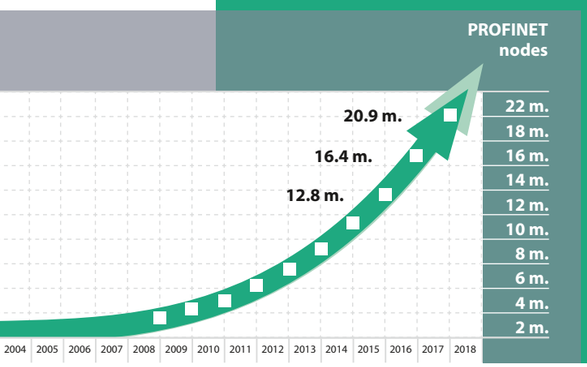
PROFINET Technology

The Easy Way to PROFINET

PROFIBUS • PROFINET

PROFINET Features

PROFINET is the open, cross-vendor Industrial Ethernet standard for production and process automation.



Would you like to …

- *Share in the success of PROFINET?*
- *Equip your automation devices with PROFINET interfaces?*
- *Find out how easy it is to integrate PROFINET into your products?*

The information you are looking for is in this brochure.

PROFINET …

- enables consistent communication from the company management level to the field level.
- offers everything from scalable real-time communication to isochronous motion control.
- integrates safety technology for protecting humans, equipment, and the environment (safety).
- protects equipment from unauthorized access (security).
- provides detailed and meaningful diagnostics.
- enables flexible topologies like star and line structures when using automation devices with an integrated multi-port switch.
- supports a variety of transmission media, e.g., copper, fiber optics, wireless, etc.

PROFINET is future-proof …

- through the use of Time Sensitive Networking (TSN) as additional Ethernet technology.
- due to the integration of OPC UA for mapping data to IT services and for controller communication.
- extends functions for security, semantics and other requirements for Industrie 4.0.
- and offers a simple migration path.

With these features, PROFINET fulfills all of the requirements for the use of Ethernet in industrial automation today and tomorrow.

Karsten Schneider
Chairman PROFIBUS & PROFINET International (PI)

PROFIBUS & PROFINET International (PI) is backed by about 1,700 member companies worldwide. With around 21 million devices installed by the end of 2017, PROFINET has established itself as the leading Industrial Ethernet standard on the market. Due to trends such as Industrie 4.0 and the Industrial Internet of Things, PROFINET will continue to gain in importance, and will become even more powerful with new technologies such as TSN. For device manufacturers, many questions arise today on the use of PROFINET. Through our technology providers and competence centers, we offer comprehensive support ranging from consulting services and hardware and firmware integration to certification. A wide range of available options for ready-to-use PROFINET basic technology makes it very easy for all companies to implement PROFINET quickly and cost-effectively.

Our Community

The industry organization PROFIBUS & PROFINET International (PI) promotes the widespread use and further development of PROFIBUS and PROFINET and provides worldwide support.
With about 25 Regional PI Asscociations (RPAs) in every international market and nearly 1,700 international member companies, PI is the largest community of interest for industrial communications. It covers every key market of industrial automation, ranging from production automation and process automation to motion control and safety applications.
An overview of the product diversity and the strong position in the market can be found in the online PI Product Finder. This catalogue will soon include 4,000 registered products (**www.profibus.com/productfinder**).
We support you during the actual product development with specifications and technical support. You are up to date on the technology and have shorter development cycles and time to market. You can have your innovations certified to international standards.

Contents

This brochure focuses on the development and integration of PROFINET products.

In the rest of the brochure, you will find more information on the following topics:

TABLE OF CONTENTS

Product Development Cycle

Consulting | Implementation

Every device development project undergoes a product development cycle. An example of this process for PROFINET is presented here.
This advice is followed by identification of implementation options, an explanation of certification activities, and a service & support offer.

Consulting

Integration of an industrial communication interface into an automation device begins with information gathering to determine the functionality of your industrial networks along with familiarization about the task at hand. PI itself as well as a number of its member companies can provide you with comprehensive information here. Advice is available from various PI Competence Centers (PICC), vendors, books, brochures, seminars, and workshops for getting to know PROFINET.
Individual consulting services support you, as a manufacturer, in every phase of implementation. Here are some typical questions: What benefits does PROFINET offer for my products? Which features (Conformance Classes) must be implemented for the specific automation device? What technologies and support are available for implementing PROFINET?
Specialized training is available for developers and product managers of device manufacturers, who are looking for a quick, yet solid, introduction to PROFINET technology.

Among other things, this training covers the following:

- Basics of data transmission with Industrial Ethernet
- PROFINET basics
- PROFINET field devices and PROFINET communication models
- Development packages for construction of PROFINET field devices
- Engineering
- Device description file (GSD file)
- Explanations of Conformance Classes
- Security measures
- Profiles

Some training courses award participants a certificate.

Implementation

Development proceeds faster to our goal „if we don't have to reinvent the wheel".
In order to bring PROFINET into automation devices quickly and efficiently, the expertise of PI members on the following topics is available:

- Implementation methods
- Hardware/software design
- Development environments
- GSD file

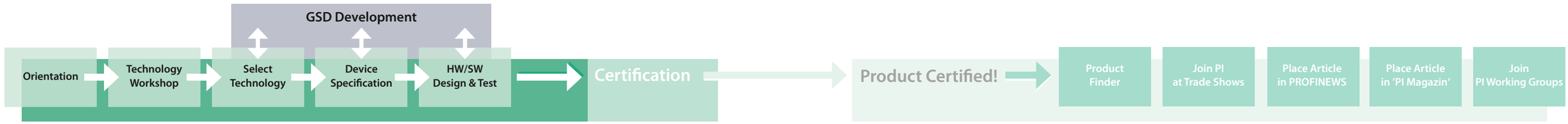
Implementation

Implementation options
Depending on the functionality required (Conformance Class), it is essential to select the suitable type of implementation for each individual case. The available development capacity, company expertise, expected costs to produce the interface, and the time to market also play a large role. Whether a pure PROFINET interface is to be implemented or a universal interface that is also suitable for communication via PROFIBUS should also be considered. The companies listed in this brochure have many years of experience in the design of communication interfaces and will support you in finding the optimum solution (see expertise matrix on page 15, as well as pages 16-49).

Development environment
A variety of starter kits and evaluation boards are available for almost every implementation method. These complete sets enable a quick introduction to development activities and often contain a complete development environment, as well. Included sample programs, block diagrams, and sample circuits can be especially helpful. The development packages also include the certifiable PROFINET stack of the corresponding provider and detailed documentation.

Hardware/software design
The plan of action and expenditure required for hardware and software design depend heavily on the selected implementation method. Here, you can carry out the development work fully and independently or work collaboratively with a development or technology partner. Independent development requires well-grounded PROFINET expertise and your own hardware and software development resources. To unburden your development resources, PI member companies can provide complete development packages, ready-to-install PROFINET communication modules, and a host of development services that give you, the device manufacturer, the support you need from the design phase to hardware and software development to certification. .

Device description file (GSD file)
To enable fast and easy configuration of an automation system, manufacturers of field devices must provide a PROFINET device description file.
This so-called „General Station Description file" (GSD file) contains all information needed to configure a device. The GSD files for PROFINET are XML-based and enable multiple product variants and different languages to be captured in one file. The development partners also provide support for the creation of the GSD.



Product Development Cycle

Certification | Support & Service

Certification

PROFINET communication in industrial plants is based on IEC 61158 and IEC 61784. In addition, IEC 62061/ ISO 13849-1 apply to safety modules and devices. To ensure interoperability and conformity of automation devices from different manufacturers, device certification by an accredited test laboratory (PITL) is mandatory for PROFINET. As a result, end customers are guaranteed a high level of plant availability, and the risk of cost-intensive service calls is significantly reduced for you, the device manufacturer. As part of the certification process, a check is made to determine whether automation devices comply with standards, thus ensuring their problem-free interaction within an automation system.

