IEEE P802.1DP Outline Proposal

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July 14, 2021

Objective

- Stimulate discussion in the joint working group on aerospace profile
- Provide a starting point to draft P802.1 DP
- Encourage more participation from IEEE 802.1 TSN TG members and the aerospace community
- Learn and borrow from other profiles – namely, automotive and industrial automation profiles
  Credit and thanks to the authors of and contributors to P802.1 DG and IEEE/IEC 60802

P802.1DP Table of Contents

1. Overview
2. Normative references
3. Definitions
4. Abbreviations
5. Conformance
6. Aerospace on-board networks
7. Required functions for aerospace networks
8. Profiles

Annex A (normative). Profile Conformance Statement (PCS) proforma

Annex B (informative). TSN-based aerospace design considerations

Section 1 through 4: IEEE-SA mandatory elements

1. Overview
    - 1.1 Scope (PAR)
    - 1.2 Purpose (PAR)
    - 1.3 Introduction to the standard/document
        - *This standard address…*
        - *Will be used by...*
        - *This standard selects…*
    - 1.4 Reference convention
2. Normative References
3. Definitions
4. Abbreviations

5. Conformance

5.1 Requirements terminology (explains *shall, may, should; call out to PCS*)

5.2 Conformant components and equipment

This subclause specifies requirements and options for the following core components

5.3 Protocol Implementation Conformance Statement (PICS)

The supplier of an implementation that is claimed to conform to this standard shall complete a copy of the PICS proforma provided in Annex A

5.4 Common PHY and MAC requirements

5.5 ccA Bridge requirements

5.6 ccA Bridge options

5.7 ccA Bridged end station requirements

5.8 ccA Bridged end station options

5.9 ccA End station requirements

5.10 ccA End station options

Repeat for all profiles

6. Aerospace on-board networks

The purpose of this clause is to define the assumptions (about aerospace networks) that this profile is based on and justify the requirements (based on use cases)

6.1 Introduction to aerospace networks

6.2 Network consideration/constraints

6.3 Network topologies

6.4 Traffic characteristics

Majority of the required content is already prepared and available in the use cases and traffic characterization documents and their summaries

https://www.ieee802.org/1/files/public/docs2021/dp-Jabbar-et-al-Aerospace-Use-Cases-0321-v06.pdf

https://www.ieee802.org/1/files/public/docs2021/dp-Jabbar-et-all-Aerospace-Traffic-Characterization-0421-v02.pdf

https://www.ieee802.org/1/files/public/docs2021/dp-Jabbar-Aerospace-UseCase-Summary-0521-v01.pdf

https://www.ieee802.org/1/files/public/docs2021/dp-Jabbar-Aerospace-TrafficTypes-Summary-0521-v02.pdf

7. Required (TSN/802.1) Functions for Aerospace Networks

The purpose of this clause is to define the specific network functions that are required in aerospace networks. These could be high-level or detailed requirements. [reference: section 6 in 60802]. The conformance statements in clause 5 will refer to these requirements.

7.1. Security

7.2. Time Synchronization (working clock, global time)

7.3. Egress Traffic Shaping

7.4. Redundancy (FRER)

7.5. Filtering and Policing

7.6. Stream separation (stream identification,)

7.7. Forwarding (FDB, cut-through)

7.8. Management and monitoring (status and fault)

7.9. Configuration (TSN configuration as LSAP?)

7.10 Data Integrity

Define the superset of all the tools that will be used by the profile. Details of each tool only if needed.

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7.9. Configuration (TSN configuration as LSAP?)

7.10 Data Integrity

Approach: Don't try to group these into some logical higher-level functions like (bounded latency, determinism). Keep it relatively straightforward by directly calling out each function/feature.

Example (from IEC/IEEE 60802):
7.7.1 Bridge FDB requirements for TSN Streams
The default FDB configuration for TSN streams shall be :
a) Learning disabled
b) Default forwarding rule is drop

8. Profiles [Optional – Debatable]

The conformance clause is the ultimate authority on what shall, may, or should be supported for each conformant component. This clause could provide a complete summary of each of the profile.

8.1. Profiles

8.1 Profile A: Asynchronous Profile

The base profile defines the requirements for a minimal yet fully functional implementation of TSN for an aerospace network. It is based on the requirements from the following use cases. Table 8.1 is a detailed breakdown of the TSN features and configurations necessary to meet the base profile requirements.

8.2 Profile B: Synchronous Profile

ITEM #	TSN FEATURE DESCRIPTION	REFERENCE	VALUE
Timing and Synchronization (gPTP) (IEEE Std 802.1AS)			Yes
DGB1	Use External Port Configuration?	Annex E.2.2	Yes
DGB2	Use BMCA?	Annex E.2.2	Not used
DGB3	Send Announce messages whether using BMCA or not?	Annex E.2.2	Yes
DGB4	Send Pdelay messages?	Annex E.2.3	Yes
DGB5	Sync message format?	Annex E.2.4	Two-step
DGB6	Minimum number of Domains	Annex E.2.6	1
DGB7	Maximum number of Domains?	Annex E.2.6	Undefined
DGB8	Message rates?	Table E-1, Annex E.2.5	Default values
Per-Stream Filtering and Policing (PSFP) (IEEE Std 802.1Q-2018 clause 8.6.5.1)			Yes
DGB9	Per-stream ingress policing at the end station to bridge connections	Annex E.3	Yes
DGB10	Per-class ingress policing at bridge to bridge connections	Annex E.3	Yes
DBG11	Per-stream ingress policing at bridge to bridge connections	Annex E.3	Optional
Forwarding and Queuing Enhancements for time-sensitive streams (FQTSS) (IEEE Std 802.1Q-2018 clause 34)			Yes
DGB12	<< Editor's note: See Credit-Based Shaper (Qat) (E.7.2) for associated reference material. >>	?	?

Reference: https://www.ieee802.org/1/files/private/dg-drafts/d1/802-1DG-d1-3.pdf

Annex A. PCS proforma

The standard IEEE Protocol/Profile Conformance Statement (PCS) proforma

Annex B. TSN-based aerospace design considerations

This annex captures the informative discussion on design of aerospace networks using the 802.1 DP

Flexibility in what goes here:

1. Clarifications – what does it mean to not use BMCA
2. Examples – how to use FRER to create an ARINC 664 equivalent redundancy
3. Aerospace centric summaries of relevant standards
4. Tutorial like discussion of functions/features
5. Any other item

Thank You!

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