ITU-T and IEEE 802.1AS Inclusive Terminology and IEEE 802.1AS Developments

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Agenda

- **Inclusive terminology in IEEE 802.1AS and ITU-T**
- IEEE Std 802.1AS-2020 Amendments
- IEEE P802.1AS-2020-Revision and new Amendments

Inclusive terminology in IEEE Std 802.1AS

- IEEE Std 802.1ASdr-2024
  - This amendment changed the non-inclusive, insensitive, and deprecated terminology in IEEE Std 802.1AS-2020
    - https://store.accuristech.com/ieee/standards/ieee-802-1asdr-2024?product_id=2570050
  - The new terminology was updated per IEEE Std 1588g™-2022

| Old term	New term
master	timeTransmitter
slave	timeReceiver
ClockMaster	ClockTimeTransmitter
ClockSlave	ClockTimeReceiver
Grandmaster	No change
BMCA (Best Master Clock Algorithm)	BTCA (Best TimeTransmitter Clock Algorithm)

Inclusive terminology in ITU-T G.826x & G.827x Recommendations

- ITU-T G.826x & G.827x Recommendation Series specify requirements for synchronization in telecom networks
- Inclusive terminology in the Telecom profiles (G.8265.1, G.8275.1 and G.8275.2) was updated per IEEE Std 1588g™-2022
- For G.8262 (SyncE) non-inclusive terminology has either been removed or replaced with appropriate terminology (e.g. Sync slave has been replaced with Sync receiver)
- Several recommendations with inclusive terminology have been published
- Old Recommendations (e.g., G.812) are not planned to be revised just for terminology updates

