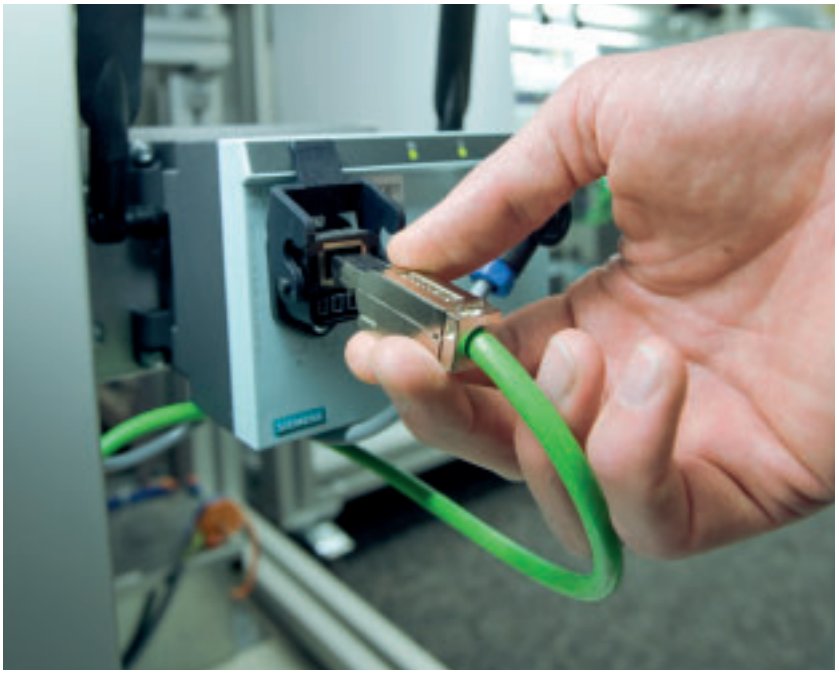
SIEMENS

This is my way – PROFINET

The Ethernet standard for automation

www.siemens.com/profinet

PROFINET is the leading Industrial Ethernet standard with more than 3 million nodes worldwide. PROFINET makes companies more successful by accelerating processes, boosting productivity, and increasing plant availability.



PROFINET – for maximum freedom in structuring your machine and plant architecture.

Individualized success

Globalization offers companies completely new opportunities for growth. But these opportunities also present new challenges. Only companies that can respond to short-term market trends by changing products quickly, offer consistently high product quality at high production speeds, and rely on maximum plant availability and low maintenance costs can prevail in the long term against global competition.

Flexibility, productivity, and efficiency are also decisive success parameters for your company. PROFINET, the open Industrial Ethernet standard, meets the requirements for optimizing these parameters. PROFINET enables secure and high-speed data exchange at all levels, making it the basis for stable processes. PROFINET offers you maximum freedom in engineering and in structuring your plant architecture.

www.siemens.com/profinet

The technology driver

PROFIBUS & PROFINET International (PI) is the world's largest fieldbus organization with more than 1,400 members. It drives technical development and pushes through the standard on the international stage. It also supports the further development of PROFIBUS to PROFINET.

Tried and tested for years

On the basis of PROFINET and PROFIBUS, technological requirements can be easily implemented with profiles such as PROFIsafe, PROFIdrive, and PROFIenergy. PROFIsafe enables fail-safe communication for PROFIBUS and PROFINET on the basis of standard network components. PROFIdrive has been well-established for years as the application profile for drives with PROFIBUS interface, and it is also available for drives with PROFINET communication. PROFIenergy enables automated shutdown of plant sections during breaks in production and thus saves energy costs. It is partly thanks to this innovation potential that PROFINET has become established in the fieldbus market with more than 3 million nodes worldwide.

The open Industrial Ethernet standard paves the way for your sustained corporate success. This is my way – PROFINET.

Siemens relies on PROFINET for sustained customer benefits.

Siemens, as a member of PROFIBUS & PROFINET International (PI), strongly influenced even the development of PROFIBUS. The evolution of PROFIBUS to PROFINET is the logical progression to be able to offer maximum benefit to companies in all sectors at all times. This is why Siemens backs PROFINET and thus offers you maximum flexibility, efficiency, and performance for your application.

