

**SIEMENS**

*Ingenuity for life*



## PROFINET for future-proof device development.

Industrial communication that optimizes  
flexibility, efficiency, and performance.

[siemens.com/profinet-development](https://www.siemens.com/profinet-development)

# The Industrial Ethernet standard ...

**Standardized – today and tomorrow: Ethernet is a global standard (IEEE 802.3) that sets no boundaries between cable, fiber-optic and wireless (IWLAN) and enables almost any topology. Since PROFINET is 100 percent Ethernet, PROFINET users benefit from all the advantages, possibilities, and future innovations of the Ethernet.**

## Added value for device development

PROFINET is the industrial communication standard for maximum flexibility, efficiency, and performance. It allows modular machine concepts to be implemented especially easily and quickly thanks to features such as variant management functions and a modular architecture.

At the same time, PROFINET is easy to operate, integrate, and commission with the help of efficient configuration and diagnostic tools. And when it comes to performance, fast data exchange, a high data rate, and deterministic communication with minimum jitter provide a solid foundation for high production output.

PROFINET also offers the best diagnostic functions available on the market, so that you always have a firm handle on things both locally and remotely.

## Basis for digital production

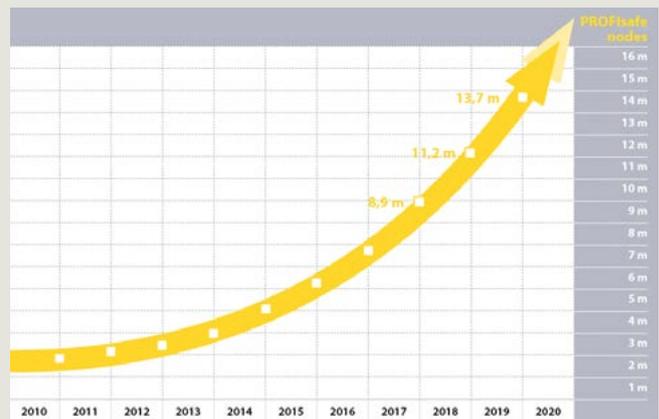
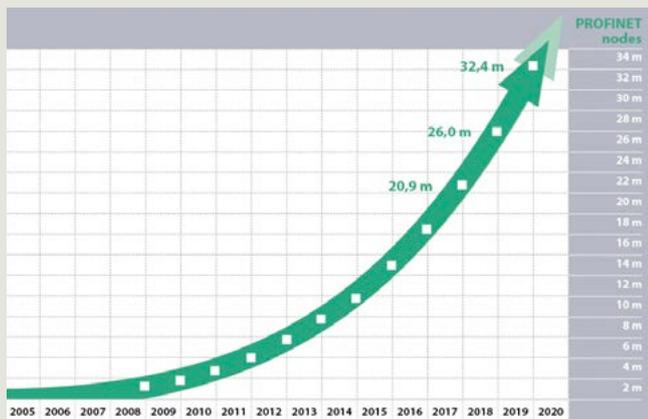
The market is increasingly demanding individual, personalized products down to a batch size of 1, which need to be available as quickly as possible. To do this, production must become faster, more efficient, and more flexible, for example through a consistent flow of data between product development, production, and service.

Machines, products, and controllers must therefore be able to exchange information in real-time. Auto-configurations are required to absorb the massive increase in network users, while high bandwidths must also be available to autonomously control and optimize processes and machines.

PROFINET is the only standard that can master these challenges.

## Change now quickly and easily!

Migrate from PROFIBUS to PROFINET, the standard with more than 32 million PROFINET nodes worldwide and benefit from greater flexibility and viability into the future.



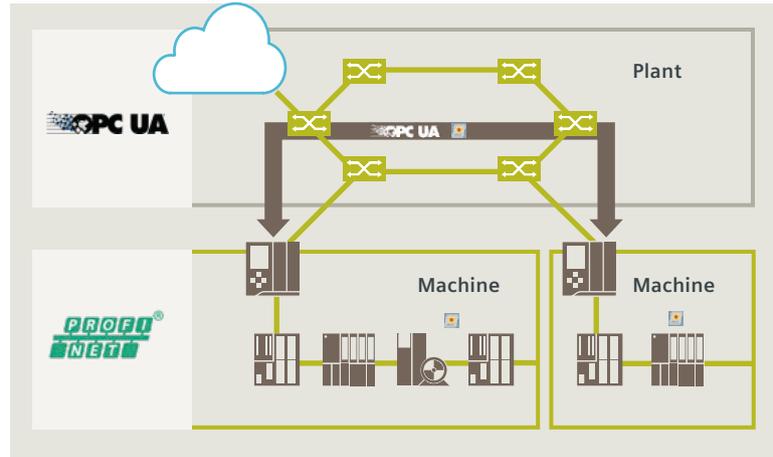
Steeply rising growth rates: PROFINET is the leading Industrial Ethernet communication standard.

