Conformance Class IEC/IEEE 60802

Contributor group

	Column
Ademaj, Astrit <astrit.ademaj@tttech.com>	TT
Dorr, Josef <josef.dorr@siemens.com>	SI
Enzinger, Thomas <thomas.enzinger@br-automation.com>	BR
Hantel, Mark <mrhantel@ra.rockwell.com>	RA
Hotta, Yoshifumi <Hotta.Yoshifumi@eb.MitsubishiElectric.co.jp>	MI
Kehrer, Stephan <Stephan.Kehrer@belden.com>	—
Sato, Atsushi (Alex) <a.satou@jp.yokogawa.com>	YO
Seewald, Maik <maseewal@cisco.com>	—
Stanica, Marius-Petru <marius-petru.stanica@de.abb.com>	AB
Steindl, Guenter <guenter.steindl@siemens.com>	SI

Abstract

This document describes an example Conformance Class based on “60802-Steindl-ExampleSelections-0119-v02.pdf” as a starting point for feature alignment.
The parameters and values given in this document are presenting the ongoing discussions. Currently there is no agreement which attributes, parameters and values are mandatory within the profile.

Parameters are moved to “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”.

Log

V0.1	Initial version
V0.5	Update with Example Selections “Y” and “Z”
V0.6	Update after discussion in IEC/IEEE 60802
V0.7	Update after discussion in IEC/IEEE 60802
V1.0	Initial public version for IEC/IEEE 60802
V1.2	Version created during Edinburgh meeting
V1.3	Version created in preparation for Hawaii meeting
V1.4	Version created during Hawaii meeting
V1.5	Version created after Hawaii meeting
V1.6	Update after discussion in IEC/IEEE 60802
V1.7	Tables moved to Excel for easier handling

Content

68

Figures

Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.

Tables

1 References

60802-industrial-use-cases-0918-v13.pdf

60802-Steindl-ExampleSelections-0119-v02.pdf

60802-Steindl-QuantityFigures-0519-v01.pdf

60802-Steindl-TimelinessUseCases-0718-v01.pdf

60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf

2 Terms and Definitions

2.1 Definitions

Conformance Class	A selection of IEC and IEEE features and quantities which allows to solve the required use cases.

2.2 IEEE802 terms

Priority regeneration	See IEEE 802.1Q-2018 clause 6.9.4 Regenerating priority
Ingress rate limiting	See IEEE 802.1Q-2018 clause 8.6.5 Flow classification and metering

3 TSN in Industrial Automation

3.1 General

Supporting a Conformance Classes shall allow interoperability for Bridges and End-Station as defined in the scope of IEC/IEEE 60802.

The document contains chapters for full-blown and constraint devices.

Editor's note:
Please make all changes with "track changes on"

3.2 Conformance Class

3.2.1 Standard selection

3.2.1.1 General

A Conformance Class selects out of the following standards

IEEE802.3-2018 - IEEE Standard for Ethernet

IEEE802.1Q-2018 - Bridges and Bridged Networks

IEEE802.1AB-2016 - Station and Media Access Control Connectivity Discovery

IEEE802.1AS-2020 - Timing and Synchronization for Time-Sensitive Applications

IEEE802.1CB-2017 - Frame Replication and Elimination for Reliability

3.2.1.2 Terms

Supported:
This feature is used in any class of device

Support, but optional:
This feature is intended to be used in some class of device.
For silicon vendors, these topics may be "supported", too.

Not used:
The used and thus the support of this feature is not intended.

Ω / TBD:
Not provided until agreed release date for this version.

—:
No quantities, because the assigned feature is not supported.

???:
The responsible editor is not able to fill this cell without a discussion with the other contributors.

3.3 Full-blown devices

3.3.1 Common

3.3.1.1 IEEE 802.3

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

2019-11-12:
Restricting the supported data rates in the profile seems not to be needed.

3.3.2 Bridge

3.3.2.1 IEEE 802.1Q

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.3.2.2 IEEE 802.1AB

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.3.2.3 IEEE 802.1AS

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.3.2.4 IEEE 802.1CB

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.3.2.5 IEC standards

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.3.3 End-station

3.3.3.1 General

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4 Constraint devices

3.4.1 Common

3.4.1.1 IEEE 802.3

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

2019-11-12:
Restricting the supported data rates in the profile seems not to be needed.