With PROFINET, Siemens applies the Ethernet standard to automation. PROFINET enables high-speed and secure data exchange at all levels, and so makes it possible to implement innovative machine and plant concepts. Thanks to its flexibility and openness, PROFINET offers users maximum freedom in structuring their machine and plant architectures.
PROFINET's efficiency means optimal use of available user resources, and a significant increase in plant availability. Innovative Siemens products and the performance of PROFINET provide a sustained boost to company productivity.

Your advantages at a glance:

Flexibility	Efficiency	Performance
Tailor-made plant concepts	Optimal use of resources	Increased productivity
Industrial Wireless LAN	One cable for all purposes	Speed
Safety	Device/network diagnostics	High precision
Flexible topologies	Energy efficiency	Large quantity structures
Open standard	Easy cabling	High transmission rate
Web tools	Fast device replacement	Media redundancy
Expandability	Ruggedness/stability	Fast start-up

"We have a large number of moving sections in our production plant. I need maximum flexibility for this and that's what PROFINET guarantees."

Maximum flexibility for implementing your ideas.

Innovation and product lifecycles are becoming increasingly shorter. This applies to all sectors. That's why fast response times and optimized processes form the basis for long-term competitiveness.

PROFINET ensures maximum flexibility in plant structures and production processes, and it enables you to implement innovative machine and plant concepts. Mobile devices, for example, can be integrated into relatively inaccessible locations.

With Industrial Wireless LAN, the SIMATIC Mobile Panel gives plant operators more freedom of movement. So it is always there where it is needed – without compromising safety.

www.siemens.com/profinet-benefits

More flexibility with PROFINET.

Industrial Wireless LAN (IWLAN)
IWLAN reduces maintenance costs, increases reliability, and convinces with high communication performance. Only PROFINET allows the combination of safety and IWLAN.

Safety
Safety-related communication via PROFIsafe reliably protects personnel, the environment, and plants.

Flexible topologies
PROFINET also enables the use of star, tree and ring topologies in addition to the linear topology.

Open standard
Thanks to its openness, PROFINET creates the basis for a uniform machine/plant automation network to which programmable controllers as well as standard Ethernet devices can be connected.

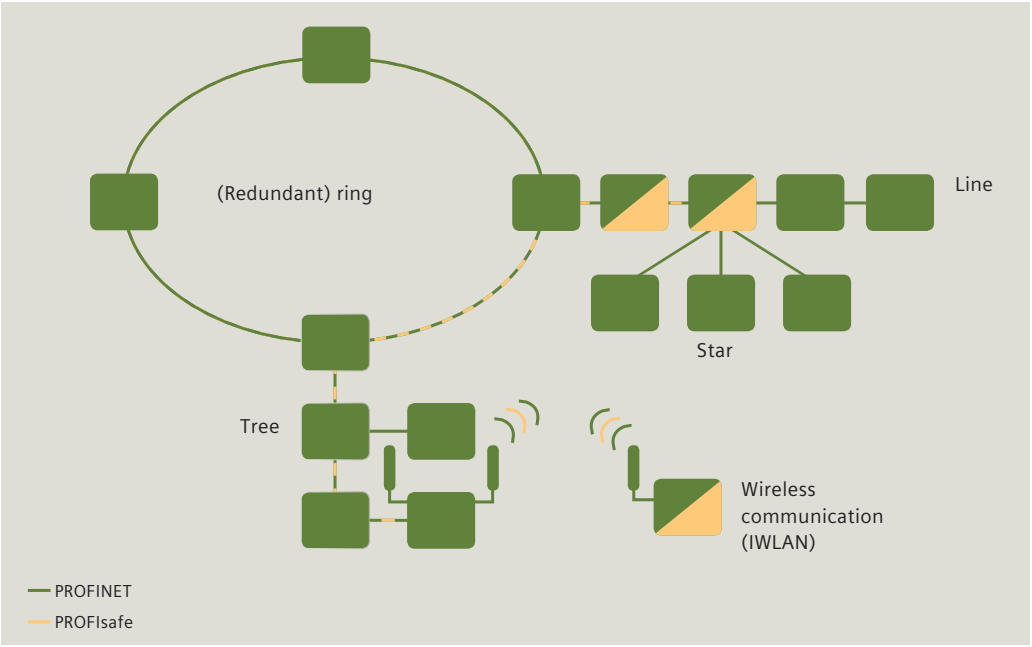
Web tools
PROFINET is 100 percent Ethernet and supports TCP/IP. Among other things, this enables the use of Web technologies, such as access to the integrated Web server of the field devices.

