NEWSLETTER NOVEMBER 2007

ETHERNET POWERLINK

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The Standard in Industrial Ethernet

NEWS

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POWERLINK center at this year's SPS/IPC/Drives trade show

The Ethernet POWERLINK Standardization Group (EPSG) cordially invites all interested parties to visit this year's SPS/IPC/Drives trade show which will take place from November 27-29 in Nuremberg, Germany. The POWERLINK user organization will provide information about the leading real-time Ethernet protocol in drive and automation technology in hall 6, booth 114. POWERLINK has seen a constant increase in use, with currently 40,000 POWERLINK serial machines in operation worldwide, which reflects the protocol's performance and the great value users attach to its independence from manufacturers and its adherence to the Ethernet standard. A special trade show presentation at the EPSG booth will showcase the speed provided by POWERLINK. The second key topic is the open, safety-oriented POWERLINK Safety protocol, which has already been certified by the German technical monitoring association TÜV in 2004 and is currently being used in systems requiring SIL 3 protection. The bus-based safety system allows for the implementation of resource-saving safety concepts which cannot be realized by means of standard equipment.

We are looking forward to your visit!

Baldor extends its range of POWERLINK drives

Figure: MotiFlex e100:
POWERLINK-compatible and suitable for heavy duty applications

Introducing new high-performance three-phase AC drives, Baldor continues to base its intelligent drive technology on POWERLINK. The motor manufacturer has extended its MotiFlex e100 drive series, adding three versions rated for continuous currents from 21.5 to 33.5 A.

Thanks to a wide functional range, the new drives offer great advantages in heavy-duty applications such as printing, papermaking, converting, textiles, plastics and steel production. For example, they allow users to integrate large AC induction motors (such as

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those used on the main axes of web processes) into the POWERLINK control network. "Baldor now has the broadest range of POWERLINK-compatible single- and three-phase drives in the industry, giving a majority of industrial system builders the platform to make their machinery more efficient", says Baldor's David Greensmith. "POWERLINK allows users to simplify control architectures, thereby reducing costs."

Plug-in machine controllers, which can be programmed with Baldor's Mint motion language, enable the drives to act as standalone units capable of executing complex functions. The optional Mint card features a POWERLINK interface which allows for the easy implementation of multi-axis systems. "The new drives complete Baldor's range of POWERLINK-compatible motion control products. Developers can now choose from a portfolio that includes single-phase and three-phase drives, small panel-mounting machine controllers and large multi-axis systems", says Greensmith.

IEC standard update ensures investment protection for POWERLINK

POWERLINK is currently being standardized according to the IEC standards 61748-2 and 61158, which provides further investment protection for users. POWERLINK has been used in automation networks since 2001. Currently featuring 304,000 installed nodes, 40,000 serial machines and 200 machine builders, POWERLINK is the leading open Ethernet-based fieldbus. The Ethernet Powerlink Standardization Group (EPSG), which has more than 400 members, users and supporters, promotes the standardization of POWERLINK. Six existing fieldbus standards (Foundation Fieldbus, ControlNet, Profibus, P-Net, World FIP and INTERBUS) included in the IEC final draft and updated by the Technical Committee 65 (TC65) have been passed on to the IEC national committees. Three new buses have been added: CC-Link, HART and SERCOS. Most important in the standardization process, however, was the inclusion of eleven new Ethernet-based fieldbuses, with POWERLINK as a front-runner.

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Fail-safe data communication with POWERLINK

The real-time communication system POWERLINK is highly resistant to electromagnetic interference. In bus systems featuring a ring topology, the master cannot analyze responses or send commands until a group telegram has passed through all nodes. By contrast, all Controlled Nodes in POWERLINK networks immediately send responses to the Managing Node after each request. This communication structure, which is based on a combination of the time slot and polling method, makes the system considerably more fault-tolerant towards undesirable electromagnetic effects, since destroyed telegrams merely lead to short-term interruption of communication with single nodes. In buses with a ring structure, corruption of the group telegram may lead to the failure of a complete cycle and may also cause problems during fault detection. In POWERLINK systems,

