

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

IEEE 802.3 SPEP2P SG:

Use Cases for 100/1000BASE-T1 with longer link length

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Bird's-Eye System for Truck & Trailer

- Bird's-Eye view systems offer better overview for driver or needed for future self-driving trucks (protection of persons and other vehicles around)
- **Technical requirements:**
 - Link length: minimum 40m and longer (for example truck trains)
 - 100Mbps and 1Gbps; future also up to 5Gbps
 - low latency $\leq 1\text{ms}$

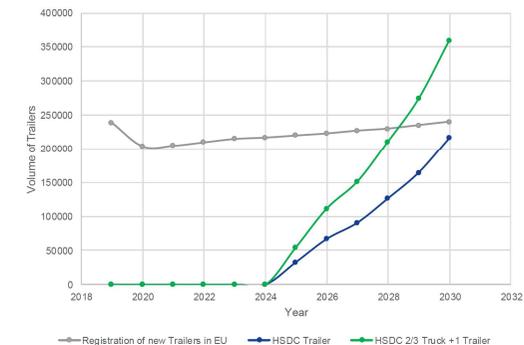


picture source: Erich Jaeger GmbH + Co. KG Germany

- **Market estimation**
 - Europe: VDA / FAT study show number of truck/trailer interface
 - Market introduction expected in 2024 and 2030: 350K systems
 - at each truck up to 3 camera systems \rightarrow with trailer switch = 6 ports \rightarrow expectation for Europe approx. 2.1 million ports in 2030
- The World market is 3-4 times bigger compared to Europe \rightarrow 2030 a world market of 6 – 8 million ports is possible for this use case per year

HSDC Connectors for Truck / Trailer Interface

Estimated Volume for Europe



source: VDA AK9 and **FAT** Forschungsvereinigung Automobiltechnik

SPE for Mobile working machines

- **Global yearly produced volume of Off-Highway Machinery approx. 3,5 million vehicles**

- Agriculture: 1,36 million tractors, harvester, various implements and so on..
- construction machinery: 840.000 vehicles
- material transport mining etc.: 1,3 million

- **Technical requirements:**

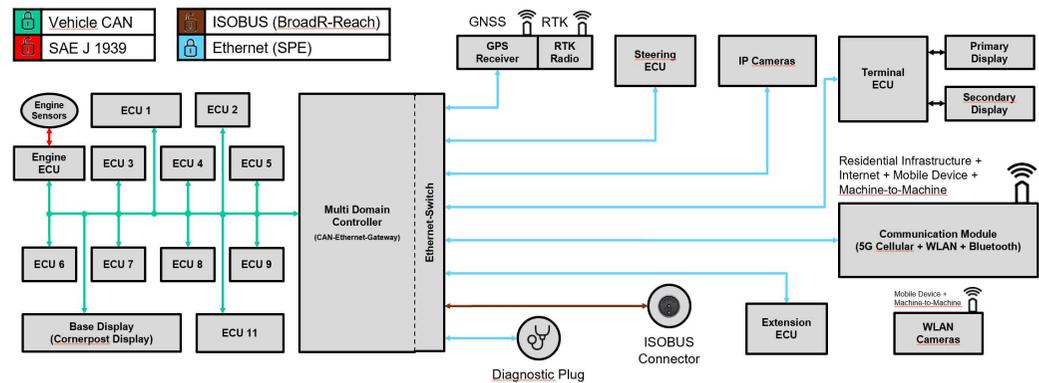
- The new SPE based High Speed Iso BUS based on 1000BASE-T1
- Link length: minimum 40m and longer
- 100Mbps and 1Gbps; future also up to 5Gbps
- low latency $\leq 1\text{ms}$

- **Market estimation**

- A typical network for mobile working machine show a lot of CAN bus for the basis driving functions and new SPE based communication additional application like vision sensors, terminals, communication
- Across this various vehicles we expect in average 5-10 additional SPE based applications.
- If we calculate as average with 7 SPE applications we need 14 ports per vehicle (switch and device side)