Expandability
With PROFINET, network infrastructures can be expanded as desired, even during operation.

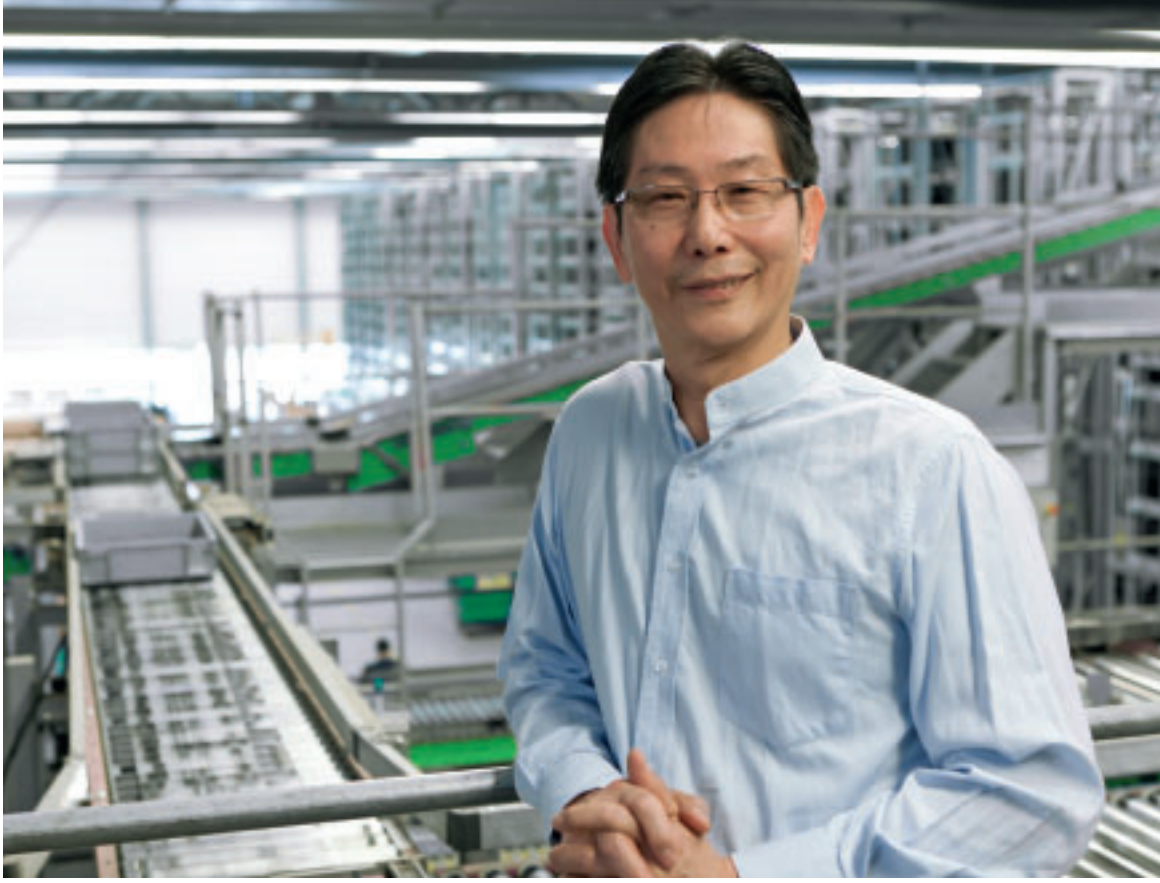
The focus is on flexible topologies
PROFINET also enables the use of star, tree, and ring topologies in addition to the linear topology characterized by the established fieldbuses. This is made possible by switching technology via active network components, such as Industrial Ethernet switches and media converters, or by the integration of switch functionality into the field devices. This results in increased flexibility in machine and plant planning, as well as savings in cabling.