# ... for maximum viability into the future

## PROFINET and OPC UA in the same network

Thanks to its lean and efficient protocol, PROFINET is ideal for cyclic and real-time I/O data exchanges on the field level. OPC UA brings its strengths to bear primarily in the vertical communication of acyclic data. OPC UA is also suitable for controller-to-controller communication.

The PROFI-safe profile is used for failsafe communication on the field level as well as for controller-to-controller communication with PROFINET and OPC UA.



## Future-proof basis for TSN

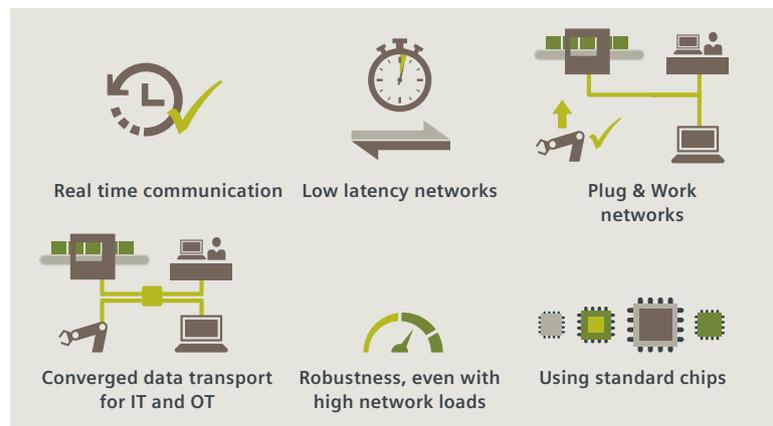
PROFINET means that you are well prepared for the future with Time-Sensitive Networking (TSN). Nevertheless, tried-and-tested PROFINET services remain unchanged for configuration, parameterization, and diagnosis purposes, as do the PROFI-safe, PROFIdrive, PROFIenergy profiles, etc. for PROFINET over TSN.

OPC UA can be used as an additional service in parallel with PROFINET. Value-added functions, such as direct communication in the cloud or enhanced diagnostic functions are also possible.

7: Applications	PROFINET services (I/O, alarms, records, etc.)		OPC UA
6: Visualization			
5: Session			
4: Transport	TCP	UDP	
3: Communication (network)	IP		
2: Security (data link)	IEEE 802.1 RT, IRT Today	IEEE 802.1 TSN Future	
1: Bit transmission (physical)	10 Mbit/s - 10 Gbit/s		

## PROFINET over TSN – a wide range of future-oriented benefits

With PROFINET, you also benefit from all future TSN advantages, such as a simplified TSN network configuration, a standardized mechanism for isochronous and non-isochronous applications, flexible topologies, and flexibility on the physical layer, as well as scalable and easy-to-integrate PROFINET stacks, which can be used with standard hardware components.



# PROFINET-technology from Siemens ...

## Innovative and well proven

In its role as a PI member, Siemens has been actively driving PROFINET development since the very beginning. Siemens' technology components benefit from this collective knowledge. They have also been proven in countless products in the field, they help to maximize performance, and they can be scaled to your specific requirements.

Moreover, Siemens competence centers will advise you in choosing the right technology component for your device, offer training opportunities, and support you throughout the entire development period all the way to successful certification.

## ERTEC 200P-2 – the path to the fastest PROFINET

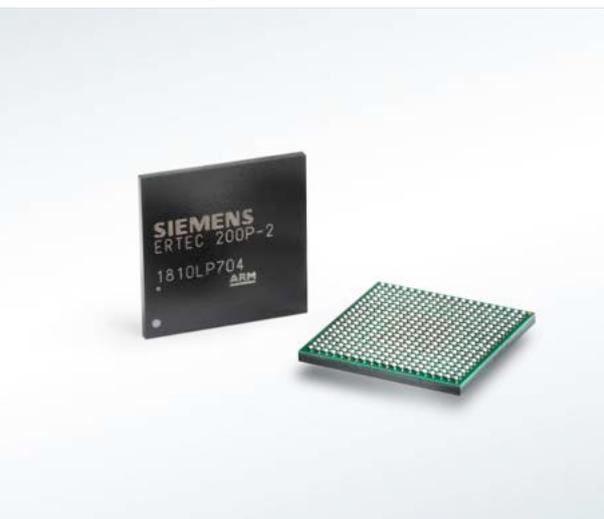
The ERTEC 200P-2 (Enhanced Real-Time Ethernet Controller) is setting new standards in communication. Designed for cycle times of only 125 µs, the performance upgrade for PROFINET has been integrated into the ERTEC 200P-2. With its 250 MHz ARM 9 CPU and an integrated IRT (isochronous real-time) switch, field devices can thus be implemented that meet the highest performance standards. The smaller chip size simplifies integration into compact field devices. In addition, the CPU lets you integrate your own applications, eliminating the need for an external host CPU, depending on the application.