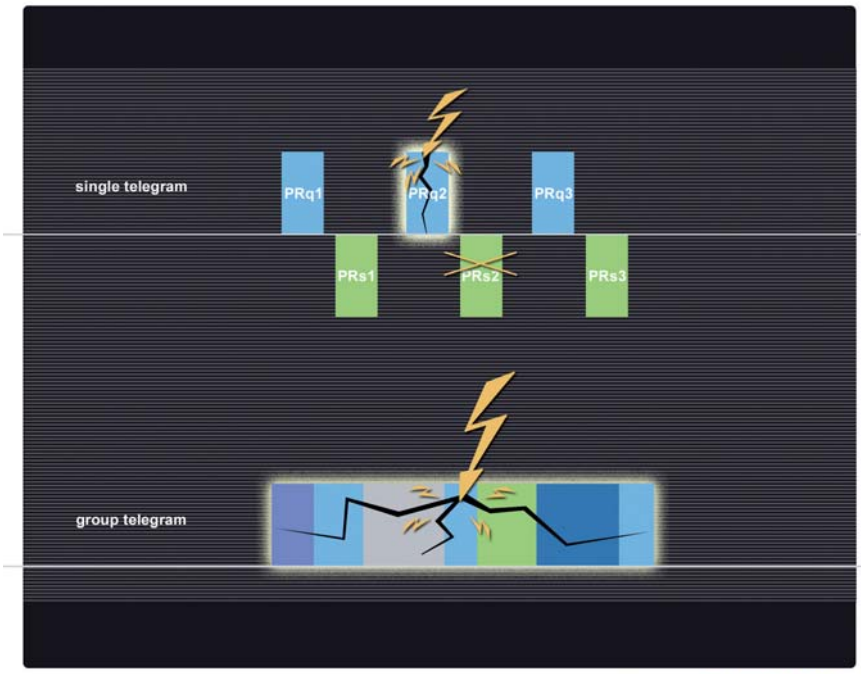

Figure: Electromagnetic interference merely results in destroyed single telegrams in POWERLINK networks, while the complete cycle is affected in group telegrams.

however, it is extremely improbable for a single telegram to be rendered illegible by electromagnetic interference in two consecutive cycles, while non-recurring errors can be tolerated by the system.

Electromagnetic interferences, caused e.g. by frequency inverters, poorly insulated wiring or by cable damage, interfere with data transfer via fieldbuses. If at all possible, complete EMC shielding requires considerable efforts.

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Smart machine reactions instead of abrupt emergency stops

Figure: POWERLINK Safety: the only open real-time safety protocol for machine and factory automation

POWERLINK Safety, the first open real-time safety protocol for machine and factory automation, allows users to implement a safety concept which presents a resource-saving alternative to conventional emergency stop mechanisms. Instead of abruptly interrupting the whole production chain, the bus-based safety system will safely throttle individual machine motions to operate at reduced speed and torque, thereby maintaining the synchronicity of the axes. Additional time for offloading procedures, empty runs and restarts is thus no longer required. Suitable for communication cycles at the microsecond level, the safety protocol has been certified by the German technical monitoring association TÜV Rheinland and can be used in systems requiring SIL 3 protection. The IEC 61508's definition of this Safety Integrity Level dictates that no more than 10^{-9} errors per hour may occur. In other words: a dangerous condition may be caused by a bus fault only once every 115,000 years on average. Ensuring safety through software-based measures, even in unsafe networks, the protocol replaces separately wired emergency stop systems or safety buses installed in parallel to the fieldbus. POWERLINK Safety is transport protocol-independent, i.e. it can also be used with other networks, such as CAN. The ideal basis for POWERLINK Safety, however, is the communication system POWERLINK.

The path towards the safety protocol

Strict standards used to require separate hardware systems with separate wiring for safety functions. In such cases, emergency stops mean that relays and contactors interrupt the power supply once the moving machine parts have reached a safe position. Dangerous situations therefore result in halted production

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lines in directly affected and adjacent areas. Recent standards, such as IEC 61508 from 1998, allow for fieldbus-based safety protocols and the implementation of safety functions in control units, I/O modules and drive systems, such as decelerating machine motions, limiting torque and implementing emergency stops within limited areas of a plant.