The PROFINET network can be installed without specialist knowledge and meets all requirements relevant to the industrial environment. The PROFINET Guideline “Cabling and Interconnection Technology” supports manufacturers and users when installing networks. Symmetrical copper cables or RFI-resistant fiber-optic cables are used depending on the application. Devices from different manufacturers are easily connected via standardized and rugged plug connectors (up to IP65/IP67).

Thanks to the integration of switch functionality into the devices, linear topologies can be formed that are configured based on existing machine or plant structures. This results in savings in cabling overhead and cuts down on components such as external switches.



PROFINET supports different network topologies and thus enables a high degree of flexibility in machine and plant planning – even in combination with profiles such as PROFIsafe.



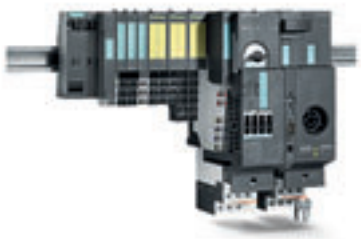
"With PROFINET, everything runs over one cable. That's what I call real efficiency."

More efficiency for your economic advantage.

Continually rising raw material prices and constantly new environmental regulations make it necessary for companies around the world to use their resources more cost-effectively and more efficiently. This applies above all to production. PROFINET ensures more efficiency here.

Simple engineering guarantees fast commissioning, and reliable devices enable high plant availability. In addition, comprehensive diagnostics and maintenance concepts help to reduce plant downtimes and maintenance costs to a minimum.

SIMATIC ET 200S supports the PROFIenergy profile. This allows energy to be saved during breaks and increases plant efficiency.



www.siemens.com/profinet-benefits

More efficiency with PROFINET.

One cable for all purposes
PROFINET offers a host of functions on one cable: Machine data and standard IT data run together. This creates integration and saves costs by reducing the overhead for cabling and training.

Device and network diagnostics
Extensive diagnostic data can be read out from the devices to locate faults quickly. HTML standard Web sites are used for servicing PROFINET devices – locally and remotely.

Increased energy efficiency
PROFIenergy switches off individual loads or entire production units during breaks – in a coordinated and centrally controlled way.

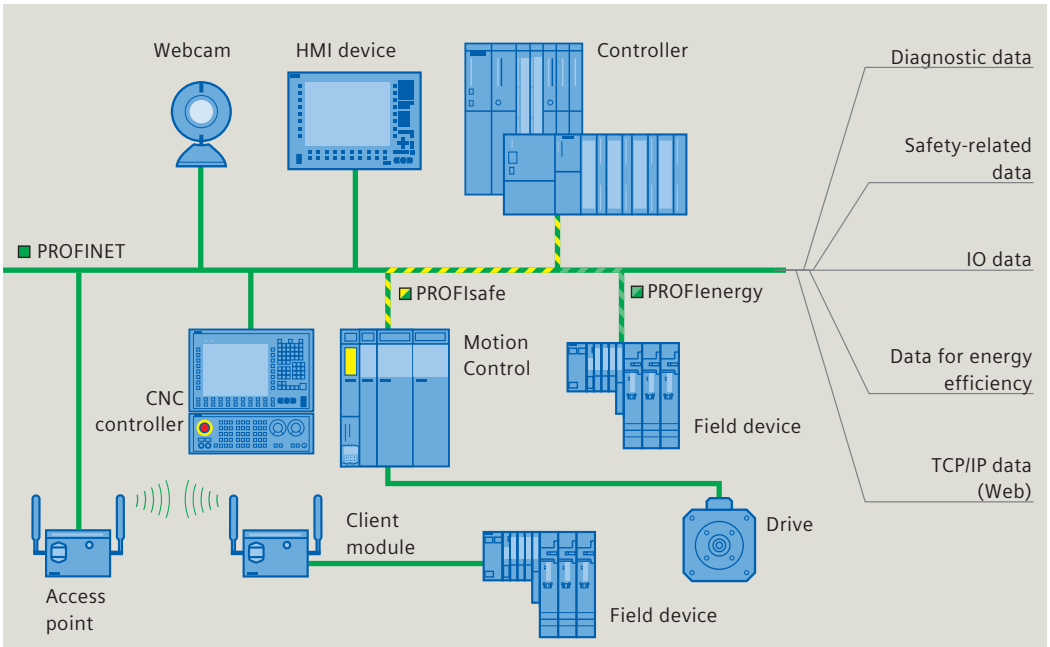
Easy cabling
Fault-free establishment of industrial networks in a short time and without specialist knowledge: PROFINET makes this possible with the FastConnect system.