Old term (Profiles)	New term (Profiles)
master	timeTransmitter
slave	timeReceiver
Grandmaster	No change
BMCA	BTCA
Time Slave Clock	Time Synchronous Clock
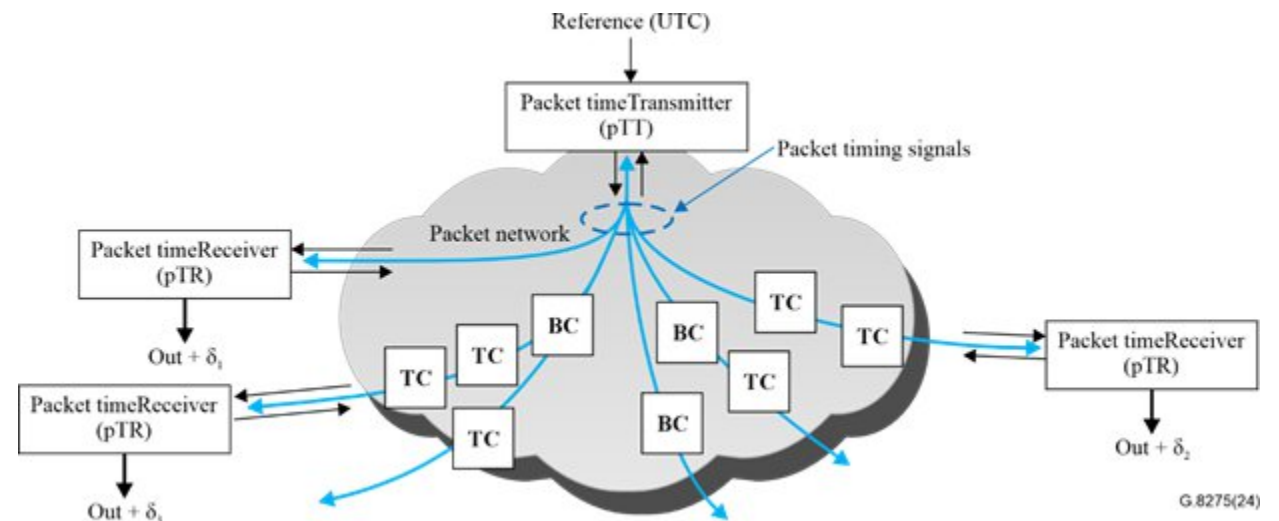
Figure Source: ITU-T G.8275 (https://www.itu.int/rec/T-REC-G.8275-202401-I/en)
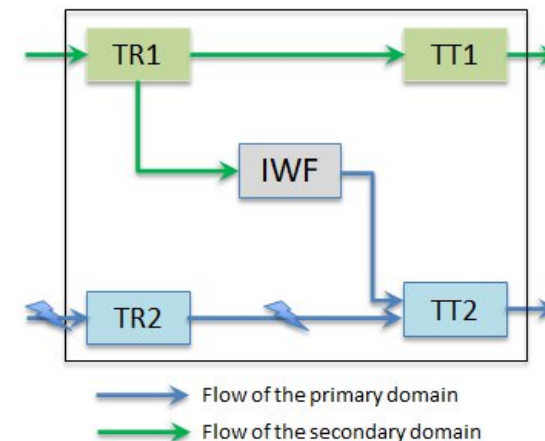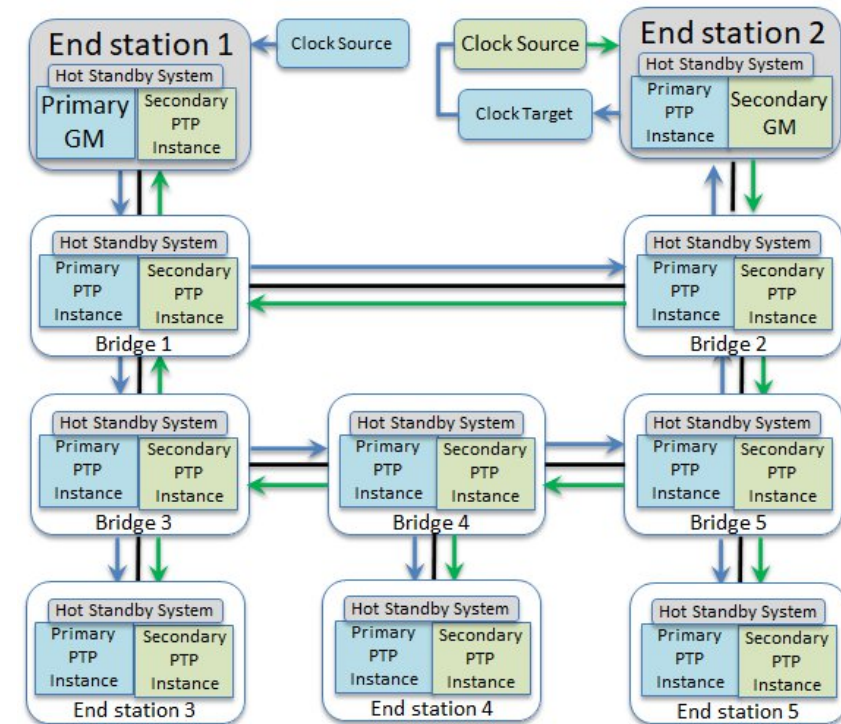
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- IEEE P802.1AS-2020-Revision and new Amendments

IEEE P802.1ASdm – Hot Standby and Clock Drift Error Reduction

- Uses synchronized times of two independent gPTP domains (two Grandmasters (GMs)), one being used as a backup for the application, providing reliable gPTP network
- The secondary GM is synchronized to the primary GM
- A state machine is specified to determine whether a PTP Instance is synchronized according to the requirements of the respective application or profile standard
- An optional IWF function (split functionality) is used to translate between two domains providing enhanced mitigation scheme for grandmaster and link failures
- A new drift tracking TLV, which carries information that can be used to reduce the time error due to local clock drift. This is needed to support the time synchronization accuracy requirements of industrial automation applications