## Development kit for ERTEC 200P-2

The development kit includes an evaluation board with sample applications, making it possible to carry out commissioning in very short order. The PROFINET stack ships in source code, including the eCos open-source real-time operating system, all development tools, analysis programs, and documentation. The ERTEC ASICs make it possible to implement RT (real-time) and IRT (isochronous real-time) field devices. The integrated switch lets you build field devices with two ports.

### Functions:

- Isochronous mode
- Shared device for 4 IO controllers
- S2 system redundancy
- CIR (Configuration in Run)
- PROFINET performance upgrade with a minimum cycle time of 125 µs
- MRP/MRPD
- Regular updates free of charge
- The latest technology certificate



## ERTEC 200P-2

Integrated IRT switch	2-port
Integrated PHYs	✓
Copper and fiber-optic cables supported	✓
Minimum cycle time	125 µs
ARM CPU	ARM 926
Clock frequency	250 MHz
Parameterizable IOs, general-purpose IOs	96
Housing size	17x17 mm
Ball pitch	0,8 mm

# ... for efficient device and controller development

## PROFINET driver for controllers

Cost-effective components are an enormous competitive advantage especially when mass-producing machines. Users often employ control software they've developed themselves. The individual application is often implemented on standard PCs for reasons such as performance, flexibility, and cost. Thanks to a conventional Ethernet interface, the PROFINET driver supports these independent developers and does not require any special hardware.

Since the PROFINET driver ships in source code, you can port your own solutions to different operating systems and hardware platforms. As a result, the PROFINET driver can also be ideally used in embedded systems for your own control solutions. Engineering and configuration are easy and take place via an open XML interface without any engineering tools. The long-proven SIMATIC PROFINET stack lies at the heart of the solution.

The PROFINET driver is suitable for both simple applications, such as individual PROFINET lines, and complex machines. It supports PROFINET with RT for cycle times above 1 ms, as per the standard Ethernet interface. Alternatively, PROFINET with IRT can also be used for cycle times above 500 µs in combination with the CP 1625 controller development kit.

## CP 1625 controller development kit

The CP 1625 controller development kit is suitable for both standalone and host operation.

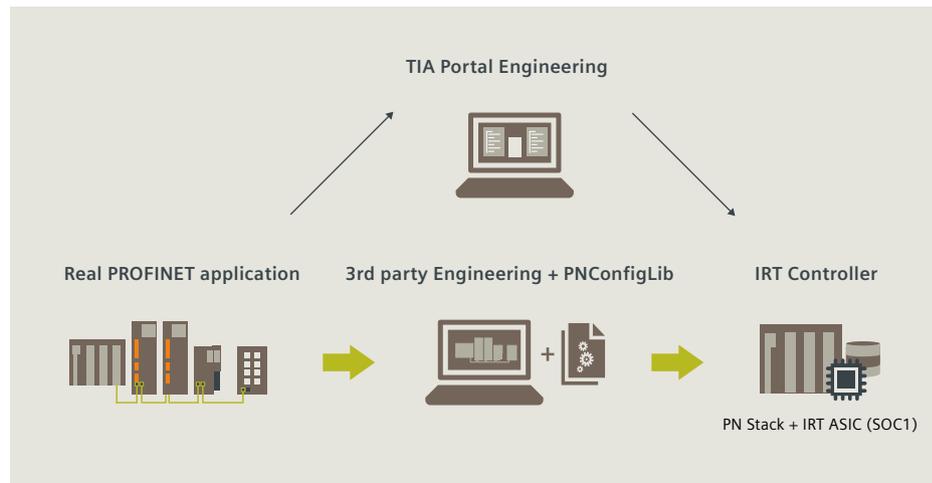
- Standalone operation: PN Stack and application run on the SOC1.
- Host operation: Application runs on the PC or, for example, ARM – the stack runs on the CP 1625.