Fast device replacement
When replacing a PROFINET device, the IO Controller detects the new device and automatically assigns its name.

High degree of ruggedness
The use of switches even in field devices prevents faults in one section of the network from influencing the entire plant network. PROFINET enables the use of fiber-optic cables especially for areas that are critically sensitive to EMI.

The focus is on device and network diagnostics
By retaining the field-proven PROFIBUS device model, the same diagnostic information is available with PROFINET. In addition, device diagnostics also includes readout of module-specific and channel-specific data from the devices. This enables simple and fast location of faults. As well as the availability of device information, the top priority in network management is reliability of network operation.

The Simple Network Management Protocol (SNMP) has become established in existing networks as the de-facto standard for the maintenance and monitoring of network components and their functions. PROFINET uses this standard and provides users with the option of servicing networks using familiar tools such as the SINEMA Server network management software. In order to facilitate the maintenance of PROFINET devices, both locally and also remotely via a secure VPN connection, application-specific Web sites in the familiar HTML standard can be created on the integral Web server of the field devices.



PROFINET enables parallel fieldbus communication and standard IT communication (TCP/IP). This real-time communication for the transmission of user/process data and diagnostic data is performed on a single cable. Profile communication (such as PROFIsafe, PROFIdrive, or PROFIenergy) can be integrated without additional cabling costs.

"High speed alone isn't everything. PROFINET is not only fast, it can also simply do more."

High performance for boosting your productivity.

Performance and precision determine market success. Precise motion control, dynamic drives, high-speed controllers, and the deterministic synchronization of devices are therefore key factors in achieving superior production.

PROFINET's performance power offers you more than enough reserves to meet today's requirements and those of the future, and thus makes it possible to continually increase your productivity.

SINAMICS drive technology and PROFINET ensure the necessary speed in your machine and maximum precision in motion control applications.

www.siemens.com/profinet-benefits

More performance with PROFINET.

Speed
Fast motion control applications need high-speed data exchange. PROFINET's short cycle times increase the productivity of machines and plants.

Precision
Communication via PROFINET is deterministic. A jitter of <1 µs results in maximum precision cycles and thus guarantees high product quality.

Large quantity structures
With PROFINET, up to 256 devices can be managed by one SIMATIC controller. The number of nodes per network is practically unlimited.

High transmission rate
By using Ethernet, PROFINET achieves a significantly higher transmission rate than previous fieldbuses. This enables problem-free transmission of even large volumes of data without affecting I/O data transfer.

