Network analysis and simulation in Profinet networks: Siemens develops new solutions for real-time Ethernet applications

The Bany PNIO network analyzer and the Simba PNIO module in the Simit simulation system supplied by the Siemens Industry Solutions Division provide operators of Profinet networks with a number of new tools for efficient monitoring and simulation. Bany PNIO enables reaction-free real-time analysis of data traffic at rates of up to one gigabit per second and a resolution of ten nanoseconds. Simba PNIO simulates up to 256 devices on the controller in real time. Mixed operation of real and simulated devices is also possible, which makes it easier to expand facilities and accelerates their commissioning.

In industrial instrumentation and control, real-time Ethernet technology is becoming more and more prevalent in bus systems at both field level and higher automation levels. At the same time networks have become considerably more complex while the availability of a production plant depends on these central networks. What is needed, therefore, is technically sophisticated and powerful analysis and simulation systems for system testing, engineering and commissioning as well as for maintaining efficient plant operation. Profinet (Process Field Ethernet bus) has now become established as the new field bus standard. Compared to other field bus systems, Profinet features high transmission rates of up to 100 Mbit/s and above-average data security.

Bany PNIO (bus analysis Profinet I/O) from Siemens is an analyzing device with which the bus can easily be monitored autonomously and at all known speeds. The bus
analyzer records data traffic reaction-free via Ethernet and Profinet at rates of up to one gigabit per second and a resolution of ten nanoseconds. Unlike other systems, which offer retrospective offline analysis of bus events only on the basis of telegram records, Bany PNIO can be used for online analysis. All the important key variables are analyzed at the moment of communication, evaluated and then entered in the statistics of the network. This enables a precise statement to be made on the quality of the network and configured cycles.

Based on a system platform with FPGA (Field Programmable Gate Array) technology, the functions of Bany PNIO are independent of bus technology conventions. Bany PNIO has freely definable filtering and triggering functions and can be deployed for development, system testing and plant diagnostics. A Windows application handles the control of all functions and can control several Bany PNIO systems via a LAN.

The Simba PNIO module (Simulation Module Profinet I/O) allows real-time simulation of up to 256 Profinet I/O devices and therefore of a complete Profinet system on the controller. Simulation is carried out reaction-free. There is no difference for the controller between communication with real and simulated devices, which makes mixed operation of real and simulated PNIO devices easy to handle. Simba PNIO facilitates the development of new network components such as controllers, devices, or switches and is also suitable for comprehensive simulation of an entire plant. The modular design of the system, with direct access of internal processes to all components, makes it possible to incorporate complete automatic testing units in a single device.

In conjunction with the Simit simulation system, Simba PNIO is an ideal tool for the automation of constantly recurring test processes or for configuring and engineering Simatic PCS 7 installations in the process industry. Another area of use is customer training: Simba PNIO allows the future operator to obtain a low-cost simulation of his plant.

Bany PNIO and Simba PNIO are based on the same hardware platform. As a result, Simba PNIO can be used as simulation hardware in the engineering and test phases of
an installation and can then continue to be used in subsequent plant operation as a Bany PNIO network analyzer after payment of an additional licence fee.


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