## DK-16xx PN IO development kit for CP 1604 / CP 1616 and DK-HN PN IO development kit for CP 1626

The development kits (driver and IO base software) for the CPs are available in the source code as PROFINET IO controllers and IO devices under Linux for porting to any PC-based operating system with the IO Base interface. This applies to both IRT operation and RT operation. The device can also act as the PROFIsafe device with the appropriate software upgrade.

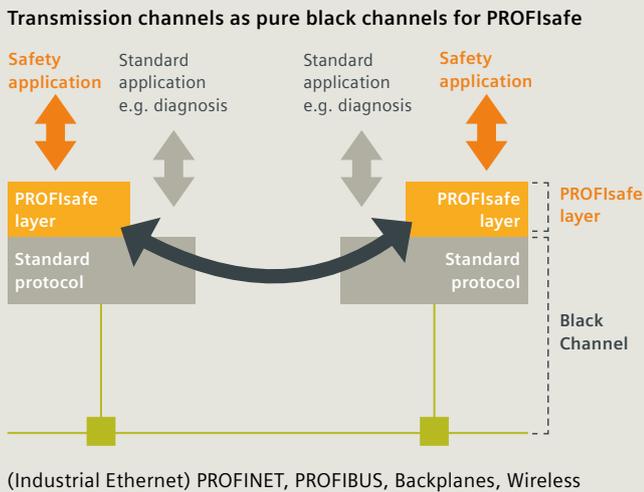
## PROFINET-ConfigLib

PROFINET networks have to be planned, which can be done via TIA Portal for the PROFINET driver. No license is required. ConfigLib is an independent API for creating PROFINET hardware engineering projects. Both RT and IRT projects can be set up, and ConfigLib handles the planning algorithm.



PNConfigLib – efficient creation of hardware engineering projects without TIA Portal

# Support for easy development ...



## PROFI-safe-starter kit

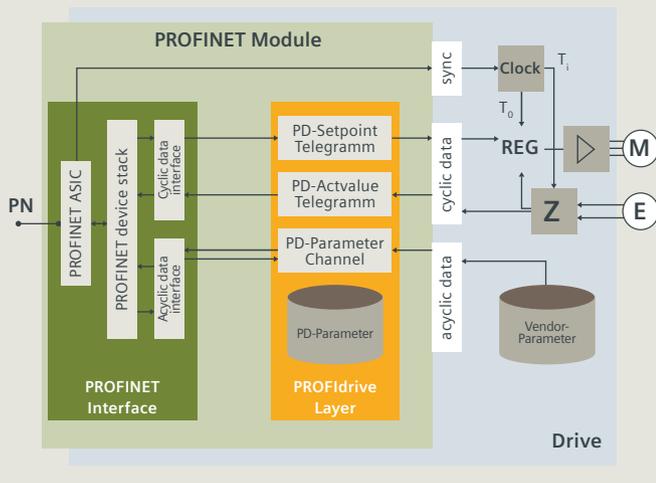
Functional safety is a serious consideration in automation. The PROFI-safe starter kit can be used to easily implement failsafe field devices. Sample implementations for easy connection to ERTEC platforms are available for the PROFI-safe stack.

F messages between an F host (safety controller) and its F device are transported as payloads in PROFINET telegrams. The PROFI-safe protocol eliminates the need for the user to evaluate the safety of his individual backplane bus system or other channels beyond PROFINET. It therefore ensures the functional safety of the entire path, from the sender of an F signal, such as an F module in the remote bus terminal, to the receiver, the F host, and vice versa. This is achieved by additional safety measures in the F messages.