Even though every PROFINET device must be certified, the effort required for successful certification varies depending on the technology used. When pre-certified technologies are used, you do not have to be familiar with all details of the PROFINET standard. This significantly reduces the risk that problems will be found during the certification test. Therefore, it is useful to consider certification aspects in advance when choosing a technology.

Certification process

For you, the manufacturer, certification is as easy as can be: The fully developed PROFINET device is tested by an accredited test laboratory. After successful testing you, the manufacturer, can apply for a certificate from the PI, using the test report as a basis.

Tests required as part of PROFINET certification include, but are not limited to:

- Hardware tests
- State machine tests
- Behavior on the network
- Testing of the GSD file
- Load tests
- Fault responses
- Alarm tests
- Security Level Tests

Certification

Certification is especially easy when precertified technologies are used. In this case, the technology supplier guarantees compliance with the PROFINET standard, which enables a significant reduction in the effort required for the certification test.

As preparation, the majority of automated tests can be performed in advance with the help of the Test Bundle (**www.profibus.com/pniotb**), which is available to PI members at no charge.

For more information, go to:

- **www.profibus.com/certification**

Experienced contact persons are available to provide you with support during the entire certification process. They can offer suggestions in advance and answer any questions.
There are currently eight test laboratories around the world.

For more information, go to:

- **www.profibus.com/pitl**

Support & Service

Across the globe, there are currently more than 50 accredited PICCs available to answer your technical questions. This includes a comprehensive range of services for device manufacturers and users throughout every product life cycle phase.
The quality of the PICC services is guaranteed by a Quality of Service (QoS) Agreement. Regular meetings also ensure a uniformly high level of employee qualifications and knowledge, transfer of expertise and, naturally, the exchange of experiences as well.

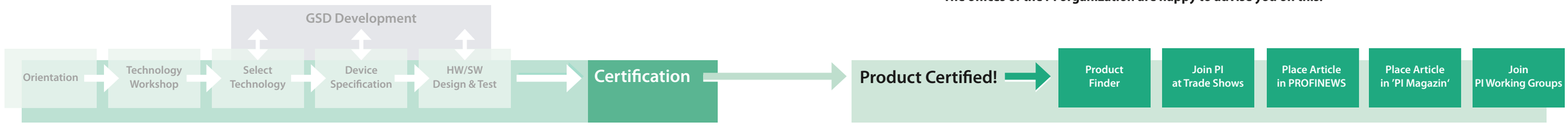
A list of all accredited PICCs can be found at:

- **www.profinet.com/picc**

The PI organization supports the marketing of devices through:

- Entry in the Product Finder
- Presentation at joint trade fair booths
- Publications in the PI Newsletter or advertisements

The offices of the PI organization are happy to advise you on this.



Implementation Options

Real-Time Requirement | Conformance Classes

Device manufacturers wanting to equip an automation device with a PROFINET interface have different options for implementation. Before deciding on a specific implementation method, it's important to first determine which functions are to be supported by the PROFINET automation device:

- *In-house development or partnership based on the criteria of expertise, time to market, etc.*
- *Real-time requirements*
- *Implementation options*
- *Device classification*
- *Development methods*

The technical and commercial decision-making criteria are explored in more detail in the following.

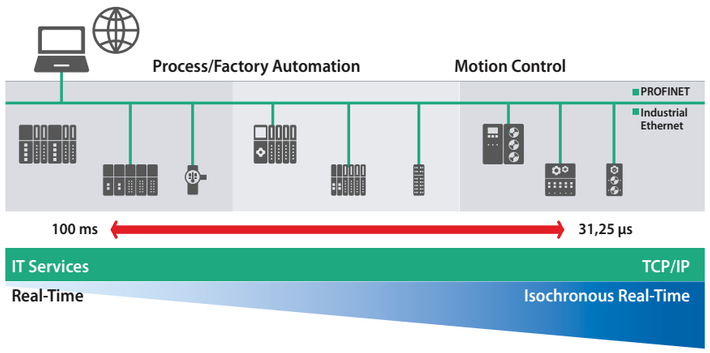
Real-Time Requirements

IEEE 802.3 ensures problem-free communication between PROFINET automation devices and among PROFINET automation devices and other standard Ethernet devices. For applications with very stringent real-time requirements, PROFINET offers mechanisms that enable both standard and real-time communication to take place in parallel. Communication with PROFINET can therefore be scaled using three different performance levels, which build on each other:

- The transmission of engineering data and **non-time-critical data** occurs over TCP/IP. This standard communication is possible between all automation devices.
- The real-time (RT) channel is available for the transmission of **process data**.
- For **isochronous applications** like motion control, isochronous real-time communication (IRT) is used. This enables a clock rate of < 1 ms and a jitter of < 1 µs.

IRT capability is based on hardware support in the device. Special ASICs, microcontrollers, and FPGAs are available for this purpose. Commercial switch ASICs without IRT hardware support are suitable for implementing an automation device with RT capabilities only.
Devices with RT communication can be easily developed based on standard Ethernet components.

PROFINET is designed for all branches of industrial automation engineering:



Conformance Classes

To meet the different requirements of automation systems, three Conformance Classes that build upon one another are defined for PROFINET. Each class has a functional scope determined for the typical area of application. The device manufacturer must consider the required Conformance Class before selecting an implementation option for the PROFINET device interface, as the type of interface implementation affects the Conformance Class that can be achieved.

In the following, only the key functions of the three Conformance Classes and their specific advantages are described:

CC-A: Use of the infrastructure of an existing Ethernet network, including integration of basic PROFINET functions. All IT services can be used without restriction. Examples of typical applications are found in building automation and process automation.

CC-B: The functional scope of CC-B comprises the functions of CC-A, plus it supports easy user-friendly device replacement without the need for an engineering tool. Furthermore, Simple Network Management Protocol (SNMP) supports extended device diagnostics of network functions, such as port status messages. To increase data reliability, a performance-adapted media redundancy protocol is available as an option. All IT services can be used without restriction. Typical applications can be found in automation systems with higher-level machine control with a deterministic, but not isochronous, data cycle.

CC-C: The functional scope of CC-C comprises all the functions of CC-B, plus it supports high-precision and deterministic data transmission, including isochronous applications. The integrated optional media redundancy enables smooth switchover of the I/O data traffic if a fault occurs. All IT services can be used without restriction. Typical applications are in the field of motion control.

In addition, optional services such as Fast Start Up are possible for even faster startup of participants.

For a detailed description, go to:

- **www.profibus.com/pncc**

Implementation Options

PROFINET Device Interface | Development Method

Implementation Options for the PROFINET Device Interface

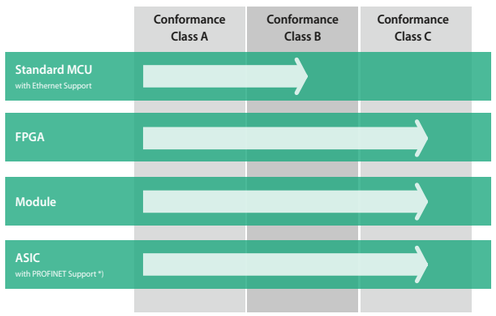
You can choose from different options in order to implement the solution that best suits the details of the automation device:

› Design › Degree of protection › Connection method › Application
› Integrated multi-port switch › Real-time properties

In principle, the following options are also available:

1: Standard microcontroller unit (MCU) with integrated or external standard Ethernet controller or FPGA
2: FPGA with internal or external standard or IRT-capable switch
3: Module with standard microcontroller or with microcontroller with IRT hardware support
4: ASIC with IRT hardware support and IRT-capable switch

The graphic below shows these implementation options in relation to the Conformance Classes:



*) CC-C only if synchronization is available

The following table shows the PROFINET functions that can be achieved with the implementation methods described above.

