NEWS

Meet the EPSG at upcoming trade shows

Unfortunately, POWERLINK is a product that cannot be touched. Interested parties can, however, seize the opportunity to learn more about the real-time communication technology at the trade shows listed below. We will provide extensive information on technical backgrounds, application areas, advantages and current POWERLINK developments. Just drop by our trade show booth – we will be happy to see you.

Trade show	Location	Date
C^2 Control and Communication	Italy / Turin	Sept. 11, 2008
Aandrijftechniek	Netherlands / Utrecht	Sept. 30 – Oct. 03, 2008
Vienna Tec	Austria / Vienna	Oct. 07 – Oct. 10, 2008
SPS/IPC/DRIVES	Germany / Nuremberg	Nov. 25 – Nov. 27, 2008
SCS Automation	France / Paris	Dec. 02 – Dec. 05, 2008

emVIEW – HMI systems from Janz now available with a POWERLINK interface

emVIEW systems from Janz are now also available with a POWERLINK PCI interface and can thus be used as Managing Nodes for POWERLINK networks. The systems are based on an emPC-A400 embedded PC and emPC-M systems. A sophisticated mechanical design allows for the easy combination of a display (with or without touchscreen) and emPC, thus allowing users to operate emPCs as stand-alone units or with a display.

12.1" and 15" displays are already available and much in demand. The new, Xscale-based emVIEW-6T with a 6.5" display is the latest addition to the em-VIEW range. Combined with the Xscale-based emPC-A400, the new 6.5" display requires little maintenance and operates with little power loss (approx. 10 W). This allows for the price-efficient implementation of a wide range of applications, such as thin client solutions in plant engineering or control solutions in house automation.

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HMI systems from Janz now available with a POWERLINK interface

Janz has announced a further member of the emVIEW line: the emVIEW-8, which will feature an 8.4" display, will be introduced in the third quarter of 2008. All units come with one or two CAN interfaces, which makes it easy to connect existing networks. Further standard interfaces include, amongst others, two 100/1000 MBit/s Ethernet ports, USB and VGA. The units are delivered with a CompactFlash card – however, a 2.5" hard drive can also be installed.

Users can choose between the operating systems Windows XP/XPe, Windows CE, Linux and RTAI.

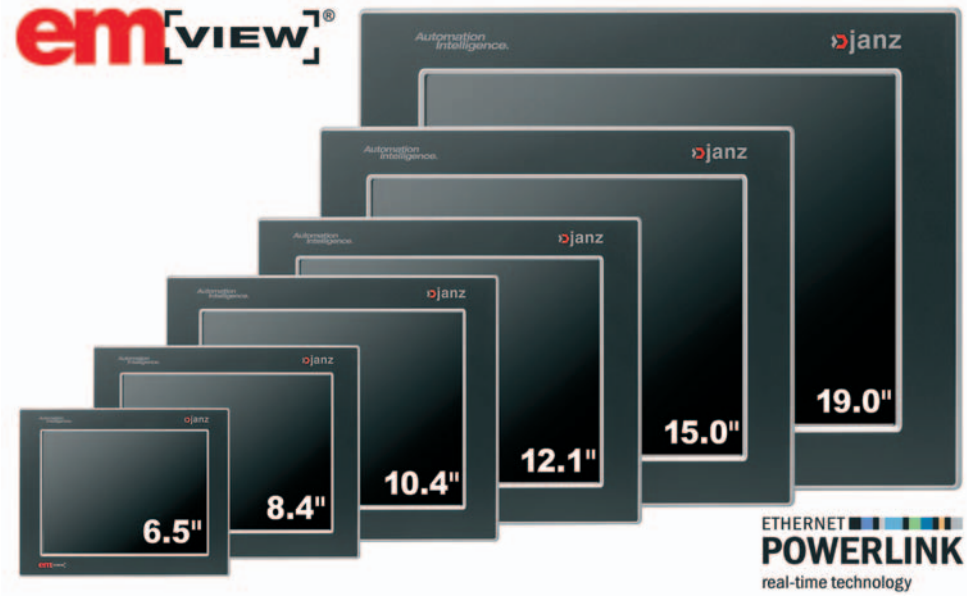

Figure 1: emVIEW from Janz

Wireless real-time?

Different types of real-time

In industrial applications, where the wiring is exposed to rugged environments and components are hard to reach, plant operators prefer to use wireless data transfer technology. For that reason, Ethernet manufacturers and system integrators are often faced with the question whether WLAN transfer routes could be integrated into POWERLINK networks. The answer is “yes and no”, because everything depends on the application type and the requirements on real-time determinism.

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continued: **Wireless real-time?**

This applies not only to POWERLINK, but to all Industrial Ethernet systems available on the market. Technically, WLAN data transfer is possible in POWERLINK networks. POWERLINK's close adherence to the Ethernet standard ensures compatibility between protocol and transfer technology. However, the basic characteristics of WLAN technology result in transfer delays. Therefore, the decision for or against using WLAN depends solely on the timing requirements of the application in question. As a matter of principle, the sum of all run times must not exceed the cycle time. “Soft” real-time, non-time-critical applications, such as picking up temperature measurements in the process industry, often manage with cycle times at a two- to three-digit millisecond level. Minor delays can be easily compensated in such cases. Digital control systems or motion control applications, which often require cycle times below one millisecond, are a whole different matter.