3.4.2 Bridge

3.4.2.1 IEEE 802.1Q

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4.2.2 IEEE 802.1AB

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4.2.3 IEEE 802.1AS

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4.2.4 IEEE 802.1CB

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4.2.5 IEC standards

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

3.4.3 End-station

3.4.3.1 General

See “60802-Steindl-et-al-ExampleSelectionTables-1119-v17.pdf”

4 “Constraint” devices

4.1 General

The understanding of the term “constraint” needs to be aligned between the different contributors.
The following chapters show the understanding of the contributors.

4.2 Question

Following questions are of interest for the discussion:

1. What is your understanding of constraint bridge or end-station?
2. Shall a vendor independent mix between “full-blown” and “constraint” devices in one TSN Domain be supported?
3. Shall a vendor independent mix between “full-blown” devices in one TSN Domain be supported?
4. Shall a vendor independent mix between “constraint” devices in one TSN Domain be supported?
5. Shall a vendor independent mix between “full-blown” and vendor dependent “constraint” devices in one TSN Domain be supported?
6. Is it enough to support a vendor dependent mix of “constraint” devices in one TSN Domain?
7. Does the usage of end-stations follow the same model?

4.3 Feedback from contributors

4.3.1 AB

"Constraint" means an end station or a bridge which presents limitations, in terms of:

- Hardware
- Ports count (i.e. less than three external ports): exception for "constraint bridges", not applicable for "constraint end stations": I would propose to avoid considering this topic as relevant for the "constraint" bridges discussion, even if it intuitively belongs here. I believe this is related to the chosen topology, see again the example system.
- Ports data rate (i.e. power dissipation constraints, due to form factor size)

- Power supply (i.e. redundant or not)
- Timestamping capabilities
- Ingress and egress queue size
- …
- Software
- QoS functions (i.e. traffic shapers, cut-through capabilities, frame preemption, ingress policing, presence of more than one TSN configuration mechanism)
- Clock synchronization functions

Network Access capabilities

- Media redundancy functions
- …

We should be able to mix in a TSN domain, both constrained and fully capable end stations

Mixing constrained and fully capable bridges in a system is dependent on the topology and less on the TSN domains demarcation, see my example system

4.3.2 Others

TDB

Literature and related Contributions

Literature:

[1] “Cyber Physical Systems: Design Challenges”, E. A. Lee, Technical Report No. UCB/EECS-2008-8; http://www.eecs.berkeley.edu/Pubs/TechRpts/2008/EECS-2008-8.html

[2] Beckers, K. (2015). Pattern and Security Requirements: Engineering-Based Establishment of Security Standards; Springer; ISBN 9783319166643

[3] PI: Isochronous Mode – Guideline for PROFINET IO; V1.0; June 2016; available at http://www.ieee802.org/1/files/private/liaisons

Related contributions:

[4] LNI traffic patterns for TSN: http://www.ieee802.org/1/files/public/docs2018/new-Bruckner-LNI-traffic-patterns-for-TSN-0118.pdf

[5] Multivendor Motion Control: http://ieee802.org/1/files/public/docs2018/new-industrial-enzinger-multivendor-motion-control-0318-v01.pdf

[6] Hierarchical Domain based Network: http://www.ieee802.org/1/files/public/docs2018/60802-harima-industrial-use-case-0518-v04.pdf

[7] Process Automation System Quantities: http://www.ieee802.org/1/files/public/docs2018/60802-sato-pa-system-quantities-0718-v01.pdf

[8] TSN Interdomain Communications: http://www.ieee802.org/1/files/public/docs2018/60802-Hantel-TSN-Interdomain-Communications-0718.pdf

[9] Cycle Timing Models: http://www.ieee802.org/1/files/public/docs2018/60802-enzinger-cycle-timing-models-0718-v04.pdf

[10] Isochronous Drive Synchronization: http://www.ieee802.org/1/files/public/docs2018/60802-enzinger-use-case-isochronous-drive-synchronization-0718-v01.pdf

[11] Machine Internal and Machine to Cell Controller (M2C) Embedded Communication: http://www.ieee802.org/1/files/public/docs2018/60802-essler-additional-use-case-0718-v01.pdf

[12] Coexistence & Convergence in TSN-based Industrial Automation Networks:
http://www.ieee802.org/1/files/public/docs2018/60802-stanica-convergence-coexistence-0718-v03.pptx

[13] Flexible Manufacturing System (FMS) for Small Batch Customized Production:
http://www.ieee802.org/1/files/public/docs2018/60802-Bai-small-batch-customized-production-0718-v01.pdf

[14] Multi-traffic transmission in industrial backbone network:
http://www.ieee802.org/1/files/public/docs2018/60802-chen-multi-traffic-transmission-on-backbone-0918.pdf