	Single Port	Multi Port
Conformance Class A	X	X
Conformance Class B	X	X
Conformance Class C		X

The table shows the minimum options.
For example, variants 2 and 3 also provide the option of implementing a single-port interface, but special attention should be paid to the economic viability of the solution.
Various basic technology components (hardware/software) are available for each of the implementation methods shown in the table. Components offered by PI member companies for this purpose are described in ample detail starting on page 14 of this brochure. For Conformance Classes A and B, standard Ethernet components can generally be used. In combination with a suitable PROFINET stack, it is possible to implement a high-performance PROFINET interface for applications in this range without special PROFINET ASICs.
However, for automation devices in Conformance Class C with IRT functions, special PROFINET ASICs or FPGAs are essential.

Development Paths

Each of the implementation methods described above can be realized in a different way. When selecting the most suitable method for the particular case in question, the expected production costs, the development time, and the resulting time to market must be taken into account. Consideration must also be given to PROFIsafe. Three different methods are described in the following:

Customer-specific/individual design:
In this method, the implemented PROFINET interface is embedded in a hardware and software design that has been optimized with regard to development expenditure and time to market using commercially available software solutions and standardized discrete or FPGA-based hardware design schemes.

Embedded module design:
Here, the implemented PROFINET interface is embedded in a design that has been optimized for flexibility and time to market based on preassembled commercially available communication modules.

External couplers:
With this solution, the PROFINET interface is implemented without accessing the device electronics based on external couplers and using an adapter connected in series.

	Development costs	Production costs (per unit)	Time to market
Individual design	High	Low	Long
Communication module	Medium	Medium	Medium
External couplers	Low	High	Short

Implementation Options

Future-Proof

Industrie 4.0

The aim of Industrie 4.0 is to improve the digitization of industrial production through the use of the latest communication technologies. Intelligently networked systems should facilitate production that is as self-organizing as possible. Furthermore, the entire life cycle of a product will be recorded – from idea, development, production and maintenance to recycling. Forming the basis are internationally standardized communication technologies, interfaces and object descriptions. The networking of machines, devices, sensors, actuators and people is extremely important.

For standardized communication to take place between machines, with higher-level systems and the cloud, uniform international communication standards are necessary. OPC UA and TSN are two components for meeting this goal.

Approach of PROFIBUS & PROFINET International (PI)

Strategy

- **TSN and PROFINET**

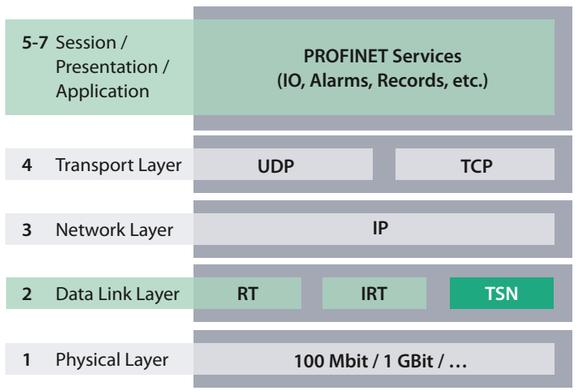
PI is currently working on the use of TSN for PROFINET.

The advantages are:

- Use of future-proof IEEE technology, including Gbit
- Scalable integration
- Application layer remains unchanged

With respect to the ISO/OSI model, another real-time capable substructure is being developed with TSN that can be used by upper protocol layers. The PROFINET protocol can thereby also use TSN as a substructure. The proven PROFINET user view of data, configuration, diagnosis and the profiles such as PROFIsafe or PROFIdrive can, as result, be used unchanged.

See following graphic.



TSN integration in PROFINET
uses future-proof IEEE technology

Implementation

- **OPC UA and PROFINET**

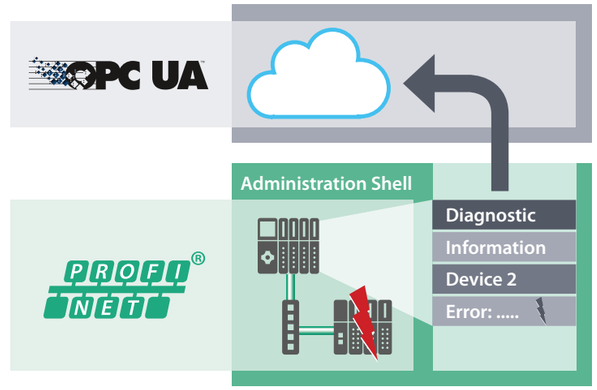
Thanks to its open system structure, OPC UA and PROFINET can use the same network and form an optimum combination for Industrie 4.0.

Typical applications include:

- Delivery of asset management and diagnostic information
- Controller-controller communication
- Vertical communication

The necessary information is depicted via objects defined in the OPC UA standard and can be used independent of vendor.

See following graphic.



PROFINET and OPC UA
From Data to Information

Furthermore, PI is leveraging its profiles in a joint working group with the OPC Foundation with the aim of creating open information models. These can easily be made available to IT systems via OPC UA.

Companion specifications for OPC UA are created here using PI's application expertise. Companion specifications describe the data-related objects and sequences for specific application fields, comparable to PROFINET profile definitions. The first companion specifications describe the mapping of diagnostic and asset management information and handle the topic of PROFIsafe via OPC UA for controller-controller communication.

You can find further information on Industrie 4.0 and the approach of PI on the PI website

- **www.profibus.com/i40**

Implementation Options

In-House Development or Development Partnership

Implementation is possible by the device manufacturer themself or together with an external technology or development partner. The basic technology of the device or system plays no role when making this fundamental choice.

The advantage of collaborating with an external technology or development partner when developing a PROFINET interface is that the device manufacturer can concentrate on its core areas of expertise. This reduces development risks and time to market. The experience of the external specialists helps to ensure that the design of the automation device is competitive and technically feasible with respect to its communication technology. In many cases, project-specific training courses and/or workshops are offered so that the device manufacturer can build up PROFINET expertise quickly and efficiently and use its own resources in a targeted way for development, support, and product management.

In-House Development or Development Partnership

PI member companies offer a wide range of services during the development phase.
For details, see page 15 and pages 16-49.

	Internally required PROFINET expertise	Time to market	Requirement for internal capacity/resources
In-house development	Thorough expertise must exist internally	Long	High
Cooperation with a technology or development partner	Partner helps to bridge expertise gaps	Medium	Medium
Complete assignment of development to a development service provider	Only limited internal expertise required	Short	Low

