

# 802.1 – Activities & status

Glenn Parsons

Chair, IEEE 802.1 WG

[glenn.parsons@ericsson.com](mailto:glenn.parsons@ericsson.com)

Jessy Rouyer

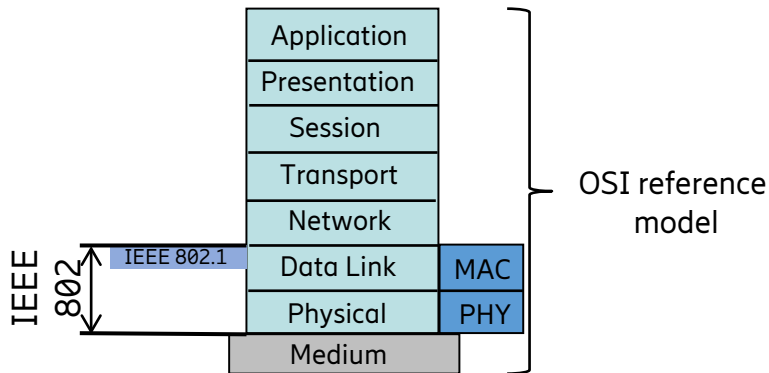
Vice-Chair, IEEE 802.1 WG

[jessy.rouyer@nokia.com](mailto:jessy.rouyer@nokia.com)

