    - Individuals may bring topics to WG or TGs and argue that it has been vetted in Nendica
    - Nendica may report to WG or TG that it has completed vetting on a topic and anticipates that further progress should be considered in WG or TG
  - Current thinking is that Nendica could progress discussions on PAR and CSD content but not draft a full PAR
    - Nendica prefers to help accelerate rather than hinder progress



# CTF

- Study Item: “Cut-Through Forwarding in Bridges and Bridged Networks”
  - Initiated March 2021
- Tentative goals
  - Develop IEEE 802 Plenary tutorial on Cut-Through Forwarding (CTF)
  - Identify and analyze relevant technical elements in IEEE Std 802.3
  - Discuss administrative and technical aspects of potential lower layer modelling across IEEE 802.3 and IEEE 802.1 with support for CTF
  - Discuss contributions with input for PAR&CSD of a potential IEEE 802.1 project for standardizing CTF (standalone standard):
    - With support for *IEEE 802.3 compatible real implementations*
    - Incorporate lower layer model with support for CTF, if such a model becomes available during such a project.
- Consensus building
  - Nendica consensus is that further discussion should be brought to the 802.1 WG or a Task Group.
- Planned Presentations (tentative dates)
  - 23 Sept, IEEE WG 802.1: CTF forwarding timing in Industrial Automation
  - 24 Sept, IEEE WG 802.1: On CTF

# ELLA

- Study Item: “Evolved Link Layer Architecture [ELLA]”
  - Initiated 22 July 2021
  - Motion: to initiate a Study Item on Evolved Link Layer Architecture (ELLA), with the goal of producing, by the November 802 Plenary, an informal report documenting:
    - Summary of aspects missing from current IEEE 802 Architecture documentation
    - Potential benefits enabled by additional architectural details
    - Impact of new and evolving technologies on architecture
    - Architectural optimization in specific network environments
    - Possible standardization recommendations
  - Intending to support and inform IEEE 802 activities toward the revision of IEEE Std 802
  - Contribution: 802.1-21-0014-03-ICne
    - Potential Nendica Study Item: Evolving IEEE 802 Architecture Requirements
  - Contribution: 802.1-21-0014-03-ICne
    - Potential Nendica Study Item: Evolving IEEE 802 Architecture Requirements
  - Contribution: 802.1-21-0045-01-ICne
    - ELLA: What is the IEEE 802 Link Layer Service?

# New 802.1 Topic: PFC Headroom

- Contributions (January 2021 to present)
  - <https://www.ieee802.org/1/files/public/docs2021/new-lv-adaptive-pfc-headroom-0121-v02.pdf>
  - <https://www.ieee802.org/1/files/public/docs2021/new-congdon-a-pfc-h-Q-changes-0521-v01.pdf>
  - <https://www.ieee802.org/1/files/public/docs2021/new-lv-adaptive-pfc-headroom-and-PTP-0602-v03.pdf>
  - <https://www.ieee802.org/1/files/public/docs2021/cz-finn-pfc-headroom-0629-v01.pdf>
  - <https://www.ieee802.org/1/files/public/docs2021/new-lv-PFC-Headroom-Project-Proposal-0721-v01.pdf>
  - <https://mentor.ieee.org/802.1/dcn/21/1-21-0048-00-ICne-pfc-headroom-with-macsec.pdf>
  - <https://mentor.ieee.org/802.1/dcn/21/1-21-0050-00-ICne-pfc-enhancements-project-proposal.pdf>
  - <https://mentor.ieee.org/802.1/dcn/21/1-21-0052-00-ICne-pfc-enhancements-next-steps.pdf>
- Goals:
  - Amendment to 802.1Q with limited changes to support the PFC auto-configuration and address errors/omissions
  - Clarify PFC propagation model and operation with MACSec
  - Revive July motion to develop PAR & CSD
- Planned presentations:
  - 24 Sept – TSN TG: PFC headroom proposal
- Status
  - Technical alternatives have been explored with agreement
    - Reuse PTP protocol to measure link delay
    - Update DCBX (using LLDP) to negotiate capability and convey internal processing delay
    - Define PFC shim layer to allow optional MACSec protection of PFC frames.
  - Nendica consensus is that further discussion should be brought to the 802.1 WG or a Task Group based on the PAR description in 802.1-21-0052 (rev 00 or newer).

# New 802.1 Topic: Pulsed Queues

- Contribution
  - [new-specht-non-fifo-queues-0721-v01](#) (26 August)
  - [new-finn-pulsed-queuing-0821-v03](#) (26 August)
  - [new-yizhou-small-cycle-impact-0914-v01](#) (16 September)
- Tentative goals:
  - Demonstrate that the results will be deterministic.
  - Minimize changes to 802.1Q.
  - Maximize utility of basic idea; it may be useful for Asynchronous Traffic Shaping, as well as for Cyclic Queuing and Forwarding and/or Paternoster.
- Planned presentations:
  - 23 Sept: A technique for synchronizing input timing for CQF
  - 30 Sept (tent.): Multi-CQF and Paternoster in the context of Pulsed Queues
- Exploration is in progress; too early to talk about consensus.
  - Future contributions in Nendica are expected