Expertise Matrix

Range of Services of Member Companies

Phases	AIT	Analog Devices	Deutschmann	Esyse	Hilscher	HMS	ifak	KUNBUS	Molex	Phoenix Contact	Port	profichip	Renesas	Schildknecht	Siemens	Softing	TMG TE
1 Consulting																	
Implementation consulting	D	D	D	C/D	C/D	D	D	C/D	C/D	C/D	D	D	D	D	C/D	C/D	C/D
Technology training	D	–	–	C/D	D	D	–	–	–	–	–	D	D	D	C/D	C/D	C/D
Application consulting	D	–	–	C/D	–	D	D	–	–	–	C/D	–	–	C/D	C/D	–	–
2 Supported development method																	
Individual design																	
Stack development and integration	–	–	–	C/D	C/D	–	D	–	C/D	C/D	D	–	D	–	C/D	C/D	D
Development services	D	D	D	C/D	C/D	D	D	C/D	–	–	D	D	D	D	C/D	C/D	C/D
Modular design																	
Embedded modules	–	D	D	C/D	C/D	D	D	C/D	C/D	D	D	D	D	–	C/D	C/D	C/D
External coupling																	
Protocol implementation	D	D	D	C/D	C/D	D	D	C/D	C/D	–	D	D	D	C/D	–	C/D	C/D
Safety																	
PROFIsafe	D	–	–	C/D	–	D	C/D	–	C/D	–	–	–	–	D	D	D	D
PROFIdrive	–	–	–	C/D	C/D	–	–	–	–	–	–	D	–	–	C/D	C/D	–
3 Supplier for																	
Embedded modules	–	D	D	C/D	C/D	D	–	C/D	C/D	–	D	(D)	D	–	–	C/D	–
PC cards	–	–	–	–	C/D	D	–	C/D	C/D	–	–	–	–	–	C/D	–	–
External couplers	–	D	D	–	C/D	D	–	C/D	C/D	–	–	–	–	D	–	C/D	–
Chips/ASICs/FPGA/Microcontrollers	–	D	D	–	C/D	D	–	C/D	–	D	D	D	C/D	–	C/D	C/D	–
Starter and evaluation kits	–	D	D	C/D	C/D	D	–	C/D	–	D	D	D	C/D	–	C/D	D	D
4 Certification & Support																	
Accredited competence center	D	–	–	–	C/D	D	D	–	C/D	–	–	–	–	–	C/D	C/D	C/D
Accredited test laboratory	D	–	–	–	–	–	D	–	–	D	–	–	–	–	C/D	–	–
Certification support	D	D	D	C/D	C/D	D	D	C/D	–	C/D	D	D	D	–	C/D	C/D	D

C = Controller D = Device ( ) = in preparation

AIT PROFINET Competence Center & Test Lab

PROFINET – Thoroughly tested

The AIT is a PI-accredited PROFINET Competence Center and Certification Test Lab. Among the services it offers are training courses and workshops, integration tests and certification tests of PROFINET devices for manufacturers, planning support for machine and plant builders, and commissioning and acceptance testing support for plant owners.

As an international service provider, AIT specializes in performing tests for individual devices as well as complete systems. It provides numerous services for manufacturers and users of PROFINET technology in this regard.

Specifically, AIT's areas of expertise and range of services include:

Training courses and workshops
Conducts customer-specific PROFINET workshops
(Languages: German, English, Spanish).

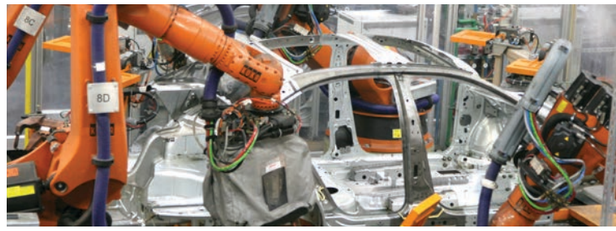
Development support
GSDML, engineering, configuration, implementation.

Test lab/certification testing
Performs integration and conformity tests for manufacturers of PROFINET devices.
In addition to test environments used for certification, AIT has multiple test systems with up to 60 PROFINET nodes, which are employed in particular for integration and interoperability tests.

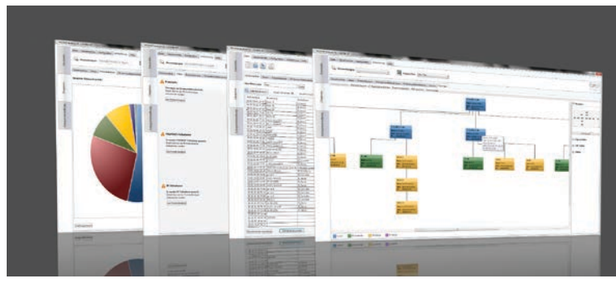
Industrial Security
Performs network load tests and vulnerability analyses for examining the robustness of devices for use in industrial networks.

Planning support
Supports PROFINET users in the specification of factory automation machines and manufacturing plants.

Troubleshooting and validation
Supports PROFINET users in commissioning, troubleshooting and validation (technical acceptance testing) of factory automation machines and plants.



Software solutions for diagnostics, validation and monitoring of PROFINET installations
AIT has incorporated its experience gained from performing troubleshooting and technical acceptance tests both in Germany and abroad in the development of its PROFINET diagnostic tools and systems. This enables users to quickly determine the configuration of PROFINET nodes based on a network analysis and to identify the „health status" of a plant. And it enables errors in communication and the plant configuration to be quickly eliminated.



PROFINETanalyzer – the field-tested and proven validation tool

- **Automated technical acceptance testing**
  Measurement, evaluation, reporting and validation report.
- **Configuration analysis and communication analysis**
  Acquisition and checking of device names, IP configuration and firmware versions of PROFINET devices. Fast evaluation of the „health status" of a PROFINET network (communication quality, communication anomalies).
- **Topology display**
  Graphical topology view with display of the configuration details, port connections and network monitoring functions.

HERAKLES – the scalable monitoring and diagnostic system

- **Monitoring**
  Scalable monitoring system up to a plant wide exhaustive surveillance of PROFINET systems. Continuous monitoring of communication, configuration and device status.
- **Diagnostics**
  Network wide diagnostics including trend analysis and root cause identification.
- **Validation**
  Automated technical acceptance testing (Measurement, evaluation, reporting).
- **Asset management**
  Life cycle management, analysis of device conditions, predictive maintenance

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Robust and reliable PROFINET network interface

ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

Analog Devices is the leading global high-performance analog technology company dedicated to solving the toughest engineering challenges. We enable our customers to interpret the world around us by intelligently bridging the physical and digital with unmatched technologies that sense, measure, power, connect and interpret. Our extensive experience with industrial communication and our commitment to industry have led to the development of the RapID Platform Network Interface – a complete, cost-effective, and easy-to-integrate PROFINET connectivity solution.

The RapID Platform network interface manages the PROFINET protocol and network communication for a host processor.

The network interface can be integrated as a module or embedded circuit. It contains everything needed for star, line, and tree network structures, including the communication controller, protocol stacks, Flash memory, RAM, Ethernet switch, and PHYs.

The two Ethernet connections can be connected to any PROFINET network. A UART interface, SPI, I2C or std. Ethernet interface can be used for the connection to the applications processor. On the software layer, the host processor is connected to a „Unified Interface" so that other industrial protocols can also be used without having to change the software of the host processor. Thanks to the PriorityChannel® technology of Analog Devices, the network interface has earned PROFINET v2.3 certification for Class B and C devices as well as Net Load Class III approval. System start according to v2.2 and v2.3 are both supported so that your field device functions problem-free in any PROFINET network.

Easy hardware and software integration

As a module, the network interface solution can be easily integrated into your own designs. You simply connect a power supply/ground/reset and connect the host processor to selected host interface.

For development of customized circuits, the hardware of the network interface can be integrated based on circuit diagrams contained in the scope of delivery. The scope of delivery also includes the bill of materials and example circuits in order to minimize the hardware development costs. Software for development of customer-specific circuits is provided in the form of firmware, which is downloaded to the Flash memory on the printed circuit board. There is no license fee or user fee, regardless of whether you use the module or an integrated circuit.

Software can also be easily integrated in a host processor. Messages are exchanged between the host processor and the network interface on the basis of a „Unified Interface". A tool provided by Analog Devices that is designed to run on a PC is used to configure the network interface so that you can adapt the necessary parameters of the field devices. The tool also facilitates the adaptation of the GSDML sample file supplied by Analog Devices to your field devices. An additional function of the Unified Interface ensures that the software of the host processor does not have to be changed when PROFINET network parameters change or a different Industrial Ethernet protocol is used. A component of the Unified Interface is a „socket" interface that supports direct Ethernet communication. The scope of delivery includes sample C code so that you can quickly establish a connection between the host processor and the configured network interface.