November 14, 2022

# IEEE 802.1 Working Group

- Architecture and Bridging
  - Traditionally, the Higher Layer Interface



## IEEE 802.1 Working Group

*Chair: Glenn Parsons*

*Vice-chair: Jessy Rouyer*

### TSN Task Group

*Chair: János Farkas*

### Security Task Group

*Chair: Mick Seaman*

### Maintenance Task Group

*Chair: Paul Congdon*

### YANGsters

*Chair: Scott Mansfield*

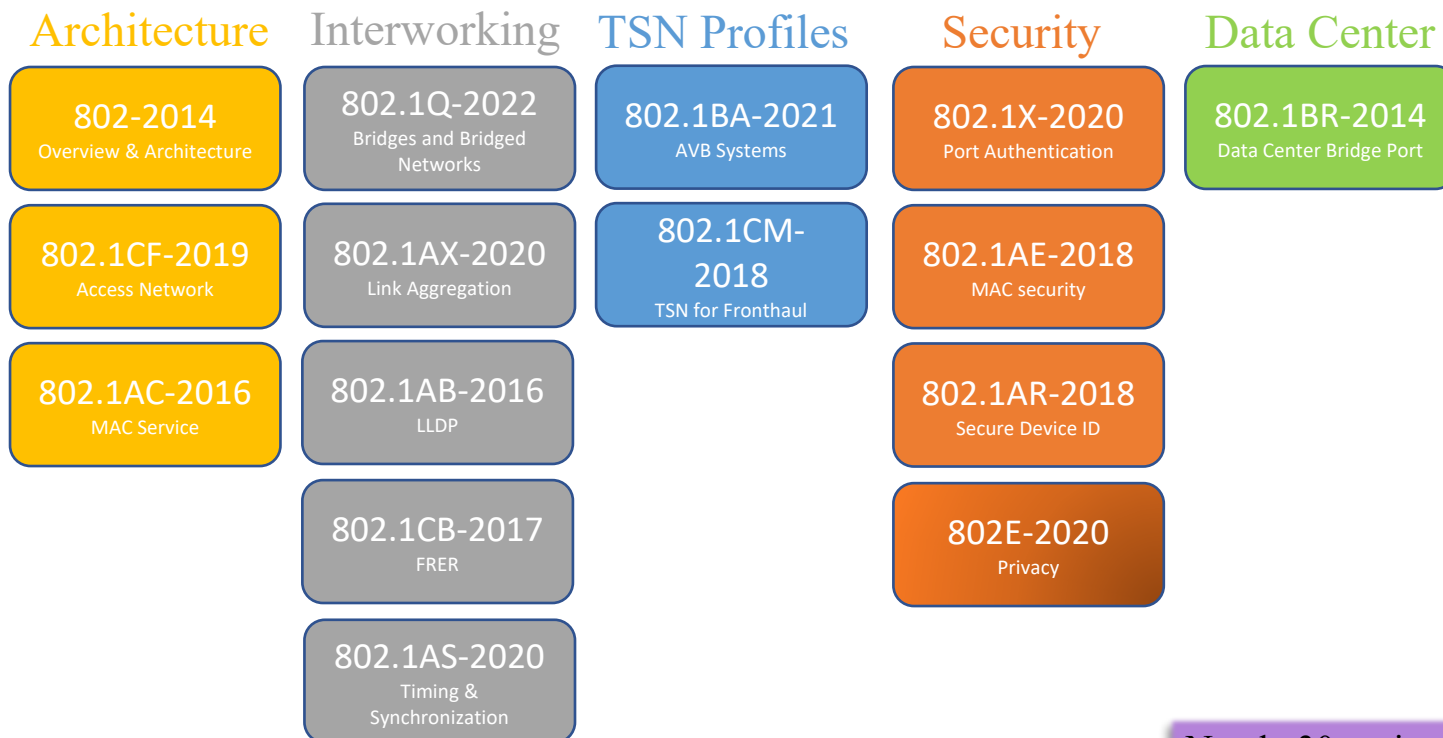
### Nendiica

*Chair: Roger Marks*

# Areas of work

- 802 Architecture and interworking between 802 technologies
  - Cross-802 Architecture group, including “Technical Plenary” if needed
- Time-Sensitive Networking (TSN) Task Group:
  - Bridges and Bridged Networks
  - Discovery mechanisms
  - Link aggregation and protection
  - Time synchronization
  - Enhanced queuing and protection algorithms
  - Congestion management
  - TSN profiles for fronthaul, industrial, automotive and service providers
  - Local Address usage including protocols for local address acquisition
- Security Task Group:
  - Secure frame transmission, Key management and Secure device identity
  - Port authentication
  - Privacy
- Maintenance Task Group
  - Tracking issues reported with published standards
- YANGsters
  - Network Management Data Modelling
- 802 NENDICA
  - IEEE 802 “Network Enhancements for the Next Decade” Industry Connections Activity

# Approved IEEE 802.1 base standards



Nearly 30 projects are underway for new standards, amendments and profiles

# Architecture components

## Architecture

802-2014

Overview & Architecture

Describes the IEEE 802 reference model as well as defining addressing, protocol identifiers and management object identifiers.

802.1CF-2019

Access Network

Recommended Practice that describes an access network (which connects terminals to their access routers) utilizing 802 technologies

802.1AC-2016

MAC Service

Specifies the MAC Service provided by all IEEE 802 LANs

- P802REV
  - Revision required to keep active before 2024
- P802f
  - YANG module for a set of EtherTypes
- P802.1CQ
  - Mechanisms to assign unique addresses for local 48-bit and 64-bit addresses in IEEE 802 networks.

# Interworking components

## Interworking

802.1Q-2022

Bridges and Bridged  
Networks

Specifies interworking among IEEE 802 LANs by bridging at the MAC sublayer

802.1AX-2020

Link Aggregation

Originally defined in 802.3 to combine multiple Ethernet connections so that neither network is aware of the details of the interconnect

Also defined to over any real or virtual medium supporting one, two or three systems at each end of the aggregation with no state synchronization necessary

802.1AB-2016

LLDP

Defines a link layer protocol used by network devices for advertising their identity, capabilities, and neighbors on an IEEE 802 local area network

Information Exchanged is in the form of TLVs and can be extended

802.1CB-2017

FRER

Defines a fault-tolerance mechanism for 802 networks that sends the same packets via redundant paths

802.1AS-2020

Timing &  
Synchronization

Defines the transport of time synchronization with a PTP Profile and additional features (not in IEEE 1588)

Performance requirements and related informative description (mainly oriented towards audio/video applications)

# TSN PROFILES

- An IEEE 802.1 TSN Profile specification
  - Selects features, options, defaults, protocols, and procedures