- In this way the world market is could be in 2030: 40 -50 million ports

- More info at AEF page: [High Speed ISOBUS - AEF Online \(aef-online.org\)](https://www.aef-online.org)

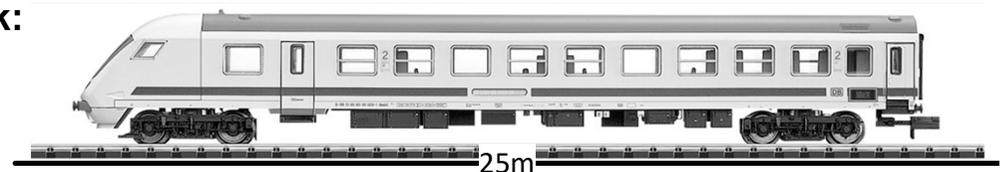


source: HARTING

Railway transportation

- **Global yearly produced volume of rolling stock:**

- HighSpeed trains: 250 sets/a
- Trams / Metro: 6.500 sets/a
- DMU / EMU: 1.800 sets/a
- Loco: 5.000 sets/a

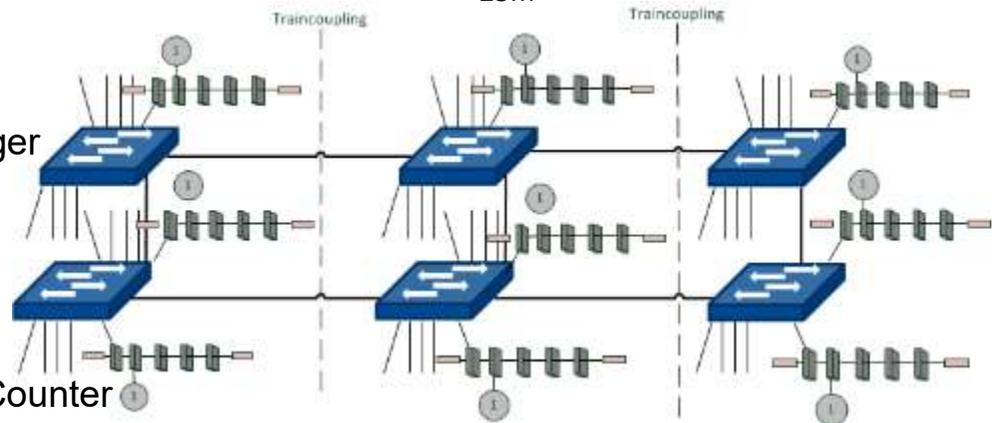


- **Technical requirements:**

- Link length: minimum 40m (one wagon) and longer
- 100Mbps and 1Gbps; future also up to 5/10Gbps
- low latency $\leq 1\text{ms}$

- **Typical applications:**

- PtP 1000Base-T1/100Base-T1 w/o PoDL
up to 50W for IP Cameras, Displays, Passenger Counter



source: HIRSCHMANN/Belden

- **Market estimation**

Depending on the train type different speed and number of ports are needed and also today Ethernet is used in trains. An estimation see a potential of new 1.5 – 0,9 million SPE ports per year.

Wind mills and wind parks

- Big wind turbines have towers higher than 100m and because of this fact Ethernet based on 4-pair copper is not possible.
- With 100BASE-T1L up to 500m link segment length a market potential about 100.000 ports for connections from ground to the top of the tower and between wind mills (wind parks) per year is possible.
- In addition for shorter link segments up to 50m SPE can be used inside the wind mills to and a potential of approx. 2-3 million p.a. ports is possible

→ **Advantage for this use case:** More robust and cost effective connections (just one cable for data and power)



Solar energy plants

- Solar plants are installed at huge areas and between the solar converters the distances usually are bigger than 100m and 100BASE-T1L will be a very good solution with a big market potential.



Other application areas to consider

- Video Surveillance
 - Airports
 - Harbors
 - Government facilities
 - Military Areas

- Large buildings
- Ships / vessels

- ...



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