



Is the same level of safety available for everyone?

Industrial Ethernet is not a uniform technology. There are as many types of high-speed field networks as there are well-known manufacturers of controllers and automation technology. With openSAFETY, the EPSG has now satisfied the long-stated demand for uniformity and interoperability throughout all systems when handling safety data communication via networks. On behalf of x-Technik AUTOMATION, Ing. Peter Kemptner asked just how far this openness extends during a discussion with Stefan Schönegger, Open Automation Business Unit Manager at B&R.

Long-time readers of x-Technik AUTOMATION will remember: When in October 2007 the protagonists of the various Industrial Ethernet solutions discussed the state and the future of the technology, interoperability of the individual systems was given great importance (AUTOMATION 6/2007). With regard to network-based safety technology, which was still in its infancy at the time, one of the people taking part in the discussion requested that safety protocols be included in the specification in order to guarantee that safety components could be used without restrictions on all real-time industrial Ethernet systems.

A safety protocol for all bus systems

Since safety equipment is not only used directly on the machine, but often surrounds entire manufacturing cells, this is an easily understandable and justifiable request. The Ethernet POWERLINK Standardization Group (EPSG) has now answered this request with the release of openSAFETY, the first completely open safety-related data transfer protocol for all areas of automation. Since the method has already received certification, it can be used for new components and systems immediately.

Certification has already been provided for this procedure, so it can be immediately implemented when developing new components and systems.

Stefan Schönegger is responsible for the Open Automation business unit and has been in charge of business development in the EPSG since 2007. The goal of the new business unit is the standardization of technologies developed by B&R so that they can also be used by other system manufacturers and integrators as well as by external service providers and component suppliers.

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The word bus is derived from the Latin term omnibus, and means 'for all'. How extensively can openSAFETY be used in reality? What are the limitations? Are there any Industrial Ethernet systems on which openSAFETY cannot be used?

Stefan Schönegger:

openSAFETY really is bus independent and can be used with all fieldbus systems or Industrial Ethernet systems. To demonstrate the interoperability of the safety solution with different protocols, the EPSG presented openSAFETY solutions based on four different Industrial Ethernet protocols at the 2010 Hanover trade fair. Solutions were presented for SERCOS III, Modbus TCP, EtherNet/IP and POWERLINK. Of course, implementation is also possible on all other Industrial Ethernet systems.



The openSAFETY protocol can even be used with traditional fieldbus systems. However, the level of safety that can be attained is limited in some cases by the data throughput of the bus system, i.e. a calculation must be made in each case to determine if a safety data packet will arrive on time in order to react fast enough. With all well-known Industrial Ethernet systems, this is not a problem.

Uniformity not only refers to the technical requirements for basic use with all applicable data communication mechanisms, it goes beyond that. Legal issues and usability were handled in a way that makes it easy for all market players to integrate openSAFETY in their products and solutions for applications in any industry. The protocol is available for free download as open source software.

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How does integration in any bus or network system work from a technical standpoint?

Stefan Schönegger:

openSAFETY uses an extremely flexible telegram format, and it can be adapted as needed to the requirements of the transfer standard being used. In this way, it is included in the available user data window of the respective bus system and can even be used in single-channel, non-safe transport networks without compromising safety.

In order to really be independent of the carrier, the safety-relevant mechanisms for data transfer are contained within the telegram specified as the safety frame. For example, the transferred data is available twice in the frame (doubled) and the two identical parts are protected with CRC flags. Including the safety telegram in the transport protocol in the form of a black channel also ensures that no conflicts can occur with data cross traffic.

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What is the black channel principle?

Stefan Schönegger:

openSAFETY's black channel principle is the basis for interoperability with arbitrary transport protocols. In simple terms, this means that from the viewpoint of the system being used as a tunnel, the safety protocols are closed application data packages traveling in safety frames, and they are integrated smoothly into the rest of the data traffic. This guarantees independence from the transport protocol.

openSAFETY continually monitors all transferred data content to ensure that it is complete, that it has the correct transfer sequence, that the transfer duration is maintained and that all transfer errors are immediately recorded. Therefore, no adaptations to the functional system are necessary. This provides the advantage of easy and fast implementation, and also allows safety margins to be ideally dimensioned and machine clock rates to be increased because of the obtainable reduction of safety-relevant braking distances on the machine.

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What level of safety is possible with openSAFETY? Is the safety protocol certified?

Stefan Schönegger:

As the first well-established network-based safety protocol, openSAFETY is already certified by TÜV Süd and TÜV Rheinland. This includes all safety levels up to SIL 3.

x-Technik:



How easy is it to use in the field?

Stefan Schönegger:

openSAFETY has an automatic safe parameter setting function. That means that after the parameters for the connected devices are entered once by the machine manufacturer, they are available for the safety components everywhere on the network. In the field, this means that parameters do not have to be set again (after exchanging a safety gate, for example) and are instead redistributed automatically. This increases the efficiency of service tasks because expensive specially trained personnel are not required for this type of work.

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What is the motivation for other companies to implement openSAFETY?

Stefan Schönegger:

openSAFETY is currently the only network-based safety protocol that is not limited to a certain network system or a certain control system manufacturer. This makes it easy to implement integrated safety solutions over multiple machines. It is already certified and can therefore be integrated immediately without hesitation. Specifications are not the only thing available, hardware and software products are also available and there will soon be more. In addition, the open architecture is not limited to the stack for creating slave components; it is also available on the master side. In this way, existing component manufacturers can create all parts of safety systems without worrying about compatibility problems with the target control systems.

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Images:

openSAFETY Schluessel.jpg: openSAFETY is a uniform safety standard for all high-speed fieldbus systems.

BuR_Stefan Schoenegger_1.jpg: "The time of proprietary systems for automation safety is over," says Stefan Schönegger, Manager of Open Automation Technologies at the EPSG. "With openSAFETY, a certified protocol for creating system-independent safety networks is now available for the first time."

Fabrikvernetzung_cmyk: openSAFETY provides a uniform safety standard for a complete machine line independent of the control system manufacturer, and therefore reduces costs and commissioning times for complete production systems.

safety_frame_gelb_CMYK: The safety frame is transported in the user data section of a standard frame. It consists of two identical sub-frames, which are each protected with a separate checksum and use the respective system environment as a tunnel without involving it in any way.