Tasks of a safety-oriented protocol

The safety protocol serves to continuously monitor the data transfer for correct functionality. It must immediately recognize any deformation of original signals and transfer delays. In case of interruptions or incomplete data transfer, the protocol activates safety functions or triggers the safe shutdown of the plant.

POWERLINK Safety in detail

POWERLINK Safety divides data packets into two subframes with identical content, securing them by means of different checksums. During readout, the protocol first uses these checksums to verify that the frames are complete. Subsequently, it compares the actual data content of the subframes. Additionally, the protocol takes signal runtimes and processing times into account, since bus-based systems cannot compete with the transfer speed of separately wired components. Similar

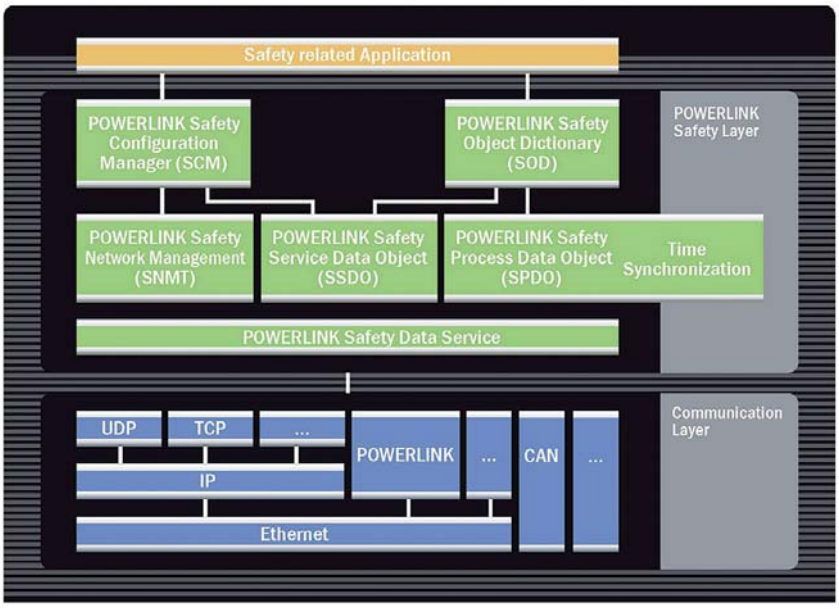

Figure: Diagram of the POWERLINK Safety Layer

to the closed-circuit principle in separately wired systems, emergency stop disconnecting devices continuously send data to a safety relay via the safety-oriented bus in order to ensure an intact connection. As POWERLINK has extremely short cycle times (100 s), failures are detected almost without any delay. Since all data traffic irregularities will thus be recognized, unsafe networks

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do not compromise safety functionality. On the other hand, small but normal fluctuations must not cause alarms. POWERLINK will tolerate data delays that do not exceed a few 100 s before safety measures are triggered. The resulting safe reaction time of a few ms is still at least ten times shorter than in other bus-based safety systems.

User benefits

POWERLINK Safety is a highly scalable, flexible basis for safe infrastructures that supports modular machine concepts, allows for a free choice of network topology and can optionally also be used in redundant, POWERLINK-based safety-oriented networks. In addition, POWERLINK is fully compatible with CANopen and supports all CANopen communication profiles. A wide range of predefined safety function blocks simplifies the implementation of safety functions.

POWERLINK training in Nuremberg fully booked

Around 40 employees from ten automation companies followed the invitation of the EPSG office to participate in a POWERLINK sales training workshop. Since component manufacturers are currently facing an increasing market demand, Stefan Schönegger and Rüdiger Eikmeier presented new marketing strategies designed for a wider audience. The EPSG rated the first-of-a-kind event as a success. "We are pleased with the high number of participants and the all-in-all positive feedback", says Eikmeier. The next date is scheduled for January 22, 2008, at the same venue, with POWERLINK basics as a key topic. Another event for product developers is planned and expected to take place in March 2008. The EPSG Office will announce these dates in sufficient time.

Masthead:
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