IEEE 802.3 Enhancements to Point-to-Point Single Pair Ethernet Study Group

IEEE 802.3 SPEP2P SG:

Why the market needs 100BASE-T1L and 1000BASE-T1L

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New Use Case for Ethernet in the Process Industry

- From the presentation of Steffen Graber about “Higher Speed Upgrade Path for Process Automation”:
  https://ieee802.org/3/SPEP2P/public/graber_3SPEP2P_01a_06232021.pdf
  we learn:
- The process industry needs for APL-Phase 2:
  “100 MBit/s communication for future projects having higher bandwidth requirements, up to 500 m trunk, up to 200 m spur length.”
- This technology could be also interesting for other application in building automation and here is a consensus to support 100BASE-T1L with 400-500m reach

New Use Case for Ethernet with SPE

- At my Use case presentation:
  https://ieee802.org/3/SPEP2P/public/Fritsche_3SPEP2P_01_05122021.pdf
  I show up a lot of applications not using Ethernet today and would apply SPE with higher data rate and longer reach because of less space, weight, cost like:
  - Mobile working machines for agriculture, building construction, mining etc.
  - Trucks and trailers
  - Public transportation with busses, trams, trains
  - Ship building industry

- **Here SPE is needed to adopt Ethernet technology to replace bus systems and 1000BASE-T1L (minimum 100m) is the best fitting technology**
- **It is not a replacement but an addition to the 4-pair market**
- Behind these use cases is a big and relevant new market potential for Ethernet

SPE for Industrial Automation

- Most Industrial Ethernet protocols like PROFINET, EtherCAT, Ethernet/IP and the Industrial Ethernet devices in the market are running today with 100BASE-TX on 2-pair cabling
- Here is a need to change to Gigabit because of the strong request for:

→ Higher data rate needed for vision sensors, new production technologies like 3D printing and many more

→ Shorter cycle times and better performance for high dynamic drive applications like robotics, machines and production line (see presentation from Dayin Xu / Rockwell Automation: https://ieee802.org/3/SPEP2P/public/xu_3SPEP2P_01a_04282021.pdf

- Here 1000BASE-T1L SPE is the best fitting technology, because of:
  - less space, cost and material use for magnetic parts, cabling and connectivity
  → 1 pair for SPE instead of 4 pairs for 1000BASE-T

What we can use for 1000BASE-T1L?

- Existing components with 600MHz bandwidth like cables (acc. to the IEC 61156-11 & …-12), connectivity (acc. to IEC 63171-x) and magnetic components

- These parts are available in the market from several vendors and there is no cost reduction possible if these parts are only designed for 100MBit/s

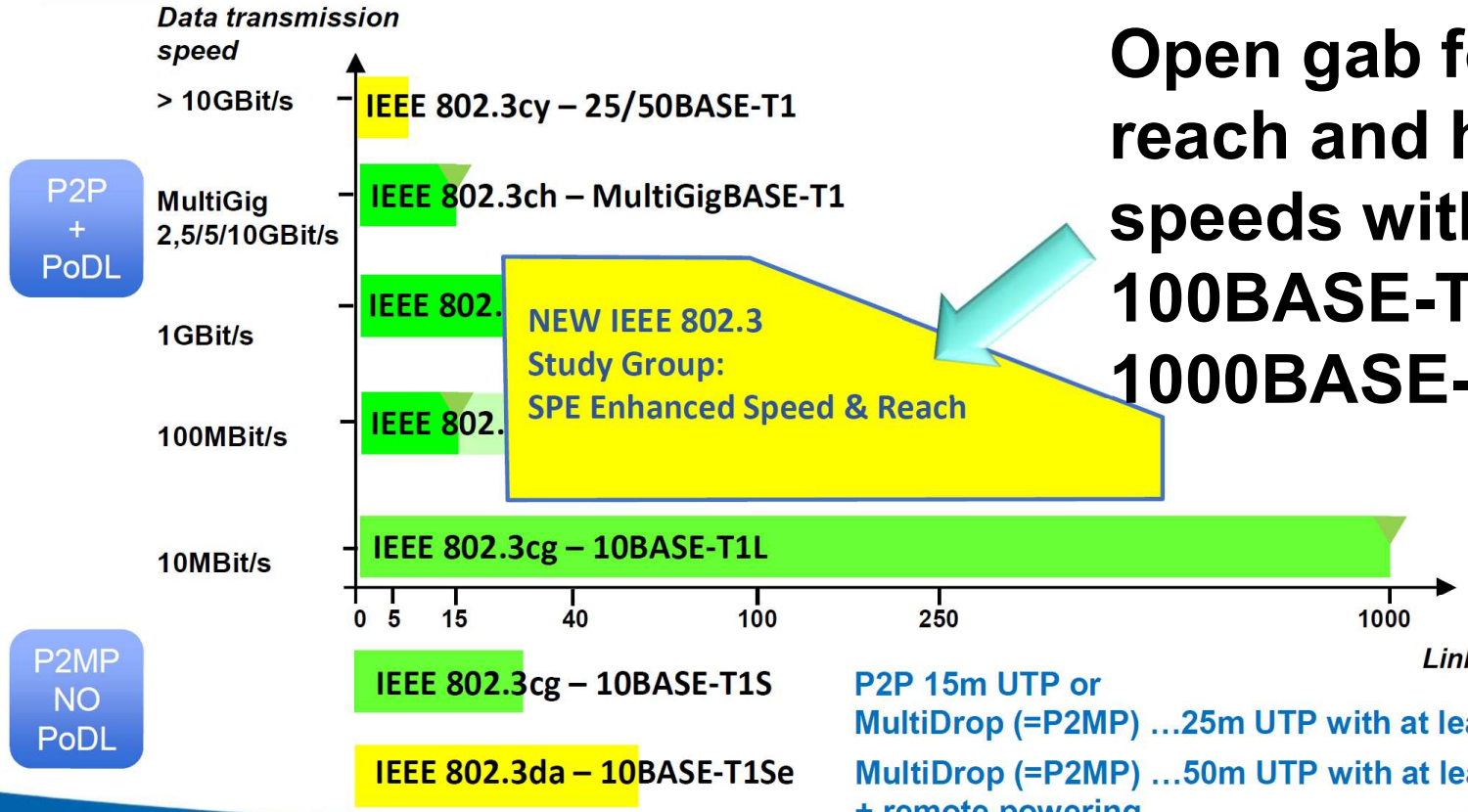
- TIA and ISO/IEC are on the way to define the needed cabling infrastructure
  → See presentation https://ieee802.org/3/SPEP2P/public/ISOchannels%20July21-schicketanz.pdf and the liaison reports from TIA and ISO/IEC

- In ISO/IEC there are proposals for 600 MHz Links (Channels) T1B-100 and T1C-100 suited for 1000 Mbit applications.

INTERNATIONAL STANDARDIZATION PROCESS

IEEE 802.3

IEEE802.3 SPE protocols – Active new SPE projects



Open gab for longer reach and higher SPE speeds with 100BASE-T1L and 1000BASE-T1L

source: HARTING

Open questions I see

- Comparison of the Complexity, energy consumption, development effort of potential PHY concepts for 100BASE-T1L and 1000BASE-T1L
- Summarised market analysis for the potential of 100BASE-T1L and 1000BASE-T1L
- …

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Thanks for your attention and feedback