802.1BA-2011  
AVB Systems

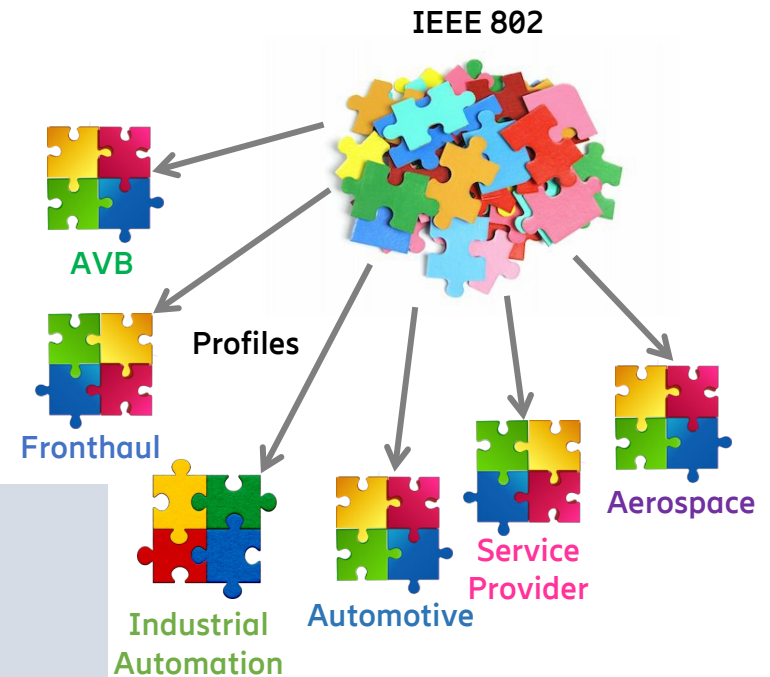
- Audio-Video Bridging (AVB) networks

802.1CM-  
2018  
TSN for Fronthaul

- IEEE Std 802.1CM TSN for Fronthaul
- IEEE Std 802.1CMde Amendment on enhancements

## • Ongoing IEEE 802.1 TSN profile projects:

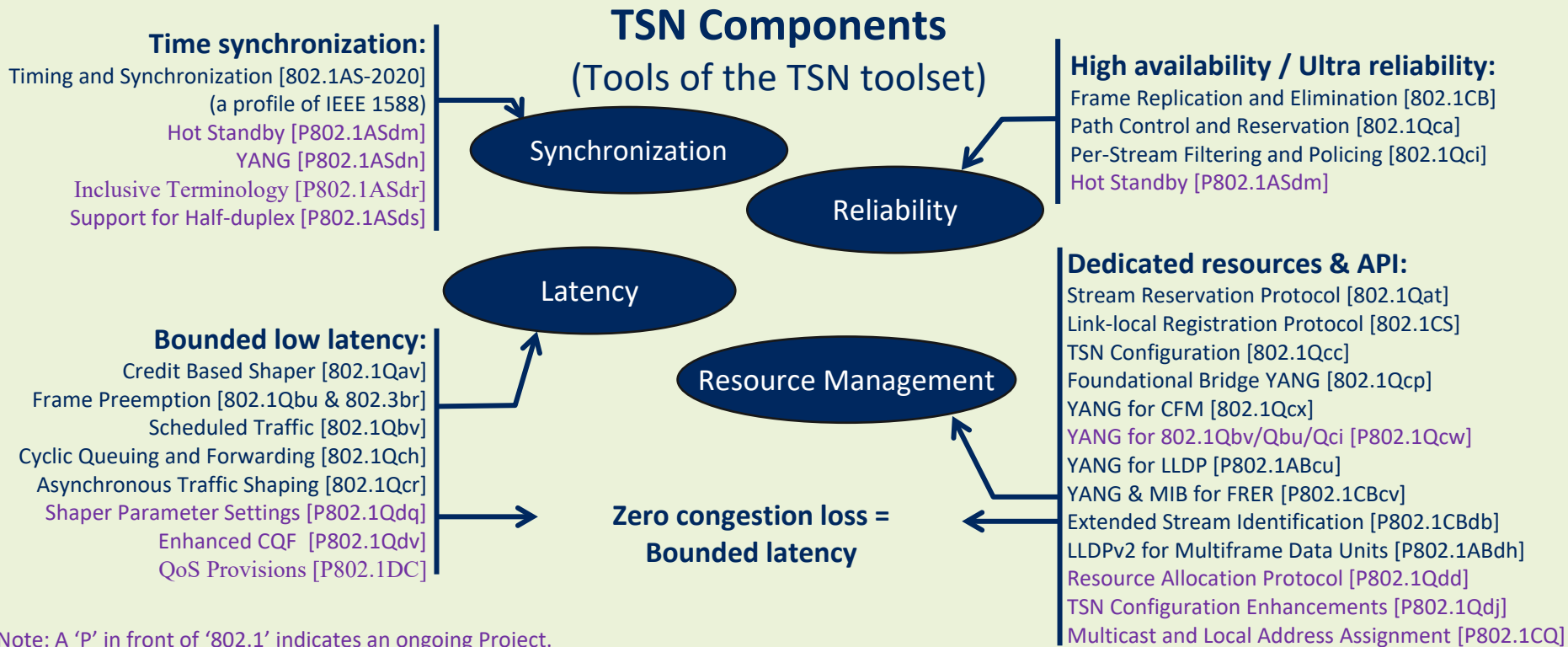
- IEC/IEEE 60802 TSN Profile for Industrial Automation
- P802.1DG TSN Profile for Automotive In-Vehicle Ethernet Communications
- P802.1DF TSN Profile for Service Provider Networks
- P802.1DP / AS6675 TSN Profile for Aerospace onboard Ethernet