Figure 1: Wireless data transfer creates additional delay times. The decision for or against using WLAN always depends on the required real-time determinism.

How POWERLINK ensures hard real-time

POWERLINK cycles reach cycle times as low as a few hundred µs through a combined polling and time-slot procedure: within the POWERLINK network, one device is assigned the Managing Node (MN) function, while all other devices act as Controlled Nodes (CN). The MN defines the clock cycle to synchronize all devices. It controls data communication by sending Poll Request messages to all CNs within one cycle, requesting their user data. The CNs reply directly with a Poll Response message.

A POWERLINK cycle consists of three periods: during the “Start Period”, the MN sends a “Start of Cycle Frame” (SoC) to all CNs, which synchronizes the devices. The second period (“Cyclic Period”) is used for cyclical, isochronous data transfer. The following “Asynchronous Period” enables the transfer of non-time-critical application and service data.

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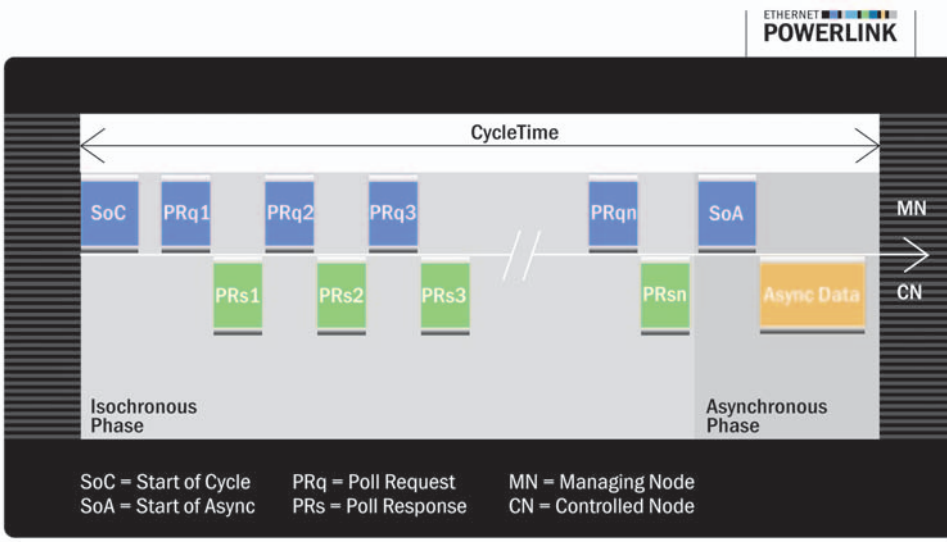

Figure 2: Model of the time-slot procedure: One cycle consists of a real-time phase with direct requests (Poll Requests), responses from the addressed nodes (Poll Response) and an asynchronous phase, which is used to transfer non-time-critical data.

This strict data traffic organization allows POWERLINK to avoid the delaying CSMA/CD procedure, which is part of the Ethernet standard according to IEEE 802.3. This procedure detects data collisions and, if required, orders nodes to delay sending until a random time interval has passed. This, however, leads to unforeseeable delays which are incompatible with deterministic data transfer.

Run time delays in WLAN networks

The WLAN standard uses the similar CSMA/CA procedure, which is based on CSMA/CD, but operates differently due to the different transfer medium and thus cannot be avoided. In contrast to wire-based transfer, WLAN senders cannot detect collisions (Detection), but must avoid them from the start (Avoidance). Therefore, the sender "listens in" to the network before sending data packets. Data cannot be sent until radio silence has been ensured. Moreover, receivers must acknowledge the arrival of error-free data packets – if the sender does not receive any acknowledgement, it will send the data again. Further delays are caused by radio transfer mechanisms: the sender fragments the data and the Access Point must reassemble it in order to route the packets to their destination addresses. This also takes (real-) time. Several approaches have been taken in order to minimize delay times and ensure a deterministic time behavior (on a level of several milliseconds per station). The 802.11g WLAN standard, for instance, makes better use of the transfer bandwidth through better data compression, and the 802.11b standard allows for data packets to be prioritized for applications with demanding timing requirements. Whichever WLAN technology is chosen, however, it will only be suitable for data transfer cycle times on a two-digit millisecond level. Even with

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proprietary configurations, which reach delay times of few milliseconds, there is no guarantee against occasional longer delays which cannot be tolerated in any deterministic system. An automation manufacturer confirmed this and described a test assembly which was used to measure run times at both Ethernet sockets in an Ethernet-WLAN-Ethernet network. The data rate was 1 MBit/s, the distance was kept short and the environment was kept free from electromagnetic interference. In spite of that, occasional delays as long as 8 ms occurred. It must be assumed that considerably longer delays can occur in networks with higher data rates, larger data packets and close proximity to HF sources. Even though these test results are not universally applicable, it can be expected that other devices will act in a similar fashion.

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