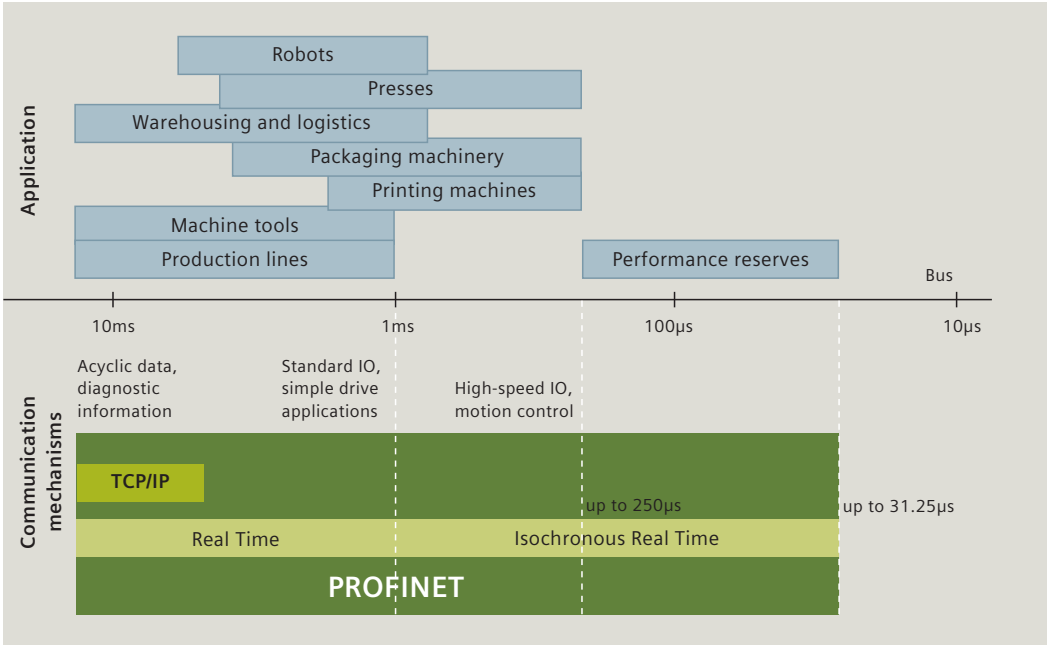
Media redundancy
Higher plant availability can be achieved by means of a redundant installation. This can be implemented both with the help of external switches and directly via integral PROFINET interfaces.

Fast start-up
In modular plants, IO Controllers must detect new machines or plant sections quickly. With Fast Start-up, PROFINET can detect devices in up to <500 ms and connect them with the IO controller.

The focus is on speed and precision
Fast motion control applications need precise and deterministic data exchange. This is implemented thanks to isochronous drive controls using Isochronous Real Time (IRT). The different cycles of a system (input, network, CPU processing and output) are also synchronized in the case of parallel TCP/IP traffic.

PROFINET's short cycle times make it possible to increase the productivity of machines and plants, and to ensure product quality through high precision of the cycle.

The standardized PROFIdrive profile enables vendor-independent communication between motion controllers and drives.



PROFINET offers outstanding performance. You can already implement all your applications today with PROFINET. With cycle times up to 31.25 µs, the PROFINET standard also offers you sufficient reserves for your future requirements.

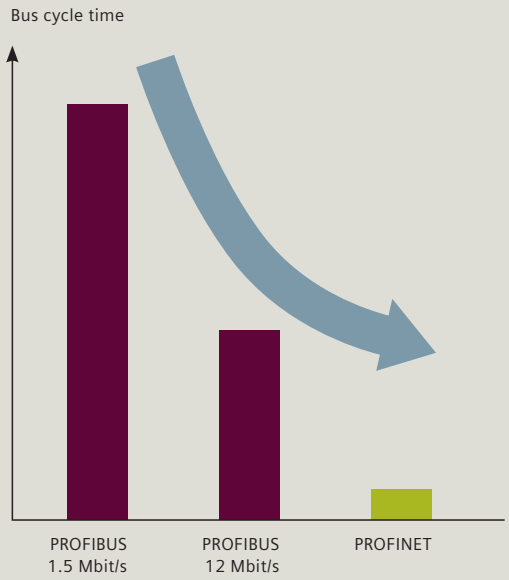
"My PROFIBUS experience also enabled me to set up the PROFINET solution without problems. In doing so, I discovered the many benefits of PROFINET."

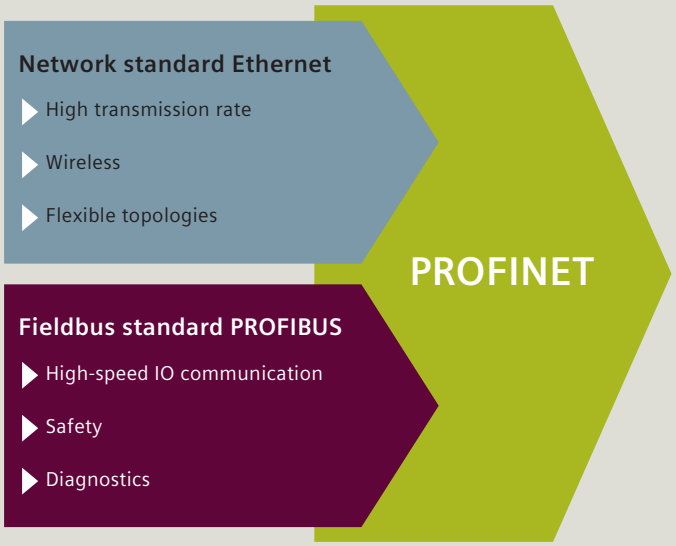
PROFIBUS or PROFINET?