# TSN (AND INTERWORKING) COMPONENTS

## Time-Sensitive Networking (TSN) Profiles (Selection and Use of TSN tools)

|  |                           |   |                                     |                                |   |
|--|---------------------------|---|-------------------------------------|--------------------------------|---|
| Audio Video Bridging<br>[802.1BA-2021] | Fronthaul<br>[802.1CM/de] | Industrial Automation<br>[IEC/IEEE 60802] | Automotive In-Vehicle<br>[P802.1DG] | Service Provider<br>[P802.1DF] | Aerospace Onboard<br>[IEEE P802.1DP / SAE AS6675] |
|--|---------------------------|---|-------------------------------------|--------------------------------|---|



More on [TSN standards](https://www.ieee802.org/1/tsn) and [ongoing projects](https://www.ieee802.org/1/tsn) at: <https://www.ieee802.org/1/tsn>

10/26/2022



# Security components

## Security

802.1X-2020

Port Authentication

Defines encapsulation of Extensible Authentication Protocol (EAP) over IEEE 802 (EAP over LAN, or EAPOL) to support network access control and the creation of secure infrastructures.

Widely deployed on both Ethernet and Wi-Fi networks

Also specifies the MACsec Key Agreement (MKA) protocol used by IEEE Std 802.1AE.

802.1AE-2018

MAC security

MACsec secures a link or a VLAN with encryption

MACsec counters 802.1X man-in-the-middle attacks

802.1AR-2018

Secure Device ID

Supports trail of trust from manufacturer to user

Defines how authentication credentials (DevIDs) may be cryptographically bound to a device to support device identity authentication.

802E-2020

Privacy

Specifies a privacy threat model for IEEE 802 technologies

Provides recommendations on how to protect against privacy threats

- MAC Privacy Protection [802.1AEdk]
  - Specifies privacy enhancements that reduces the ability of external observers to correlate user data frames, their sizes, transmission timing and transmission frequency with users' identities and activities.
  - The encapsulation format allows one or more user data frames and padding to be carried within the confidentiality protected data of a consolidating frame, hiding the users' MAC addresses and original frame sizes

# Data Center components

## Interworking Amendments

802.1Qau  
Congestion Notification

Layer-2 end-to-end congestion control defining congestion detection points and rate controlling reaction points

802.1Qaz  
Enhanced Transmission Selection

Defines queuing behavior that enables bandwidth sharing between traffic classes

802.1Qbb  
Priority-based Flow Control

Defines per-priority flow control that enables lossless traffic classes

802.1Qbg  
Edge Virtual Bridging

Defines bridging (i.e. edge relays) in an end station virtualization environment and bridged virtual server connections to the data center network.

## Base Standards

802.1BR-2014  
Data Center Bridge Port Extension

Specifies the operation of Bridge Port Extenders that extend MAC service over an Extended Bridge to multiple physical devices and virtual end stations.

- Congestion Isolation (P802.1Qcz)
  - Avoids head-of-line-blocking and a reduction in the use of priority-based flow control by isolating congesting flows to their own traffic class.
- PFC Enhancements (P802.1Qdt)
  - Defines the automatic calculation of headroom and specifies the protection of PFC frames using MACsec
- Source Flow Control (P802.1Qdw)
  - Defines mechanism and signaling for the remote invocation of flow control at the source of transmission in a data center network