https://1.ieee802.org/tsn/802-1asdm/

IEEE P802.1ASdn – YANG data model

- P802.1ASdn specifies YANG data model for IEEE 802.1AS-2020 and its amendment IEEE 802.1ASdr-2024
- It is based on IEEE 1588e-2024 (YANG model for IEEE 1588-2019), using inclusive terminology
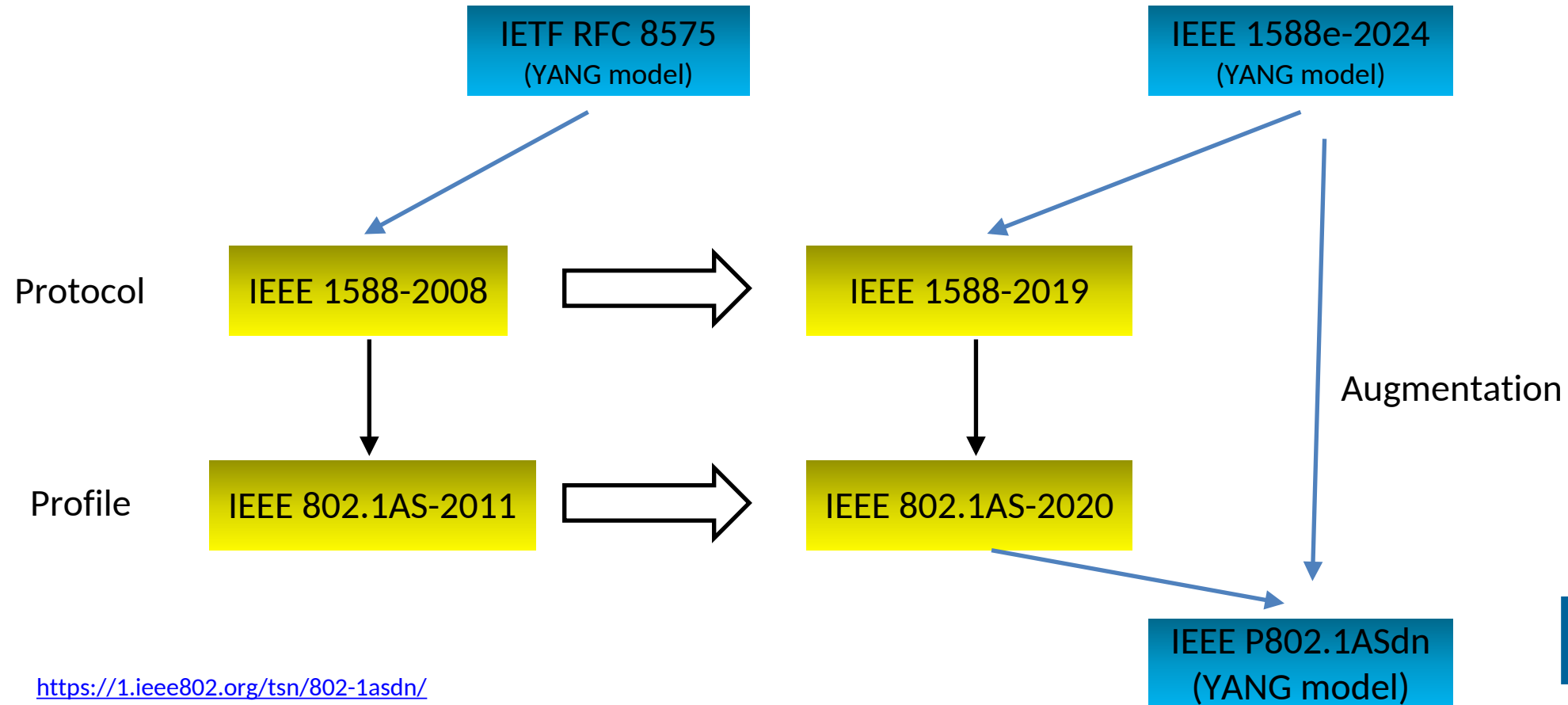
https://1.ieee802.org/tsn/802-1asdn/

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- Inclusive terminology in IEEE 802.1AS and ITU-T
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- **IEEE P802.1AS-2020-Revision and new Amendments**

New Revision of IEEE 802.1AS (P802.1AS-2020-Rev)

- It is a roll-up of IEEE Std 802.1AS-2020 including the corrigendum IEEE Std 802.1AS-2020/Cor1 and the amendments (IEEE Std 802.1ASdr, IEEE Std 802.1ASdm, and IEEE Std 802.1ASdn)
- There are three new amendments planned for P802.1AS-2020-Revision: P802.1ASds, P802.1ASeb, P802.1ASed
- Timeline: 2026 (expected)
- See https://1.ieee802.org/maintenance/802-1as-2020-rev/

