

Industrial Automation In-Cabinet Use Case for SPMD

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Purpose

- The purpose of this presentation is to:
 - Describe the Industrial Automation In-cabinet use case
 - Propose enhancements to 10BASE-T1S that would improve the market potential

Existing proposed objectives

1. Define performance characteristics of a mixing segment with a single balanced pair of conductors supporting up to at least 32 nodes, for up to at least 75 m reach
2. Add support for the new mixing segment to 10BASE-T1S
3. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to 10^{-10} on the mixing segment
4. Specify improvements for Energy Efficient Ethernet
5. Specify an optional plug-and-play power distribution technique over the mixing segment
6. Add support for increased node count to the PLCA RS.
7. Support the optional Time Synchronization Service Interface (TSSI)
8. Specify optional improvements for Time Sensitive Networking (TSN) operation over the mixing segment (with/without PLCA)

In-Cabinet Use Case

- More than 8 nodes in a typical industrial automation electrical enclosure
- To reduce in-cabinet wires, the network cable could provide device power and actuation power (*i.e. DeviceNet, SmartWire, and POE*)
- Nodes must be removable without interrupting adjacent nodes

High Node Count Need

- Existing in-cabinet networks
 - RS485 = 32
 - DeviceNet = 64
 - SmartWire = 99
 - PROFIBUS = 126 (with repeater)
 - I/O Link = 128 (with hubs)

Diagnostics Need

- Indicate health of cable system
- Provide location of shorts and opens
 - Convenient for maintenance of long reach multidrop installations
 - Important where the multidrop is made of a chain or replaceable cables
 - Industrial automation makes a tradeoff of redundancy for rapid repair

Time Synchronization

- Some industries value the “Sequence-of-Events” (SoE) feature
 - Diagnosis of a chain of events (breaker tripping) to a root cause

Proposed/Supported Objectives

- Define performance characteristics of a mixing segment with a single balanced pair of conductors supporting up to at least 64 nodes, for up to at least 75 m reach
- Add support for the new mixing segment to 10BASE-T1S
- Add support for increased node count to the PLCA RS.
- Add 10BASE-T1S support for mixing segment diagnostics
- Support the optional Time Synchronization Service Interface (TSSI)

References

[1] Multidrop Ethernet for In-cabinet Applications

- http://www.ieee802.org/3/cg/public/Mar2017/brandt_cg_01_0317.pdf

[2] Environmental Conditions for Industrial Areas

- http://www.ieee802.org/3/bp/public/mar13/lounsbury_3bp_01_0313.pdf