Review of potential use cases for a potential amendment to IEC/IEEE 60802

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IEEE 802.1 Interim

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Use Case Num	Use Case Name	Requirement Num	Requirement	Direct Copy (vs Summary)	Met in 60802?	Notes
1	Sequence of Events	1-1	Plant wide high precision Universal Time synchronization;	•		
		1-2	Maximum deviation to the grandmaster time in the range from 1 µs to 100 µs;	•		
		1-3	Optional support of redundant sync masters and domains;	•		
		1-4	Non-zero failover time in case of redundant universal time domains;	•		
2	Isochronous Control Loops with Guaranteed Low Latency	2-1	Strict timing and synchronization requirements.			
		2-2	Guaranteed low-latency communication.			
3	Non-Isochronous Control Loops with Bounded Latency	3-1	Cyclic traffic pattern with relaxed timing.			
		3-2	Transfer time may exceed network cycle.			
		3-3	Communication disturbances must be signaled asynchronously.			
4	Reduction Ratio of Network Cycle	4-1	Support for reduction ratio and phase parameters.			
		4-2	Flexible network cycle time granularity.			
5	Drives without Common Application Cycle	5-1	Isochronous data exchange	•		
		5-2	Different cycles for data exchange, which are not multiples of each other			
		5-3	Independent application cycles.			
		5-4	Synchronization via network cycle.			
6	Drives without Common Application Cycle but Common Network Cycle	6-1	Shared network cycle despite differing application cycles.			
7	Redundant Networks	7-1	Support for network redundancy to ensure reliability, including ring topology.			
8	High Availability	8-1	Failure must not disturb processes.			
		8-2	Support for redundant PLCs, IOs, and network paths.			
9	Wireless	9-1	Support for cyclic and non-real-time communication over wireless.			
		9-2	Compatibility with IEEE 802.11, 802.15.1, 802.15.4, and 5G.			
10	10 Mbit/s End-Stations (Ethernet Sensors)	10-1	Support for low-speed Ethernet sensors.			
		10-2	Compatibility with POE and SPE.			
11	Fieldbus Gateway	11-1	Integration of non-Ethernet and Ethernet fieldbus devices via gateways (either transparent or hidden).			
		11-2	TSN scheduling must accommodate subordinate systems.			

12	**New Machine with Brownfield Devices**	**12-1**	Seamless integration of legacy devices. (All machine internal stream traffic communication - stream traffic and non-stream traffic - is decoupled from and protected against the brownfield cyclic real-time traffic. Brownfield cyclic real-time traffic QoS is preserved within the TSN domain.)			
13	**Mixed Link Speeds**	**13-1**	Support for varied Ethernet speeds within the same network.			
14	**Multiple Isochronous Domains**	**14-1**	Isolation and synchronization across multiple domains. (Isochronous real-time domains may run independently, loosely coupled (start of network cycle is synchronized) or tightly coupled (shared working clock). They shall be able to share a cyclic real-time domain.)			
15	**Auto Domain Protection**	**15-1**	Automatic protection mechanisms for TSN domains.			
16	**Vast Number of Connected**	**16-1**	Scalability to support large numbers of devices.			
17	**Machine to Machine / Controller to Controller Communication**	**17-1**	All machine internal communication (stream traffic and non-stream traffic) is decoupled from and protected against the additional M2M traffic and vice versa.	•		
		17-2	1:1 and 1:many communication relations shall be possible.	•		
		17-3	Scheduling in a way that interleaved operation with machine intervals is possible.	•		
18	**Pass-through Traffic**	**18-1**	Internal communication must be protected from pass-through traffic.			
		18-2	Separate traffic patterns for pass-through.			
19	**Modular Machine Assembly**	**19-1**	Automatic TSN communication setup upon module connection.			
		19-2	Support for dynamic assembly in various operational states.			
20	**Tool Changer**	**20-1**	Added network portions must be operational within 500ms.			
		20-2	Support for dynamic extension/removal of up to 16 devices.			
21	**Dynamic Plugging and Unplugging of Machines (Subnets)**	**21-1**	Automatic TSN traffic setup/removal.			
		21-2	Support for thousands of AGVs with dynamic traffic layouts.			
22	**Energy Saving**	**22-1**	Switching off/on plant components must not disturb processes.			
		22-2	Avoid communication paths through energy-saving regions.			
23	**Add Machine, Production Cell or Production Line**	**23-1**	Integration must not disturb existing installations.			
24	**Multiple Applications in a Station Using TSN-IA Profile**	**24-1**	Support for stations running multiple TSN traffic classes.			

25	**Functional Safety**	**25-1**	Safety and standard applications must share the same TSN communication system.			
26	**Machine Cloning**	**26-1**	Unique TSN domain addressing and identification.			
		26-2	Support for isolated logical infrastructure (including for "cloned" machines").			
27	**DCS Device Level Reconfiguration**	**27-1**	Reconfiguration must not disturb communication.			
		27-2	Support for device replacement, addition, and software updates.			
28	**DCS System Level Reconfiguration**	**28-1**	System extensions and security updates must be seamless.			
		28-2	Same influencing factors as device-level reconfiguration.			
29	**Network Monitoring and Diagnostics**	**29-1**	Minimize downtime.			
		29-2	Provide diagnostics data including TSN features.			
		29-3	Quick error identification and repair indication.			
30	**Security**	**30-1**	Optional support for confidentiality, integrity, availability, and authenticity.			
		30-2	Security must not interfere with real-time communication.			
31	**Firmware Update**	**31-1**	Stations must accept and store an additional firmware version without disturbance.			
		31-2	Support for bump and bumpless update strategies.			
32	**Virtualization**	**32-1**	vBridge and vPort must behave like real bridge and port.			
		32-2	Must be TSN domain members.			
		32-3	Should support multiple applications.			
33	**Offline Configuration**	**33-1**	Define device type descriptions including all managed objects.			
		33-2	Support offline machine configuration in textual form (e.g., XML).			
		33-3	Enable offline-online configuration comparison.			
		33-4	Provide mapping between XML and YANG models.			
34	**Digital Twin**	**34-1**	Enable reliable planning, development, testing, simulation, and optimization.			
		34-2	Support virtual pre-commissioning to save time and cost.			
35	**Device Replacement Without Engineering**	**35-1**	Allow mechanical replacement of failed devices without engineering tools.			
		35-2	Support replacement of end-stations, bridged end-stations, or bridges with minimal downtime.			

Y = 0
N = 0
It's Complicated = 0
TBD = 70