IEEE P802.1ASds – Support for half-duplex Ethernet

- This amendment adds support for IEEE Std 802.3 Clause 4 Media Access Control (MAC) operating in half-duplex (e.g., 10BASE-T1S)
- This amendment is important for Automotive applications
- In IEEE 802.1 AS-2020, either side of the link can be the initiator and the responder of Pdelay messages
  - The initiator has all the timestamps necessary to calculate the mean link delay (D) relative to the GM timebase
- For half-duplex Ethernet, the peer delay initiator is restricted to timeReceivers (TRs) only
  - This enabled the existing peer delay protocol, which was intended for point-to-point PTP links, to be used for half-duplex without any changes
- timeReceivers use clockIdentity to filter PTP messages, and acts on Pdelay_Resp if and only if requestingPortIdentity field corresponds to its PortIdentity
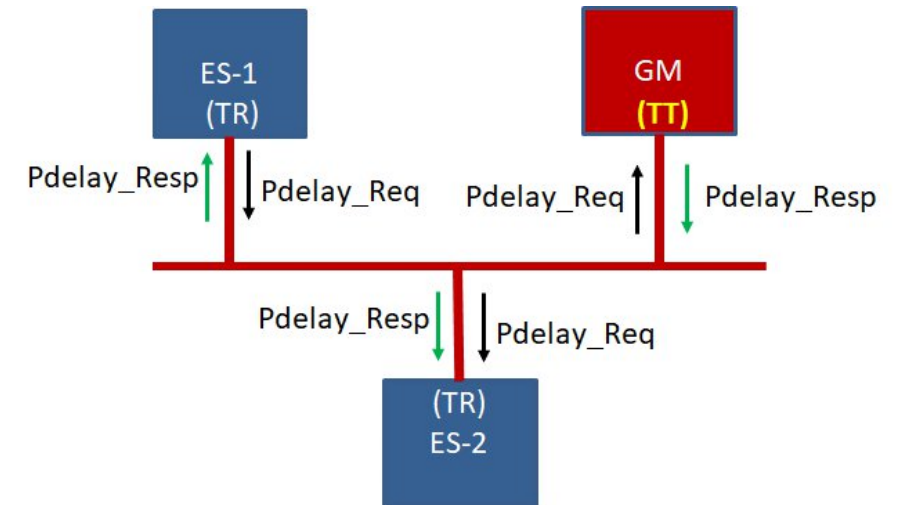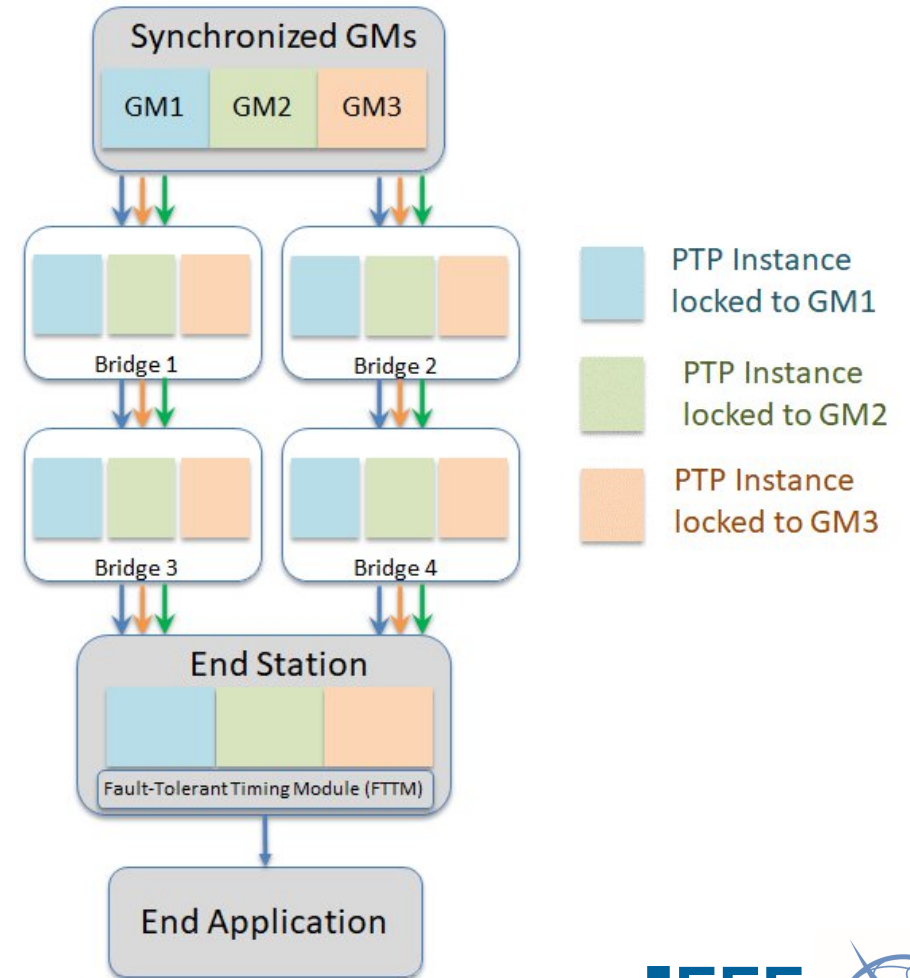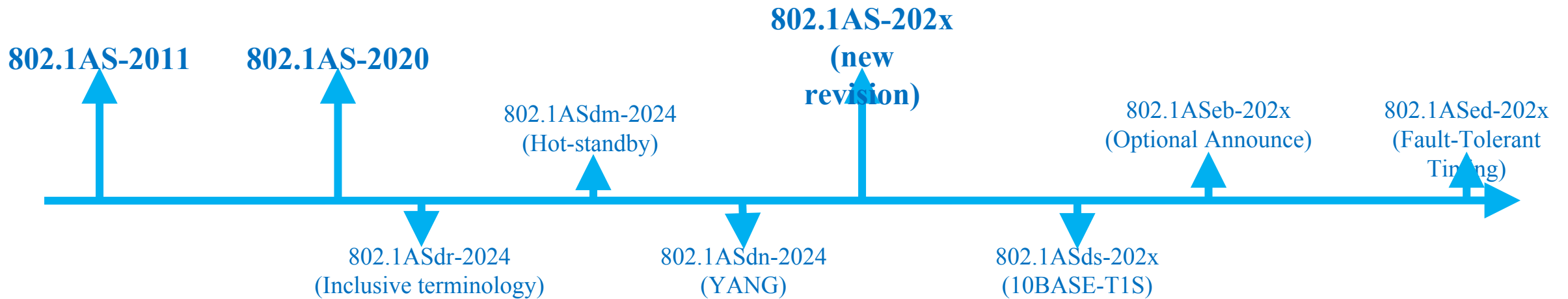
IEEE P802.1ASeb – Optional Announce

- This amendment allows the Announce message functionality to be optional on new implementations in gPTP networks where External Port Configuration is used rather than BTCA
- This is particularly important for Automotive and Aerospace applications due to stringent certification requirements; as a result, implementations should be as simple as possible

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IEEE P802.1ASed – Fault-Tolerant Timing with Time Integrity

- This amendment enables fault-tolerant timing
- It increases the availability of the time and adds time integrity, i.e., a measure of the confidence in the correctness of the time supplied by gPTP
- This is particularly important for Aerospace due to the need to time integrity and the need for time availability

Roadmap of IEEE 802.1AS

802.1AS-2011   **802.1AS-2020**

802.1AS-202x (new revision)

802.1ASdm-2024 (Hot-standby)

802.1ASeb-202x (Optional Announce)

802.1ASed-202x (Fault-Tolerant Timing)

802.1ASdr-2024 (Inclusive terminology)

802.1ASdn-2024 (YANG)

802.1ASds-202x (10BASE-T1S)

- The year in the roadmap for the new projects will depend on the progress of the work
- The work on the new Revision of IEEE 802.1AS (P802.1AS-2020-Rev) will start as soon as 802.1ASdm and 802.1ASdn are finalized

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