INTERVIEW

Questions on the topic of

"Is IIoT challenging Ethernet? Industrial Ethernet yesterday, today and tomorrow"

Xaver Schmidt
Chairman of PROFIBUS Nutzerorganisation e. V.

This is a translation of the questions from Andreas Knoll and answers from Xaver Schmidt of the following article:
https://www.elektroniknet.de/automation/m2m/industrial-ethernet-gestern-heute-und- morgen.208363.html

How did Ethernet develop from its beginnings in 1973 to the emergence of Industrial Ethernet?

Xaver Schmidt: The journey from the beginnings of Ethernet as a campus network to the Industrial Ethernet of today was one of stages. While the objective at the beginning was initially to connect individual computers with one another, it was primarily the topic of security, as well as network structuring and speed, which played a major role in further development. Today, a world without Industrial Ethernet is unthinkable. The reasons why Industrial Ethernet prevailed over other LAN technologies which have been created over the years have included both international standardization with a large number of committed companies and continual further development of the technology.

When Industrial Ethernet emerged in the late 1990s, classic fieldbus systems had already been established. How did Industrial Ethernet take shape, and what were the reasons for betting on Ethernet in industrial production?

Xaver Schmidt: Back then—and it's still the case today—PROFIBUS was established as the classic fieldbus. It meets all the industrial requirements concerning robustness and reliability. At the time, however, there was an increasing demand for the connection of plants, higher-level systems and higher-grade machines. Higher data throughput was required here. Ethernet as it was being used in the office environment was not able to meet the requirements of a rough industrial environment, however, including robustness, availability and easy installation.

When it became possible for Ethernet to also be used for fieldbus communication about 20 years ago, the PI community utilized the substantial architectural advantage and established PROFINET. This enabled real-time IO data alongside established TCP/IP protocols. Its openness to other protocols is one of the crucial advantages of PROFINET.

Today, field devices are able to exchange IO data with a controller in real time as required and run the respective appropriate protocol without any elaborate additional methods with a computer or other systems. This basic principle is important—and is becoming increasingly so—with Industry 4.0 and the digitization of industry, as it makes free and independent access possible.

What's the position of Industrial Ethernet relative to other communication technologies (fieldbuses, sensor/actuator buses & interfaces, IIoT communication technologies (OPC UA, MQTT etc.) and wireless)?

Xaver Schmidt: We're convinced—and various studies confirm this—that Industrial Ethernet is continuing to grow. This is also the case with classic fieldbuses, but their growth curve is flattening out. If sensor/actuator buses are able to transfer more additional data, they'll capture new markets as well. This can currently be seen with IO-Link. To "relocate" this data to edge and cloud computing, in turn, OPC UA and/or MQTT and other technologies like JSON will be required. This is nothing but advantageous for users and manufacturers, as they're able to find optimal solutions for their applications.

Industrial Ethernet, which sits in the middle of this chain, will play a big role with all these applications and is a crucial factor in the digitization of industry.

What role will TSN, OPC UA over TSN and OPC UA Field eXchange play in the future, including in relation to the established Industrial Ethernet standards?

Xaver Schmidt: TSN is an option standardized in the IEEE for integrating real-time applications with different service levels. Together with many other organizations, PI has promoted a selection of detailed functions and the integration of TSN so that this technology is also possible in addition to the tried-and-tested methods used today.

For controller-to-controller communication, OPC UA is a further option with a focus on object orientation. The task now is to implement these approaches and put them into practice. These new technologies will have to demonstrate their added benefit over the tried-and-tested solutions currently in use today.

What role will Single-Pair Ethernet play in industry in the future?

Xaver Schmidt: In the Ethernet APL expression, this new transmission technology is crucial for access to process automation. PI has participated in everything from standardization to installation guideline creation on various committees. Now we're seeing concrete implementation in devices and systems.

In factory automation and hybrid systems, both correspondingly adapted process automation devices and new devices combining the advantages of SPE with simple cabling and integrated power supply can be used. SPE is also of interest for smart building networks and IoT applications, as the end devices—sensors and actuators—can be operated with sufficient data bandwidth cost effectively on the lower field levels and can be docked to existing IT networks with no barriers. More detailed work is still required here, though.

What tasks will Ethernet fulfill in systems with sensor-to-cloud communication in the IIoT in the future?

Xaver Schmidt: Ethernet has established itself as the standard medium. Full utilization of the potential of Ethernet is crucial for current and future tasks. PI technologies are open to further development of the basic technologies themselves, i.e. TSN, SPE and Multi-Gig. What's decisive here is utilizing this openness to different services on the same cable to easily enable access to the data for IIoT use cases in addition to IO data transfer for machine/system functioning.

What future do you see for Industrial Ethernet? How do you think Industrial Ethernet will continue forward?

Xaver Schmidt: The demand for industrial communication will grow enormously, including with regard to new applications. In some industries, such as mining environments for example, older fieldbus technologies are only now being replaced with PROFINET. We also need to keep an eye on new requirements, though. We'll always be faced with the issue of security as well, such as in wireless applications, omlox for an open, standardized positioning infrastructure and Module Type Packages (MTPs) as keys for flexible process engineering production plants. PI offers a future-proof strategy for these diverse requirements based on an open Ethernet architecture with PROFINET.

Kontakt:

PI (PROFIBUS & PROFINET International)

PROFIBUS Nutzerorganisation e. V.

Emilia Biche

Ohiostraße 8

D-76149 Karlsruhe

Tel.: 07 21 /98 61 97 - 0

Fax: 07 21 / 98 61 97 - 11

Emilia.biche@profibus.com

http://www.PROFIBUS.com