PROFIBUS has been established for years as the fieldbus for machines and plants. Based on serial bus technology, it revolutionized the automation world in the 80s, and created for the first time the foundation for the distributed concepts common today. In the 90s, Ethernet spread into IT and industry. Today, manufacturing is inconceivable without both systems. But would it not be more efficient to combine the advantages of both systems?

The answer to this question is PROFINET. It merges the industrial experience of PROFIBUS with the openness and flexible options of Ethernet.

www.siemens.com/PB2PN





Significant performance gains can be achieved with PROFINET.

The advantages of PROFIBUS, the leading fieldbus, combined with the diverse options of Ethernet, form the basis of PROFINET. Highlights such as Safety over Wireless become as feasible as high-dynamic, isochronous motion control applications.

Good reasons for a change.

Can I continue to use my existing PROFIBUS expertise?

PROFIBUS will continue to play an important role in the future. That's why care was taken in the development of PROFINET to enable simple and smooth integration of PROFIBUS. The engineering of PROFINET is very similar to that of PROFIBUS. You can, for example, convert a SIMATIC ET 200S station to PROFINET simply by replacing an interface module: just change the configuration, reinstall, done.

Do I have to convert the entire plant at once, or can I make the transition in stages?

You can connect existing plant sections to PROFINET simply via the IE/PB Link PN IO or also wirelessly via the IWLAN/PB Link PN IO. The huge diversity of field devices on PROFIBUS can thus be integrated without problems into new PROFINET systems, and you can structure the transition individually and by stages.

Is the transition complicated?

You know the basic techniques: simple integration of distributed I/O such as PROFIBUS DP, assignment of addresses and names as with a PC. This facilitates the change and you can quickly put the advantages of PROFINET to use. Test it out and configure a familiar and frequently used PROFIBUS application with PROFINET. You'll be convinced by the simple handling and the results.

How will I benefit from the transition?

The many benefits that PROFINET offers in implementing automation tasks mean the transition is always worthwhile: Flexible topologies, one cable for all applications, wireless with safety, and significantly increased system performance thanks to scalable mechanisms speak for themselves.

When is the right time for me?

For many users, now is the best time for changing to PROFINET. The technology is mature and has been tried and tested in many customer applications. The wide range of available devices with PROFINET connection is being extended continuously, so devices are available for just about all application areas and sectors. You can thus use all of the functions with which PROFINET implements automation solutions more flexibly, more efficiently, and with higher performance.

PROFINET – this is my way.

The integrated PROFINET product portfolio from Siemens

Controller


SIMATIC S7-1200


SIMATIC S7-300


SIMATIC S7-400


System interfacing for SIMATIC S7

Motion control systems


SIMOTION D


SIMOTION C


SIMOTION P

CNC systems


SINUMERIK 840D sl

HMI devices


SIMATIC HMI Panels


SIMATIC HMI Mobile Panels

Drives


SINAMICS G120/G120D


SINAMICS S110

Industrial Ethernet Switches


SCALANCE X and
Compact Switch Modules CSM

Cabling technology


FastConnect for electrical and
optical networks

Network transitions


to PROFIBUS, AS-Interface,
PROFINET

Industrial Security


SCALANCE S and
communications processors

Sensor systems


Vision sensors

Identification systems


SIMATIC RFID
communication modules


Code reader systems

Technology components


ERTEC/Development Kits
for ERTEC and PROFINET IO

SIMATIC ET 200 interface modules with CPU

PC-based Automation

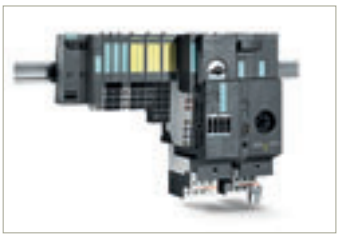
SIMATIC PC-based Automation with SIMATIC WinAC