Reliable and flexible network integration

The network interface enables reliable PROFINET communication in conformance with Class B and Class C. PriorityChannel® technology – available only from Analog Devices – is used for this. It eliminates the effects of the network traffic and ensures reliable real-time behavior of the network in accordance with Net Load Class III. This technology provides a significant competitive advantage for your devices, extremely low jitter, and a reliable connection, which will not be disconnected even at a network load of over 95%.

PROFINET support includes optional support of isochronous communication (IRT) the Discovery and Configuration Protocol (DCP) for configuring field devices, and the Link Layer Discovery Protocol (LLDP) for topology management. The scope of delivery also includes the Simple Network Management Protocol (SNMP) and the required Management Information Bases (MIBs) that are used for network configuration and diagnosis. To make commissioning easier, the solution includes a dynamic web server. You can use this web server to create web pages for your field devices that can be displayed on a standard web browser. The network information and real-time parameters of the relevant field device can be updated dynamically at any time on the web page.

Fast integration

The starter kit for the RapID Platform network interface enables fast analysis of the circuit for connection of a host processor to the network interface module. The scope of delivery includes an application example that demonstrates the end-to-end communication, i.e., the communication between the host processor and network interface and controller. The Evaluation board allows to connect a host application board on the bench.

As soon as communication has been established on the host processor side, the PROFINET communication can be tested with a PLC or controller simulator. This communication can be thoroughly checked before the network interface is integrated in the circuit of the field device.

Future Proof

The RapID platform using the FIDO5000 family of Real-time multiprotocol switches. The fido5000 family is TSN ready and upgardes of the RapID platform to support TSN and PROFINET@TSN are under development.

You can find more about Analog's RapID Platform and Industrial Ethernet products at:

› **www.analog.com/en/products/industrial-ethernet.html**

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Albuquerque, NM 87109 | USA
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www.analog.com/en/support/technical-support.html

Deutschmann Automation

– the fast way to PROFINET

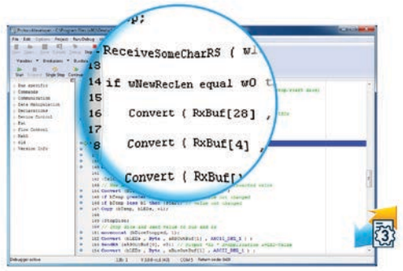
Deutschmann
your ticket to all buses

The widest variety of devices must be interconnected in the Industrie 4.0. environment. With our products, you can implement PROFINET interfaces quickly and reliably. Under the brand name UNIGATE® we offer various protocol converters, gateway series and embedded solutions as core components for IoT based systems.

PROFINET solutions from Deutschmann:
Protocol converter: For all devices with a serial interface
Embedded Solutions: Ready-to-install Bus nodes
Gateways: Making incompatible networks compatible

Future-proof – We keep at it!
- Continuous development of our products
- Changes to the protocol specifications
- Migration to TSN, OPC, …

What sets us apart:



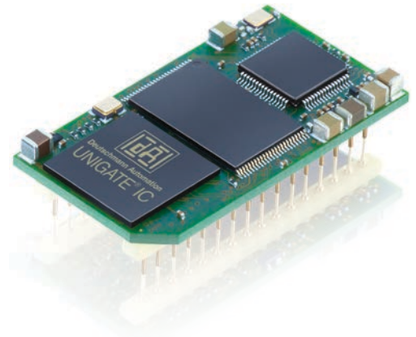
Programmable
For more complex applications, which cannot be represented via a pure configuration, we offer the Deutschmann Script language for the flexible, proprietary protocol connection between the UNIGATE module and the terminal device. With the help of the free Deutschmann software Protocol Developer, you control the data traffic between the application and the bus system without having to change the firmware of the terminal.

Configurable
The intuitive configuration tool WINGATE with an easy-to-use interface ensures a comfortable configuration of the devices.

Protocol converter – UNIGATE CL PROFINET
The solution for all devices with a serial interface
UNIGATE CL PROFINET gateways are DIN rail-mounted protocol converters which connect automation components and other devices to PROFINET.
Terminal devices are connected via RS232, RS485 and RS422 interfaces. The communication between the serial side and PROFINET optionally takes places by means of standard protocols such as Modbus ASCII, Modbus RTU (Master or Slave) as well as 3964 (R), RK512, DIN measuring bus or DIN 19244.

The PROFINET models comply with the PROFINET specification. Deutschmann offer to fit UNIGATE CL converters – just like all UNIGATE products – with OEM brand labels.

Embedded Solution – UNIGATE IC PROFINET
Ready-to-install bus nodes
The pre-certified embedded communication interfaces can be directly integrated into the electronics of the terminal device. Changes in the firmware of the terminal device are not necessary.
The modules comprise a microcontroller, flash, RAM and a bus controller. They handle the complete communication on the bus side, thus reducing the workload of the application's microprocessor. The embedded solution can be connected via a UART interface to the microcontroller of the terminal device or can operate as stand-alone. The hardware development is reduced to integration of the IC socket and bus specific connectors.



CAN Gateway – UNIGATE CM PROFINET
Easily configurable, ready-to-use
The UNIGATE CM Gateway connects CAN/CANopen-Participants to PROFINET. Besides RS232, RS485 and RS422 standard interfaces, the UNIGATE CM CANopen Gateway has an additional CAN/CANopen interface with Mini-Master functionality. Hence, the gateways can connect both CANopen networks and individual CANopen devices into higher-level networks. Adaptation of the device-firmware is not necessary.

Ethernet Line Gateway – UNIGATE EL PROFINET
Additional Ethernet interface on-board
In addition to RS232, RS485 and RS422 standard interfaces, the UNIGATE EL also provides a Fast Ethernet interface. After entering the network-specific data, such as IP address, the device is immediately ready for use for communication via TCP/IP. If another transport protocol is used for communication, easy configuration follows via WINGATE. Adjustable parameters are context-sensitive displayed, dependent on the changed transport protocol.

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PROFINET – From design to production

ESYSE Embedded Systems Engineering

ESYSE GmbH provides products and engineering services to the Embedded Systems market. Our service spectrum covers preparation of requirements and design specifications, project management, Hardware and software development.
Based on our technological capabilities and know-how, we offer complete end-to-end designing, development and manufacturing solutions to customers in variety of industries and automotive.

We support our customers during the entire development process, starting with the development of system concepts, followed by the development of hard- and software and finally including the series production of hardware components and the delivery of complete data communication systems

We offer services in the following areas:

- Consulting, system design and system specification
- Embedded system solutions
- Hardware and software development
- Fieldbus single- or multi-communication protocol solutions,
- Functional Safety solutions according to IEC/EN61508
- Machine-to-Machine (M2M) Client/Server solutions
- Configuration and test tools
- Production Equipment tools

Technology products

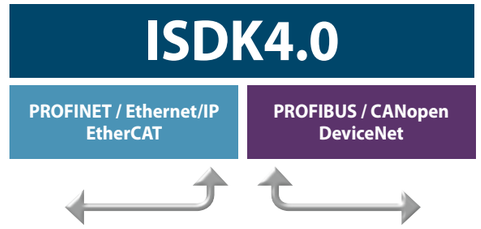
Our products have proven their worth over many years, resulting in satisfied customers all over the world.

