Conformance Class IEC/IEEE 60802

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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.

Log

V0.1	Initial version
V0.5	Update with Example Selections “Y” and “Z”

Content

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

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.

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-2019[1] - Timing and Synchronization for Time-Sensitive Applications

[1] Assumes that IEEE802.1AS will be updated in 2019

93 ### *3.2.1.2 IEEE 802.3*

94 Table 1 shows the selection.

95 **Table 1: IEEE 802.3 selection**

Attribute	Classification	Example Selection “X”	Example Selection “Y”	Example Selection “Z”	tbd
MAU type	Selection out of a list	10Mbps, 100Mbps, 1Gbps, 2,5Gbps, 5Gbps, 10Gbps	100Mbps, 1Gbps, 2,5Gbps, 5Gbps, 10Gbps	10Mbps, 100Mbps, 1Gbps, 2,5Gbps, 5Gbps, 10Gbps	
Frame size	Quantity	1532	1532	1532	
Link length	Quantity	At least 100m	*Not an TSN issue!* Depends on Media	Depends on Media	
Preemption	Feature	Supported for 10Mbps to 2,5Gbps	Supported	Supported but Optional	

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3.2.1.3 IEEE 802.1Q

Table 2 shows the selection.

Table 2: IEEE 802.1Q selection

Attribute		Classification	Example Selection "X"	Example Selection "Y"	Example Selection "Z"	
Stream identification		Selection out of a list within 802.1CB				
	Null Stream (DMAC + TCI.VID based)	Feature	Supported	Supported	Supported	
	IP stream	Feature	Not Used	Not Used	Supported	
VLAN Identification		Quantity	At least five VIDs, Four for streams	Up to 8 VIDs	Optional	
Queues		Quantity	Eight	Eight	Four	
Traffic shaping		Selection out of a list	• Strict priority, • Time aware shaper for 10Mbps and 100Mbps	• Strict priority, • Time aware shaper	• Strict priority, • Time aware shaper for 10Mbps and 100Mbps	
Ingress rate limiter / Flow classification and metering		Feature	Supported	Not Used	Not Used	
Ingress filtering and policing (Qci)						
	Time Policing	Feature	Not Used	Supported	Optional	
	Rate Policing	Feature	Not Used	Supported	Optional	
Priority remapping (PCP)		Feature	Supported	Supported	Not Used	
Priority remapping (DSCP)		Feature	Not Used	Not used	Supported	

Attribute		Classification	Example Selection "X"	Example Selection "Y"	Example Selection "Z"	
VLAN stripping and adding		Feature	Supported	Supported	Optional	
Individual VLAN learning		Feature	Supported	Supported	Optional[2]	
FDB size		Quantity	8192 stream entries[3] + 2048 for default VLAN	4096 streams entries + 1024 for default VLAN	TBD streams entries + TBD for default VLAN	
Preemption		Feature	Supported	Supported	Supported but Optional	
Synchronized network access						
	Start of cycle trigger	Feature	Supported	Supported	Optional	
	Per stream trigger	Feature	Not Used	Supported	Not Used	
Bridge / Forwarding resources		Specify attributes for the resource management. Ensure buffering of non-stream traffic during stream transmission				
	Real-Time traffic	Quantity	Up to 6.5 Kbytes per port for 100 Mbps, Up to 25 Kbytes per port for 1 Gbps	Up to 32 Kbytes per port	16k per port for 1Gbps	
	Non real-time traffic	Quantity	6.5 Kbytes per port for 100 Mbps, 25 Kbytes per port for 1 Gbps		16k per port for 1Gbps	
Cut through		Add on feature				

[2] Open: Shared VLAN learning used
[3] 2048 per VLAN

Attribute		Classification	Example Selection "X"	Example Selection "Y"	Example Selection "Z"	
	Delayed Cut-through[4]	Feature	Supported	Not Used	Not Used	
	Cut-through enabled for queue(s)	Feature	Supported	Supported	Supported	
Seamless redundancy (Handled by application layer)		Information	Supported	Not used	Not used	
1CB seamless redundancy (Frame replication and Frame elimination)		Feature	Not used	Supported	Optional	
Configuration-Centralized						
	scheduling	Feature	Class based	Stream based	Class based	
	path computation	Feature	Supported	Supported	Supported	
	network calculus	Feature	Supported	Supported	Supported	
	topology discovery	Feature	Supported	Supported	Supported	
	device feature discovery	Feature	Supported	Supported	Supported	
	management protocol	Feature	SNMP (if YANG Models are still	NETCONF	NETCONF	

[4] Not limited to port being free on receive. Packet is forward to the DST port as soon as the port is free. No need to wait for the complete packet reception

Attribute		Classification	Example Selection “X”	Example Selection “Y”	Example Selection “Z”	
			missing) + NETCONF			
	CNC Election (making sure there is only one active CNC per domain)	Feature	Supported	Supported	Supported	
	Dynamic configuration	Feature	Supported	Supported	Supported	
	Standardized stream reservation request from endstations	Feature	Supported	Supported	Supported	
Configuration-Distributed (M2M communication)						
	path computation	Feature	Supported	Not Used	Supported	
	Standardized stream reservation request from endstations	Feature	Supported	Not Used	Supported	

3.2.1.4 IEEE 802.1AB

Table 3 shows the selection.

Table 3: IEEE 802.1AB selection

Attribute	Classification	Example Selection “X”	Example Selection “Y”	Example Selection “Z”	tbd
TSN Domain TLV	Feature	Supported	Supported	Supported	
Preemption	Feature	Supported	Supported	Optional	
802.3 extension	Feature	Supported	Not used	Not used	
802.1 extension	Feature	Supported	Not used	Not used	
Topology Discovery	Feature	Supported	Supported	Supported	

3.2.1.5 IEEE 802.1AS

Table 4 shows the selection.

Table 4: IEEE 802.1AS selection

Attribute	Classification	Example Selection “X”	Example Selection “Y”	Example Selection “Z”	tbd
SyncMaster	Feature	Optional	Supported	Optional	
SyncSlave	Feature	Supported	Supported	Supported	
Domain Working Clock	Quantity	Supported	Supported	Supported	
Domain Global Time	Quantity	Supported	Supported	Supported	
Seamless redundancy – Hot Standby	Feature	Optional	Optional	Not Used	
BMCA Redundancy – Cold Standby	Feature	Not Used	Optional	Optional	
Externally Managed Sync Trees	Feature	Supported	Not Used	Not Used	
Announce & Signal	Feature	Not Used	Supported	Supported	

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