System interfacing for PG/PC/software

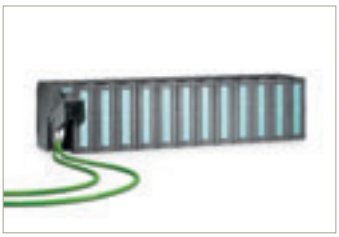
Measuring instruments

SENTRON PAC

Distributed I/O



SIMATIC ET 200S



SIMATIC ET 200M

SIMATIC ET 200eco PN

SIMATIC ET 200pro

SINAMICS S120

SINAMICS G130 / G150 / S150 / GM150 / GL150 / SM150

SINAMICS DCM

SIRIUS M200D motor starters

Industrial Wireless LAN

SCALANCE W-780 Access Points

SCALANCE W-740 Client Modules

Wireless devices

Radiating cables

www.siemens.com/profinet-products

The leading standard also for your industry.

PROFINET has become established as the Ethernet standard in industry worldwide. With its flexibility, efficiency and performance, it convinces large and small companies in all industries.

A comprehensive product portfolio
Siemens offers an extensive portfolio of PROFINET-enabled products that is growing almost daily: many new Siemens automation products have PROFINET onboard. This means the benefits of the open Ethernet standards can also be utilized for your application – no matter which sector you are in.

PROFINET is a decision for the freedom to implement innovative machine and plant concepts that are perfectly tailored to your requirements. PROFINET stands for your individual success.

www.siemens.com/profinet-references

Flexibility: Lufthansa, Germany

Siemens provided a flexible solution based on PROFINET communication with around 50 stations for the modernization of a paint shop for Lufthansa in Hamburg, Germany. The innovative feature of this system is that safety-related information such as emergency stop is distributed in real time via a dynamic wireless network. This is made possible by the fail-safe PROFIsafe V2 protocol. If employees on a platform press the emergency stop button, the signal is sent via the controller of the platform over IWLAN to the head-end station, and back to the relevant crane bridge, which is then switched off with the platform. This requires an enormously high-speed controller. Thanks to the high availability of the controller, Lufthansa benefits from significantly reduced standstill times.

Efficiency: Iaco Agricola, Brazil

Iaco Agricola built a sugar factory and bio-ethanol plant in Chapadao do Sul. The focus was on safe operation with as few downtimes as possible. The company decided on an efficient Siemens automation solution with PROFINET communication. A SIMATIC S7-400 controller controls the processes. In the control room, the SIMATIC WinCC visualization system enables access to the system. The system can be accessed from any location in the plant via the WinCC WebNavigator. In this way, PROFINET enables transparent, integrated and reliable communication, as well as fast, efficient system diagnostics. The downtime of the automation system is now only 0.28 percent. Even under the extremely adverse conditions in the bio-ethanol industry, the system is extremely robust.

Performance: Herma, Germany

The coating plant of the label manufacturer Herma in Filderstadt-Bonlanden, Germany, is the largest of its kind in the world. Due to its high production speed of 1100 m/min, it needed a communication solution that could keep pace with this level of performance. The challenge here for the drives technology was to find a solution for on-the-fly changing of material rolls at full machine speed. Use of the SIMOTION/ SINAMICS range enabled extremely accurate position control and precise timing when changing rolls. PROFINET with IRT (Isochronous Real Time) ensured stable movement of the web thanks to distributed synchronous operation. Distributed implementation of safety functions such as emergency stop was also possible thanks to PROFIsafe.

Additional information

about PROFINET:
www.siemens.com/profinet

about PROFINET at
PROFIBUS & PROFINET International:
www.profinet.com

about PROFINET technology:
www.siemens.com/profinet-technology

Siemens AG
Industry Sector
Industry Automation
P.O. Box 48 48
90026 NÜRNBERG
GERMANY

Subject to change without prior notice
Order No. E20001-A25-M116-X-7600
Dispo 06334
WÜ/32720 MM.XXXXPN.52103 WS 03113.0
Printed in Germany