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High speed Profinet

A working demo at the recent Hannover Fair in Germany showed PROFINET operating at cycle times of 31.25 microseconds. This high speed option has come through the adoption of the PROFINET Version 2.3 specification which as well as introducing other important features also contains three key technical innovations aimed at fast IO applications. These are backwards compatible with existing specification devices. Achieving this dramatic performance improvement relies on increasing the efficiency of the Ethernet data handling. Here's how it's been done:

Fast Forwarding:
Switches play a key role in all Ethernet networks but they introduce delays since the ID of an incoming frame must be determined before a decision taken as to its destination. Typically, delays of 5 microseconds are experienced. In Fast Forwarding, the ID information is placed earlier in the Ethernet telegram, enabling faster identification and immediate forwarding. Delays are reduced to 1.25 microseconds per switch, a significant improvement especially for linear networks where a switch is required at each node.

Dynamic Frame Packing:
Data packets in very fast IO applications like drives are typically small - maybe just a few bits - making poor use of Ethernet bandwidth in linear networks because the messaging overhead for each packet is large by comparison. Dynamic Frame Packing places several data packets in each Ethernet telegram. At each node the relevant data is dropped but no process data is retrieved. The telegram gets smaller the longer the line, speeding average response times too.

Fragmentation:
Transmitting a standard Ethernet frame containing TCP/IP data can take up to 125 microseconds - that's defined in the Ethernet standard. It places a lower limit on cycle times since guaranteed TCP/IP transmission is an integral part of the PROFINET specification. All Industrial Ethernets face this limit. To overcome it, TCP/IP telegrams are split into smaller units at the first network node. The final node reassembles the TCP/IP message. "Fragmenting" the TCP/IP messages allows more PROFINET data to be transmitted in the same time period.

Using these innovations results in scalable PROFINET cycle times down to 31.25 microseconds! At least three chips are emerging to support this advance - Hilscher's netX, Siemens' ERTEC and the TPS1 "Tiger" from Phoenix Contact.

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Desigo V5: Innovations from Siemens increase building efficiency

The Siemens Building Technologies Division has introduced version 5 of its Desigo building automation system. Its innovative products such as Total Room Automation as well as efficiency features, like RoomOptiControl and Eco Monitoring, give building operators and users an active role in energy management, leading to permanent reductions in energy and maintenance costs. A state-of-the-art building automation system is always optimized for energy-efficient operation. However, these optimized settings may start to drift over time. One of the underlying causes is often a lack of transparency for users who simply don't know how the setpoint changes they make can impact energy consumption. This is particularly true for air-conditioned rooms which are also equipped with lighting and sun protection controls. The new version of Desigo keeps room users and building operators apprised of the building's efficiency status. Feedback to users is given using the innovative Green Leaf display, adapted to the expertise and control options of each user group. The system makes it possible to change settings if needed to restore optimal energy efficiency. A study by Technische Universität München (TUM) indicates that by actively involving operators and users in the energy management of a building, energy consumption can be reduced by up to 25% without affecting comfort.

Total Room Automation offers energy savings without reducing comfort

The open, programmable room automation range Desigo Total Room Automation (TRA) is a holistic solution encompassing the HVAC, lighting and shading disciplines. Desigo TRA uses an innovative efficience feature called RoomOptiControl. It automatically detects unnecessary energy consumption in the room and notifies users by changing the color of the Green Leaf icon on the QMX3 room control unit: If room operations are energy efficient, this icon is green. If settings made by a room user lead to unnecessary energy consumption, the icon turns red. To reset room control to energy efficient operation, the user simply presses the display and the Green Leaf icon returns to green.

Using BACnet/IP, PXC3 room automation stations—also part of the TRA package—are integrated seamlessly into the PX automation level with its primary systems (heating generators, HVAC main units and cooling generators). The primary systems are controlled directly through the demand signals from the rooms. This means that the primary systems are only turned on if needed and their operation is adjusted so it meets the room requirements without exceeding them. One room automation station can cover multiple rooms. TRA offers complete integration of KNX, DALI and EnOcean devices; existing or new sensors and actuators from Siemens can be incorporated as well.

Eco Monitoring to reduce energy consumption and wear

Eco Monitoring is another innovative efficiency feature of Desigo. It monitors ongoing operations of HVAC systems based on energy-related quality condition indicators such as readings from temperature, humidity and pressure sensors, runtime, switching behavior and operational performance of the systems. Should deviations from the target state, inefficient operations or increased energy consumption occur, the building operator is notified via the Green Leaf display on the Desigo Insight management station. Current and future international standards (such as

EN 15323:2007) require such a feature in order to optimize building operations over the long term.
Desigo Eco Monitoring not only helps optimize energy consumption, it also reduces wear. Thanks to its dynamic behavior and timely reporting, the Eco Monitoring feature recognizes unfavorable system operations early on, allowing operators to intervene immediately before any negative impact occurs. If desired, operators can choose to be notified of unusual events via text messaging (SMS), fax or e-mail.
Expanded networking of the automation level
Starting with version 5, Desigo also offers expanded end-to-end networking of the automation level. Enhanced support for communications standards ensures efficient system integration.
The PXC series of compact automation stations has a higher number of universal inputs/outputs, which makes them much more flexible. To protect existing investments, different device generations, such as PTM and TX I/O modules and RXC room controllers, can be used in parallel on the same PX automation station.