

IEEE 802.3da SPMD TF:  
10SPE and TSN

Peter Jones - Cisco

# Background

- What's TSN and why do we care? (<https://1.ieee802.org/tsn/>)
  - “The charter of the TSN TG is to provide deterministic services through IEEE 802 networks, i.e., guaranteed packet transport with bounded latency, low packet delay variation, and low packet loss. The TSN TG has been evolved from the former IEEE 802.1 Audio Video Bridging (AVB) TG. The TSN TG includes the former IEEE 802.1 Interworking TG. The original work on AVB was done as part of the “Residential Ethernet Study Group” of IEEE 802.3.”
  - TSN is directly relevant to the target markets for 10SPE in general, and for 802.3da SPMD
- 802.3cg
  - Craig Gunther made the following presentation related to 802.3cg 10SPE multidrop and TS [https://www.ieee802.org/3/cg/public/adhoc/gunther\\_3cg\\_01\\_0817.pdf](https://www.ieee802.org/3/cg/public/adhoc/gunther_3cg_01_0817.pdf)
- 802.3da
  - Objective 5 - “Support optional Time Synchronization Service Interface (TSSI).”
  - TSSI Text proposal ([https://www.ieee802.org/3/da/public/111820/jones\\_spmd\\_01\\_11182020.pdf](https://www.ieee802.org/3/da/public/111820/jones_spmd_01_11182020.pdf)) adopted by TF ([https://www.ieee802.org/3/da/public/111820/spmd\\_TF\\_interim\\_minutes\\_00\\_2020\\_11\\_18.pdf](https://www.ieee802.org/3/da/public/111820/spmd_TF_interim_minutes_00_2020_11_18.pdf))

# 10SPE (802.3cg and 802.3da) characteristics

- The following characteristics of 10SPE/SPMD raise questions for AVB/TSN
  - 10Mb/s speed
  - Half Duplex
  - Multidrop (with/without PLCA)
- Both 802.3 and 802.1 documents explicitly exclude one or more of these characteristics, for example
  - 802.3 Clause 90 (TSSI) states “The TSSI is defined for the full-duplex mode of operation only”. To fully support 10SPE, this needs to be changed to “The TSSI is defined for the full-duplex mode of operation, *as well as clause 147 half-duplex point-to-point and multidrop.*” or similar (802.3da adopted change 11/18/2020)
  - 802.1AS 2020 in Clause 5.5 “MAC-specific timing and synchronization methods for full-duplex IEEE 802.3” *requires full-duplex.*
  - 802.1Q-2018 MSRP is used by the “Stream Reservation Protocol (SRP). Clause 35.1.1 MSRP and Shared Media states *IEEE 802.3 half-duplex CSMA/CD is not supported.*

# TSN Base Standards (from <https://1.ieee802.org/tsn/> )

- [IEEE Std 802.1Q-2018](#): Bridges and Bridged Networks
- [IEEE Std 802.1AB-2016](#): Station and Media Access Control Connectivity Discovery (specifies the Link Layer Discovery Protocol (LLDP))
- [IEEE Std 802.1AS-2020](#): Timing and Synchronization for Time-Sensitive Applications
- [IEEE Std 802.1AX-2020](#): Link Aggregation
- [IEEE Std 802.1BA-2011](#): Audio Video Bridging (AVB) Systems
- [IEEE Std 802.1CB-2017](#): Frame Replication and Elimination for Reliability
- [IEEE Std 802.1CM-2018](#): Time-Sensitive Networking for Fronthaul
- [IEEE Std 802.1CS-2020](#): Link-local Registration Protocol (approved draft standard)

# TSN Additional Standards (from <https://1.ieee802.org/tsn/> )

- [IEEE Std 802.1Qbu-2016](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment 26: Frame Preemption. (It amends [IEEE Std 802.1Q-2014](#) and it has been rolled into [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qbv-2015](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment 25: Enhancements for Scheduled Traffic. (It amends [IEEE Std 802.1Q-2014](#) and it has been rolled into [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qca-2015](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment 24: Path Control and Reservation. (It amends [IEEE Std 802.1Q-2014](#) and it has been rolled into [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qch-2017](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment 29: Cyclic Queuing and Forwarding. (It amends [IEEE Std 802.1Q-2014](#) and it has been rolled into [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qci-2017](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment 28: Per-Stream Filtering and Policing. (It amends [IEEE Std 802.1Q-2014](#) and it has been rolled into [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qcc-2018](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment: Stream Reservation Protocol (SRP) Enhancements and Performance Improvements. (It amends [IEEE Std 802.1Q-2018](#).)
- [IEEE Std 802.1Qcr-2020](#): IEEE Standard for Local and Metropolitan Area Networks — Bridges and Bridged Networks — Amendment: Asynchronous Traffic Shaping. (It amends [IEEE Std 802.1Q-2018](#).)