Multiprotocol Solution with ERTEC200P from SIEMENS

The ESYSE-E200P2-XXXX is designed for use as or in various types of field devices, fast IO devices, synchronous drives and encoders, highprecision measurement instrumentation, and any other kinds of high-performance and intelligent automation devices.
Profiles such as PROFIsafe for failsafe communication or PROFIdrive for drive control can be seamlessly integrated

ISDK4.0
Industrial Software Development Kit

ISDK4.0 is a high-performance, flexible and scalable software toolkit which enables product manufacturers to quickly and easily integrate industrial software into the existing or new products.



Software features:

PROFINET PROFIdrive Profile Drive Technology:

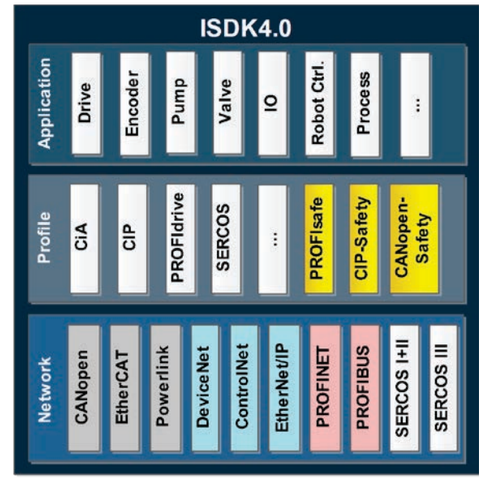
- Speed and Positioning
- Application Class AC1 up to AC6
- Standard Telegrams: 1-9 and 20
- PROFIdrive Warning and Fault Buffer handling
- Life-Sign Monitoring
- PROFIdrive Single and Multi-Parameter Access

PROFINET PROFIdrive Encoder Profile:

- Encoder Class 1, 2, 3 and 4
- PROFIdrive Position Feedback State-Machine
- Standard Telegrams: 81,82, 83, 84, 86, 87, 88, 89
- PROFIdrive Warning and Fault Buffer handling
- Life-Sign Monitoring
- PROFIdrive Single and Multi-Parameter Access

EtherNet/IP, CIP (Common Industrial Protocol):

- Drive Technology
- Encoder Device Profile (Position Sensor Object,…)
- Generic Device, IO, …



PROFINET PROFIBUS PROFIdrive PROFIsafe PROFIenergy EtherNet/IP ODVA EtherCAT Technology Group

Software and hardware development, from design to production, ESYSE GmbH has been the perfect partner for Embedded System Solutions.

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Hilscher's Flexible Communication Solutions for a Safe and Secure Path to Industry 4.0

Scalable and future-proof products are opening a huge potential for your PROFINET and IIoT business models

Solutions: From Multiprotocol Chips to Industry 4.0

- *netX „system-on-chip" multi-protocol network controller*
- *netIOT Interface for embedded and netIOT Edge for gateways I4.0 solutions*
- *Classic Coupler, Gateway and Proxy protocol converters*
- *PC cards for direct connection to industrial networks or controllers*
- *Embedded solutions for fast integration of network protocols in your system*
- *Custom PROFINET solutions tailor-made for your devices*
- *In-deep analysis of Real-Time Ethernet networks*

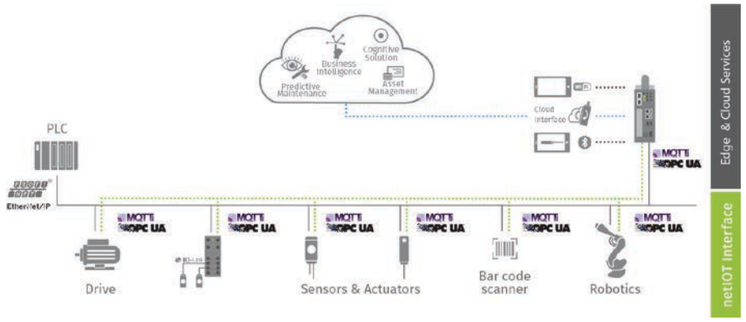
Hilscher is a global manufacturer of network connectivity solutions for device makers, OEMs and end-users. At the heart of every product is our own multi-protocol network controller netX allowing Master and/or Slave connection to all common industrial networks across Fieldbus, Real-time Ethernet and IIoT protocols.

netX 90: Industry's smallest and most secure network chip for PROFINET and Industry 4.0

netX 90 is the latest and most advanced network SoC for slave devices. It comes in a 10mm x 10mm package with a dissipation below 1 watt.

netX 90 has all the built-in security features needed for secure field- and cloud connectivity, including a hardware-based encryption engine, secure boot and a dual-core design for secure separation of application and communication tasks. It addresses field devices with a need for an upgrade to meet today's cyber security standards.

netX 90 supports PROFINET I/O device and all common Industrial Ethernet and Fieldbus protocols. Additionally it communicates via the protocols OPC UA and MQTT and offers a comprehensive set of integrated peripherals like EnDat, BiSS and IO-Link.



netIOT Solutions:
PROFINET and OPC UA for Industry 4.0

netIOT comprises the product families netIOT Interface for IoT enabled automation devices and netIOT Edge gateways for aggregating and processing IIoT data over factory networks.

netIOT Interface is a scalable solution for embedded designs and supports PROFINET, OPC UA and MQTT in compact platforms. The portfolio ranges from the multi-protocol chip netX, to the ready-to-solder chip carrier netRAPID and pluggable modules netIC IOT and comX. With these options, manufacturers can easily design Industry 4.0 functionality into their devices.

The netIOT Interface software structure allows several communication paths: cyclic and acyclic I/O data exchange; TCP connection for „transparent" Ethernet; and device specific IIoT data (such as diagnostics) via OPC UA and MQTT.

The netIOT Edge-Gateways collect and process Industry 4.0 and IIoT data for business and operational analysis and forward them to cloud applications. Edge gateways of different performance classes deliver ready-to-use software components or allow customized software to be added.

Coupler and Gateways:
PROFINET connectivity to other networks

netTAP gateway and netLINK device are plug-and-play protocol converters with master and/or slave functionality. netTAP gateways bridge between a complete network trunk and a superordinate Fieldbus or Industrial Ethernet system, whereas a netLINK Proxy maps a single PROFIBUS slave into PROFINET.

PC Cards:
PROFINET Connectivity and PC-based Controls

cifX PC Cards support all common Industrial Ethernet and Fieldbus systems as master or slave like PROFINET I/O IRT as device and controller. They are available in the formats: standard PCI and PCI Express, Compact PCI for cabinet construction, stackable PC/104 and PCI-104, and Low-Profile PCI Express, mini PCI or mini PCI Express. A free C-toolkit and predefined device drivers for Windows, Linux, INtime, VxWorks, QNX, CODESYS and RTX are available.

Embedded Solutions:
Easy PROFINET Integration in Field Devices

With embedded solutions field devices can easily be upgraded with multi-protocol capability. Besides PROFINET I/O device and controller for highest conformance- and netload-classes, all leading Industrial Ethernet and Fieldbus systems are supported as master or slave.

The embedded products include the solderable netRAPID netX chip-carrier, the plug-in modules netIC, comX and the exchangeable module netJACK. Process data are exchanged via a Dual-Port-Memory, with either 8 or 16 bit bus interface, via a 50 MHz SPI interface or via PCI Express.

Custom PROFINET Solutions:
Tailor-made for Your Device

The product portfolio also includes the development and production of customer-specific solutions. All developments are based on the proven netX technology. For more information about your customized solution get in touch with us.

Diagnostic:
Ethernet analysis made easy

netANALYZER is the tool for in-depth analysis of Real-Time Ethernet networks. The hardware records the telegrams without network impact while the graphical user interface processes them through extensive analytics functions. Characteristics such as station lists, alarms, process values, network utilization and jitter can be analyzed.

