

IEEE 802.1 Standards

Standards listed as “**IEEE Std 802.xyz-2xxx**” are complete, published standards. Those listed as “**IEEE P802.xyz**” are works in progress. A given standard can be either a stand-alone document or an amendment to a previous standard.

IMPORTANT NOTE: IEEE 802 standards are available for purchase for the first six months; thereafter, they are free via the **GetIEEE** website. Work in progress is available via the IEEE private site to those interested in contributing.

A. IEEE Std 802.1AS-2025: Timing and Synchronization

The root document includes a profile of IEEE 1588 PTP for time-sensitive network applications. It incorporates the following features originally developed as amendments:

- **IEEE Std 802.1ASdm-2024:** Hot Standby and Clock Drift Error Reduction for redundant timing.
- **IEEE Std 802.1ASdn-2024:** YANG Data Model for configuration and state reporting.
- **IEEE Std 802.1ASdr-2024:** Inclusive Terminology updates across the standard.

Active Amendments to IEEE Std 802.1AS-2025:

- **IEEE P802.1ASed:** Fault-Tolerant Timing with Time Integrity.
- **IEEE P802.1ASds:** Support for half-duplex 802.3 MAC (e.g., 10BASE-T1S multidrop).
- **IEEE P802.1ASeb:** Optional Use of Announce messages for static, engineered topologies.

B. IEEE Std 802.1Q-2022: Bridges and Bridged Networks

The root document for VLAN bridges. It incorporates the following features originally developed as amendments:

- **IEEE Std 802.1Qat-2010 (SRP):** Peer-to-peer protocol for resource reservation.
- **IEEE Std 802.1Qav-2009 (CBS):** Credit-Based Shaper for smooth time-sensitive traffic.
- **IEEE Std 802.1Qbu-2016 (Preemption):** Preempts the transmission of low-priority frames for express traffic.

- **IEEE Std 802.1Qbv-2015 (Scheduled Traffic):** Uses time-driven gates upfront of the queues of traffic classes to schedule data traffic.
- **IEEE Std 802.1Qca-2015 (Path Control):** IS-IS extensions for explicit path control.
- **IEEE Std 802.1Qch-2017 (CQF):** Cyclic Queuing and Forwarding for predictable latency.
- **IEEE Std 802.1Qci-2017 (PSFP):** Per-Stream Filtering and Policing for ingress protection.
- **IEEE Std 802.1Qcp-2018 (YANG):** Foundational bridge management data model.
- **IEEE Std 802.1Qcr-2020 (ATS):** Asynchronous Traffic Shaping for deterministic results without sync.
- **IEEE Std 802.1Qcx-2020 (CFM YANG):** Data model for connectivity fault management.
- **IEEE Std 802.1Qcw-2023 (TSN YANG):** Data models for Qbv, Qbu, and Qci.
- **IEEE Std 802.1Qcz-2023:** Congestion Isolation to prevent head-of-line blocking.
- **IEEE Std 802.1Qcj-2023:** Auto-attach to Provider Backbone Bridging (PBB) services.
- **IEEE Std 802.1Qdj-2024:** Configuration enhancements for discovery and dynamic setup.
- **IEEE Std 802.1Qdx-2024:** YANG model for the Credit-Based Shaper (CBS).
- **IEEE Std 802.1Qdy-2025:** YANG model for Multiple Spanning Tree Protocol (MSTP).

Active Amendments to 802.1Q:

- **IEEE P802.1Qdq:** Recommended shaper parameter settings for bursty traffic.
- **IEEE P802.1Qdt:** Priority-based Flow Control (PFC) enhancements and deadlock recovery.
- **IEEE P802.1Qdv:** CQF enhancements for multi-speed links and asymmetric delays.
- **IEEE P802.1Qdw:** Source Flow Control for direct congestion signaling to the sender.

- **IEEE P802.1Qee:** Traffic Engineering (TE) extension for bridged networks that include wireless technologies.

C. IEEE Std 802.1AB-2016: (LLDP)

The Link-Layer Discovery Protocol (LLDP) is the foundational protocol for station and neighbor discovery in Ethernet networks.

Active Amendments to 802.1AB:

- **IEEE Std 802.1ABdh-2021:** Support for Multiframe PDUs to carry larger TSN configuration datasets.
- **IEEE Std 802.1ABcu-2021:** Support for Multiframe PDUs to carry larger TSN configuration datasets.

D. IEEE 802.1 Security Standards

The security layer ensuring integrity and access control for time-critical domains.

- **IEEE Std 802.1X-2020:** Port-Based Network Access Control for device authentication.
- **IEEE Std 802.1AE-2018 (MACsec):** Media Access Control Security providing line-rate encryption.
- **IEEE Std 802.1AR-2018: Secure Device Identity.** Defines a unique, cryptographically verifiable identity (DevID) for a device, typically stored in secure hardware (TPM/HSM), to automate mutual authentication in TSN networks.

E. IEEE Std 802.1CB-2017: Reliability (FRER)

Frame Replication and Elimination for Reliability. Overcomes errors via redundant paths.

Active Amendments to 802.1CB:

- **IEEE Std 802.1CBcv-2021:** YANG and MIB for Stream identification and FRER
- **IEEE Std 802.1CBdb-2021:** Extended Stream identification function (mask-and-match)
- **IEEE P802.1CBec:** Configuration guidance for sequence recovery and buffering.

F. Specialized Profiles and Vertical Standards

- **IEEE Std 802.1BA-2021 (AVB):** Profiles for professional audio/video interoperability.

- **IEEE Std 802.1CM-2018 / CMde-2020:** TSN profiles for cellular fronthaul (4G/5G).
- **IEEE Std 802.1DC-2024:** QoS provision for non-bridge devices (routers/end stations).
- **IEEE Std 802.1DG-2025:** TSN profile for Automotive In-Vehicle communications.
- **IEEE Std 802.1DP-2025 / SAE AS 6675:** TSN profile for Aerospace onboard networks.
- **IEC/IEEE 60802:** TSN profile for Industrial Automation (Factory Floor).

G. Emerging Technologies

- **P802.1DD (RAP):** Resource Allocation Protocol; a scalable, peer-to-peer successor to SRP.

NOTE— Further developments in management (YANG) and base technology revisions (P802.1Q-Rev) are ongoing.