# Other 802.1 Standards

- AVB
  - IEEE Std 802.1Qat-2010: IEEE Standard for Local and Metropolitan Area Networks — Virtual Bridged Local Area Networks – Amendment 14: Stream Reservation Protocol (SRP). (It is part of [IEEE Std 802.1Q-2018](#).) Note [IEEE Std 802.1Qcc](#), which specifies enhancements to SRP.
  - [IEEE Std 802.1Qav-2009](#): IEEE Standard for Local and Metropolitan Area Networks — Virtual Bridged Local Area Networks – Amendment 12: Forwarding and Queueing Enhancements for Time-Sensitive Streams, which specifies the Credit Based Shaper (incorporated in [IEEE Std 802.1Q-2018](#))
- Misc
  - [IEEE 802.1aj-2009](#): IEEE Standard for Local and Metropolitan Area Networks — Virtual Bridged Local Area Networks Amendment 11: Two-Port Media Access Control (Mac) Relay incorporated in [IEEE Std 802.1Q-2018](#)).

# Check List






WG	Standard	10Mb/s Changes needed	Half Duplex Changes needed	Multidrop Changes needed	Notes
802.3	802.3 2018 Clause 90 - TSSI	N	Y	Y	Request changes already adopted in 802.3da draft
	802.3 2018 Clause 99 – IET (preemption)	Y	Y	Y	Preemption only relevant for point to point? Need to check what behavior would be for multidrop CSMA/CD and PLCA.
802.1	802.1AS 2020: Time Synchronisation	N	Y	Y	
	802.1AX-2020: Link Aggregation	N	N	N	
	802.1CB-2017: Frame Replication and Elimination for Reliability	N	N	N	
	802.1CS-2020: Link-local Registration Protocol	N	N	Y	
	802.1Qat-2010:Stream Reservation Protocol (SRP)	N	Y	Y	802.1Q 2018 clause 35 - Stream Reservation Protocol (SRP)
	802.1Qav-2009: Forwarding and Queuing Enhancements for Time-Sensitive Streams	N	Y	Y	802.1Q 2018 8.6.8.2 Credit-based shaper algorithm
	802.1Qbu™-2016 Frame preemption	Y	Y	Y	802.1Q 2018 6.7.2 Frame preemption, 8.6.8 Transmission selection Annex S - Preemption and scheduled traffic
	802.1Qbv-2016 - Enhancements for Scheduled Traffic	N	N	N	802.1Q 2018 clause 8.6.8.4 Enhancements for scheduled traffic Half duplex/multidrop doesn't affect the operation of the schedule, must be considered when the schedule is defined.
	802.1Qca-2015: Path Control and Reservation.	??	??	??	802.1Q 2018 clause 45. Path Control and Reservation (PCR)
	802.1Qcc-2018: Stream Reservation Protocol (SRP) Enhancements and Performance Improvements	N	N	N	802.1Q 2018 clause 35 - Stream Reservation Protocol (SRP)
	802.1Qch-2017: Cyclic Queuing and Forwarding.	N	N	N	802.1Q 2018 Annex T - Cyclic queuing and forwarding
	802.1Qci-2017: Per-Stream Filtering and Policing (in 802.1Q 2018)	N	N	N	802.1Q 2018 clause 8.6.5.1 - Per-stream filtering and policing
	802.1Qcr-2020:Asynchronous Traffic Shaping	N	Y	Y	802.1Q clause 8.6.11 - ATS Scheduler State Machines, clause 49 - Asynchronous Traffic Shaping (ATS) in End Stations, Annex V - Asynchronous Traffic Shaping Delay Analysis Framework
	802.1Q 2018 Clause 36. Priority-based Flow Control (PFC)	N	N/A	N/A	PFC not required for TSN
	802.1aj-2009: Two-Port Media Access Control (Mac) Relay - TPMR	N	N	Y	802.1Q 2018 clause 5.15 TPMR component conformance 5.16 TPMR conformance 8.5.2 TPMR Port connectivity 12.19 TPMR managed objects



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