For more information, visit
www.hilscher.com,
pricing information and bookings
can be obtained under
Phone: +49 6190 9907 790

From zero to PROFINET in 14 days

PROFINET connectivity without tedious development work

For PROFINET device interface implementation, HMS provides a wide range of certified enabling technology and services to accompany development.
What all the solutions have in common is that the device manufacturer does not need to concern himself with the details of the PROFINET protocol, yet can implement its communication interface based on proven-and-tested Anybus technology. Thanks to the modular design, a universal solution is achieved that allows connectivity to many industrial networks to be created in a single development step.

Anybus CompactCom
Embedded Anybus communication solutions are certified for PROFINET IRT and simplify implementation of a PROFINET device interface. Their use saves device manufacturers up to 70% of development costs and reduces the time to market.

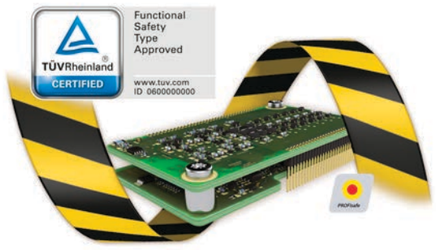
Anybus X-gateway in PROFINET IRT/PROFINET IRT combination

The product family of the Anybus X-gateways includes over 200 different gateways that cover practically every conceivable network combination.

Anybus Communicator for PROFINET IRT

PROFINET protocol converters integrate field devices in PROFINET via their serial interface or CAN interface without hardware or software changes.

IXXAT INpact for PROFINET



With the IXXAT Safe T100 safety module in combination with the Anybus CompactCom for PROFINET, an integrated PROFIsafe solution can be realized.

External couplers and gateways
The Anybus X-gateway allows you to connect a PROFINET network with another fieldbus or Industrial Ethernet network. The Anybus X-gateway is also available as IIoT version, which allows data exchange between a PROFINET network and IIoT applications.
The use of an Anybus communicator is advisable when the field device has a serial interface or CAN interface and the PROFINET connection cannot be integrated. Here, neither the hardware nor software of the field device needs to be changed.

PC card for PROFINET
With the IXXAT INpact you can easily connect your PC to a PROFINET network. Available in PCIe, PCIe Mini and M.2 versions, the card is suitable for industrial PCs as well as for mobile handheld applications. Device applications for process data visualization, configuration, and analysis can be easily and quickly implemented on the basis of Windows and Linux drivers.

Embedded communication solutions for PROFINET IRT
Anybus CompactCom is a family of communication interfaces in various designs that manufacturers can use to implement a multi-network interface in their devices. The technology is certified for PROFINET IRT and meets the requirements of the highest conformance class (Conformance Class C) and the highest network load class (Netload Class III).

Anybus CompactCom also enables PROFIsafe communication according to the black channel principle. In combination with the IXXAT Safe T100 safety module, HMS offers manufacturers a complete safety solution.

Ready for Industry 4.0 and the Industrial Internet of Things
Anybus CompactCom supports OPC UA and MQTT, offering manufacturers an easy path to IIoT and Industry 4.0. Device and machine manufacturers who use CompactCom can securely transfer data from their devices and machines to IT systems and IoT software via this HMS communication interface.

After completion of the specification work in IEEE and the PROFIBUS user organization, TSN will also be integrated into the product family.

The 40 series includes IT security mechanisms. For example, software signatures are mandatory to prevent the import of unreleased software. Unauthorized copying is prevented by encryption mechanisms.

Besides the Anybus CompactCom PROFINET module for copper cable, a version for fiber-optic cable is also available.

The modular solution is characterized by low development costs and short development times. The advantage is that you not only get a functionally-compatible communication solution for PROFINET but also for many other industrial networks. Communication solutions from the Anybus CompactCom family have a standardized network-independent hardware and software interface so that the device software is largely independent of the bus system used in each case.

Customer-specific solutions
As a supplement to standard solutions, HMS offers customer-specific solutions based on the HMS core technology. By using proven-and-tested technology, customers profit from a short development time, low development risk, and fixed development costs, which also include continual software updates by HMS.

The PROFINET solutions from HMS set device manufacturers on the right course for the Industrial Internet of Things.

Consulting and support
HMS is an accredited PROFINET Competence Center and supports device manufacturers as a partner in all phases of development. The service offer includes developer training, consulting services, development support, and preparatory tests for certification.

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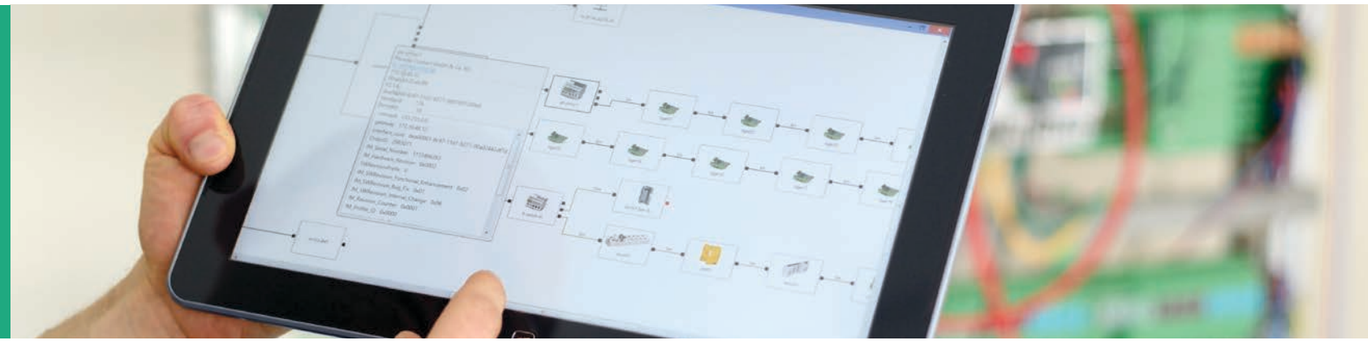
Topology Detection, Device Diagnosis and Test for PROFINET

For over 20 years, ifak has operated a PI-accredited Competence Center and test laboratory for PROFIBUS, PROFINET and PROFIsafe. In addition to certification tests for PROFIBUS, PROFINET and PROFIsafe, the offered services include training and workshops, stack integration and tools for network diagnosis and analysis.



ifak offers comprehensive services on the areas of PROFIBUS and PROFINET technology. The range includes the following services:

- Developer and user oriented consulting
- Support during integration and commissioning
- Development and adaption of communication protocols
- Application software and device integration technologies (e.g. EDD, FDT, FDI)
- Behavioural studies for PROFINET devices and plants
- Studies and consulting on device and system design
- Specialised, embedded software solutions for automation devices
- Seminars for manufacturers and users
- Accomplishment of research and development projects
- Functional safe communication

Plant Explorer – Network analysis for a faster overview

Network Analysis

- Graphical presentation of the topology (incl. port interconnection)
- Data acquisition without affecting running systems
- Detailed device information
- Consideration of GSD files

Functions

- Setting of device names and IP configuration
- Writing and reading of all device parameters
- Automatic assignment of device names for known networks
- Executable on PC and tablet

Report Function

- Export/ Import to csv and Excel
- Export to AutomationML

DIA.LYSIS – Plant analysis and device testing in detail

Analysis

- Passive or active collection of information
- Analysis of the network topology (target-actual comparison, alterations)
- Import of random planning and customer data (script-based)

Functions

- Transparent analysis (PCAP File, TAP, network interface) and generation of Ethernet frames
- Evaluation/interpretation of Ethernet frames in real-time and from records (script-based analysis)
- SNMP Support
- Evaluation of XML based device descriptions (GSDML)
- Generation of reports (PDF, RTF, Excel)
- Many functions available as script –> simple modification

Development Accompanying Device Test

- Device configuration according to the information of the device description
- High availability commissioning for PROFINET (script-based access to ARset configurations)
- Simple use of PROFINET services (DCP, DeviceAccess, Read/Write)

Services

- Development of specified test cases
- Development accompanying tests
- System inspection
- Device acceptance on the basis of specific criteria

Test laboratory:

Founded in 1998 at ifak, PI test laboratory has continuously expanded its testing services and currently offers the following certification tests to device manufacturers:

- PROFIBUS DP slave
- PROFIBUS PA slave
- PROFIBUS PROFIsafe slave

- PROFINET RT/IRT device
- PROFINET PROFIsafe device

Thanks to its many years of experience, the test laboratory is a competent partner in all questions concerning the certification of your device. The regular re-accreditation certifies the PI test laboratory of ifak the necessary competence, independence and objectivity for the tests.