# 802.1 WG current projects (24+)

| Project      | Short Title                               | Last Motion            | Current Stage      | Draft# | Next action           | PAR ends |
|--------------|---|------------------------|--------------------|--------|-----------------------|----------|
| 802.1Qcj     | Auto Attach to PBB                        | PAR extension          | WG ballot          | D1.6   | SA Ballot conditional | Dec '23  |
| 802.1CQ      | Multicast and Local Address Protocol      | PAR extension          | TG Ballot          | D0.8   | TG Ballot             | Dec '24  |
| 802.1Qcw     | TSN (Qbu, Qbv, Qci) YANG                  | WG ballot              | WG ballot          | D1.5   | SA Ballot conditional | Dec '23  |
| 802.1Qcz     | Congestion Isolation                      | PAR extension          | SA Ballot          | D2.3   | RevCom                | Dec '24  |
| 60802 (DA)   | TSN Profile for Industrial Automation     | PAR extension & modify | TG Ballot          | D1.4   | WG Ballot             | Dec '25  |
| 802.1DC      | QOS provision by network systems          | PAR extension          | TG Ballot          | D1.4   | WG Ballot             | Dec '24  |
| 802.1Qdd     | Resource Allocation Protocol              | PAR extension          | TG Ballot          | D0.6   | TG Ballot             | Dec '25  |
| 802.1DF      | TSN Profile for Service Provider Networks | TG ballot              | TG ballot          | D0.1   | TG ballot             | Dec '23  |
| 802.1DG      | TSN Profile for Automotive Networks       | TG Ballot              | TG Ballot          | D1.4   | TG ballot             | Dec '23  |
| 802.1Qdj     | TSN Configuration Enhancements            | WG Ballot              | TG ballot          | D0.3   | WG Ballot             | Dec '23  |
| 802.1AEdk    | MAC Privacy protection                    | SA Ballot              | SA Ballot          | D2.1   | RevCom conditional    | Dec '23  |
| 802f         | EtherType YANG                            | SA Ballot conditional  | WG Ballot          | D1.4   | SA Ballot conditional | Dec '23  |
| 802.1ASdm    | Hot standby                               | TG Ballot              | TG Ballot          | D0.7   | WG ballot             | Dec '24  |
| 802.1Q-REV   | Bridges and Bridged Networks              | RevCom                 | Approved - Sept 21 | D1.2   | Publication editing   | Dec '24  |
| 802.1ASdn    | Time Synch YANG                           | TG Ballot              | TG Ballot          | D0.2   | WG ballot             | Dec '24  |
| 802.1DP      | TSN Profile for Aerospace                 | TG Ballot              | PAR approved       |        | Editor's draft        | Dec '24  |
| 802.1Qdq     | Tspec                                     | TG Ballot              | PAR approved       | D0.1   | TG Ballot             | Dec '25  |
| 802.1ASdr    | Inclusive Language                        | TG Ballot              | Editor's draft     | D0.1   | TG Ballot             | Dec '25  |
| 802.1ASds    | half-duplex support                       | TG Ballot              | PAR approved       |        | Editor's draft        | Dec '26  |
| 802.1Qdt     | PFC MACsec                                | TG Ballot              | TG Ballot          | D0.2   | TG Ballot             | Dec '26  |
| 802.1DU      | Cut-through forwarding                    | PAR Development        | none               |        | PAR Development       |          |
| 802.1Qdv     | Cyclic Queueing and Forwarding            | Nescom                 | PAR approved       |        | Editor's draft        | Dec '26  |
| 802-rev      | O&A                                       | TG Ballot              | TG Ballot          | D0.2   | WG ballot             | Dec '26  |
| 802.1Qdw     | Source Flow Control                       | Nescom                 | PAR approved       |        | Editor's draft        | Dec '26  |
| 802.1CS/cor1 | LRP corrigendum                           | Nescom                 | PAR approved       |        | TG Ballot             | Dec '26  |
| 802.1Qdx     | YANG for CBS                              |                        |                    |        | PAR Development       |          |

# SUMMARY

---

IEEE 802.1 is an individual-based working group open to all

- **Tieing together 802 LANs for over 40 years with a rich set of standards**
- Bridging, aggregation, discovery, security, management, ...
- **The evolution of bridging is time-sensitive networking**
- Profiles of common functionality for a series of applications spaces:
  - AV, fronthaul, industrial automation, automotive, aerospace, ...
- **The volunteer experts continue to excel and innovate**
- Recognized with 2020 IEEE Emerging Technology Award



# ADDITIONAL INFORMATION

---

802.1 Working Group website - <http://ieee802.org/1>

## IEEE-SA process

<https://standards.ieee.org/about/policies/index.html>

<http://www.ieee802.org/1/files/public/docs2020/admin-parsons-SA+802-process-overview-0720.pdf>

## 802 process

<http://www.ieee802.org/devdocs.shtml>

## 802 orientation

<http://www.ieee802.org/orientation.shtml>

## WG process

<https://1.ieee802.org/rules/>

<https://www.ieee802.org/1/files/public/docs2021/admin-parsons-WG-logistics-orientation-0721.pdf>

## WG technical orientations

<http://www.ieee802.org/1/files/public/docs2018/tsn-farkas-intro-0318-v01.pdf>

<http://www.ieee802.org/1/files/public/docs2018/detnet-tsn-farkas-tsn-overview-1118-v01.pdf>

<http://www.ieee802.org/1/files/public/docs2018/detnet-tsn-farkas-tsn-basic-concepts-1118-v01.pdf>