## Free PROFIdrive sample applications for AC1 and AC4

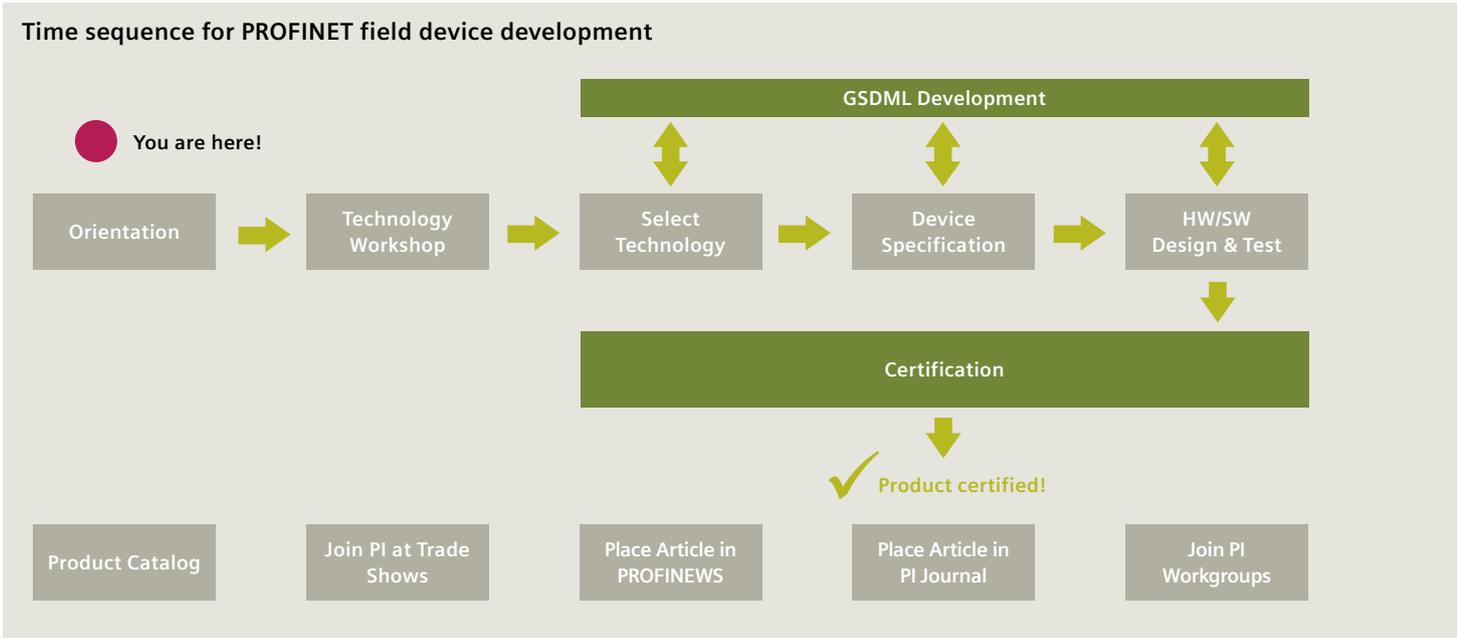
Drive systems on PROFINET use the PROFIdrive profile for standardized data exchanges. The free sample applications provide device developers with all functions needed to produce a drive for AC1 (application class 1) or AC4. The sample applications can be used together with the evaluation kit for developing new products with the PROFIdrive profile. The example runs on an ERTEC 200P-based platform but can be migrated to other communication stacks.



PROFIdrive sample applications as free downloads

From the drive perspective, PROFIdrive (orange) acts as the application layer between PROFINET stack (green) and the drive application (stone).

# ... and certification



Comprehensive consulting prior to starting the development project is particularly important for an efficient and successful development processes. The final step in field device development is certification.

## Reasons for certification

Field devices are networked with each other via PROFINET in machines and equipment. The use of certified field devices ensures the interoperability of components from different manufacturers. This increases plant availability and saves operators time and money. All PROFINET devices available on the market must therefore have passed mandatory certification tests.

## ComDeC and PROFI Interface Center (PIC) Test Labs

The independent ComDeC and PIC Competence Centers and Certification Labs, accredited by PROFIBUS & PROFINET International are two of the nine test labs worldwide that certify PROFINET devices for compatibility with the IEC 61158 and IEC 61784 standards. They have been the leading consultant on all matters relating to the development and certification of PROFINET and PROFIBUS field devices for more than 25 years.

The range of support and services includes:

- Free technical support before and during development
- Individual consulting before purchasing a development kit
- Individual training courses

- On-site support on demand
- Support during certification

## Technology certificates for development kits

The Siemens development kits are certified for each firmware stage. These so-called technology certificates help you efficiently certify your own solutions.

## Contact for certification

ComDeC for Europe and International  
 Tel.: +49 172 4396819  
 E-Mail: [comdec@siemens.com](mailto:comdec@siemens.com)  
[siemens.com/comdec](http://siemens.com/comdec)

## Technology workshops

The PROFIBUS user organization and PI North America offers free workshops for device developers.  
[profinet.com](http://profinet.com)

## Global technical development support

Siemens Sanayi ve Ticaret A.Ş.  
 E-Mail: [profinet.devkits.industry@siemens.com](mailto:profinet.devkits.industry@siemens.com)

## Find the right technology solution for your application:

- Development packages
- ERTEC ASICs
- PROFINET Drivers
- Global support and certification

For more information,  
please visit:  
[siemens.com/profinet-development](https://www.siemens.com/profinet-development)

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