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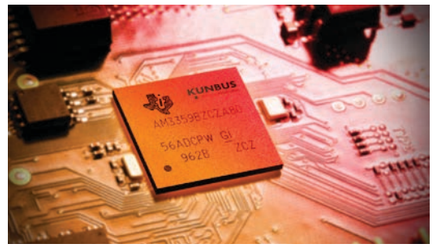
KUNBUS industrial communication

The expert for interface solutions in the PROFINET world

KUNBUS GmbH is a specialist in the automation industry for fieldbus and Industrial Ethernet solutions. The product portfolio includes embedded communication modules, gateways, PC cards, IPCs, small industrial controllers as well as various network diagnostics and monitoring devices. In addition to standardized communication products, KUNBUS also offers customer-specific development and project services. Development and production are carried out by more than 120 employees in Denkendorf near Stuttgart and in Ettlingen near Karlsruhe.

Industrial protocols for Sitara™ Processors

With its Sitara™ processor family, Texas Instruments has succeeded in bringing a processor onto the market that for the first time does not require a separate communication chip (such as an Asic or FPGA) for bus communication. For this purpose, the processor was equipped with an independent subsystem, which is exclusively responsible for the bus communication.



Space and costs can be significantly reduced by eliminating the need for separate communication chips. The multi-protocol capability of the processor allows other industrial protocols to be integrated in addition to PROFINET without further hardware development. KUNBUS offers development toolkits for PROFINET IO Device RT and IRT as well as PROFINET IO Controller RT for all Texas Instruments Sitara processors. The toolkits are independent of the operating system used and contain all components for successful integration of a PROFINET IO device or controller on a Sitara-based hardware component. Toolkits can be immediately commissioned on all common Sitara evaluation platforms from Texas Instruments. In addition to PROFINET and PROFIBUS, KUNBUS also offers development toolkits for a variety of other common industrial protocols..

Embedded communication modules

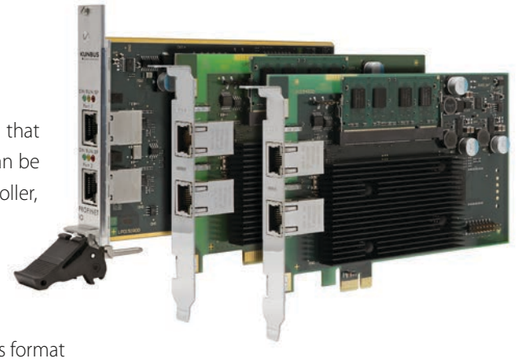
Minimize development effort, achieve cost and time savings when launching devices with PROFINET interfaces - the embedded communication modules offer companies a fast and cost-effective way to equip their devices with PROFINET capabilities.

The communication modules are available in different form factors and performance classes. Thanks to pin compatibility, it is also possible to quickly and easily implement connections to other common industrial network protocols by exchanging the communication modules.

PC-Card DF PROFINET IO

The DF PROFINET IO PC card family is a powerful controller/device unit that is well-suited for use in large PROFINET networks. The DF PROFINET IO can be used both as a PN IO controller and/or as a PN IO device. As a PN IO controller, the PC card can process up to 64 devices in Performance Class RT in one millisecond. Due to its second Ethernet interface, the PC card can optionally be used simultaneously as a PN IO device. Standalone operation as a PN IO device is also possible.

The DF PROFINET IO board is available in CompactPCI, PCI and PCI-Express format and has drivers for all common operating systems (WINDOWS and LINUX), as well as an optional **LabVIEW™ PROFINET VISA driver**.



Modular Gateway – Fast and easy connection of different networks

By using the modular gateways, different industrial networks can be connected to each other without much configuration effort, e.g. a PROFIBUS network with a PROFINET network. A modular gateway always consists of two DIN rail modules which harbor the respective network protocol and are connected to each other via an overhead connector.

Each module is integrated as a slave in its network. The modular approach offers a very high degree of adaptability. If changes occur at short notice, a quick and flexible response is possible. In case of a one-sided protocol change, it is no longer necessary to replace the complete gateway, but only the affected module. KUNBUS modular gateways are available for all common industrial network protocols.

TAP Curious – Diagnostics and monitoring of Ethernet based networks

The TAP Curious is a compact and mobile device for analyzing data streams in PROFINET or any other real-time Ethernet network. The main tasks of the device include recording and analyzing delay, jitter and CRC errors.

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Fax: +49 711 300 20 677
E-Mail: **info@kunbus.com**

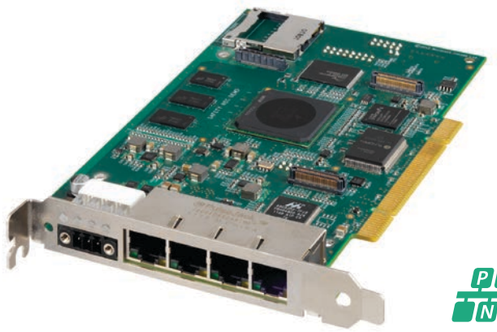
Complete PROFINET Solutions from Molex

As pioneers in industrial communication and functional safety, Molex is dedicated to help automation manufacturers & end-users creating value from their factories with technology and products. And our participation for the next industrial revolution with our Molex Industrial Automation Solution 4.0 (IAS4.0) is no different.

Providing more than connectors, Molex delivers complete interconnect solutions for several markets, including industrial automation, automotive and commercial transportation, consumer electronics, data communications, and medical markets.
Aiming to advance global Industry 4.0 initiatives, Molex Industrial Automation Solutions add communication and networking to the production process and support the drive toward smarter machines and factories.

Molex PROFINET Solutions

Molex Brad portfolio provides solutions for Automation manufacturers, Machine Builders, Line Builders or End customers to communicate and setup PROFINET infrastructures.
Brad HarshIO PROFINET modules provide a reliable solution for connecting industrial connectors to digital and IO-Link sensors and actuators in harsh environments. Contained in an IP67 rated Housing, Brad IO modules can be machine mounted and are able to withstand areas where liquids, dust and vibrations are present.
Molex Ethernet Network Interface cards provide powerful and reliable real time data exchange over PROFINET protocol. This solution enables PC based control systems like machine or robotic control systems to quickly integrate a certified communication interface with easy commissioning through Molex Network engineering software.



Brad Ethernet switches, cordsets and connectivity products are PROFINET certified, for in-cabinet and on-machine applications complete the total infrastructure offering.

PROFINET Technology and Services

The Molex PROFINET expertise is supplied as PROFINET I/O Development Kits (also called stacks) for automation manufacturers to develop and integrate PROFINET protocol support in their devices. Molex PROFINET stacks are supplied in source code and neutral from any operating system or hardware platform to be adapted to most of the existing device with Ethernet interfaces.
Collaborations with various semi-conductor manufacturers allow Molex to provide a combined IRT version of the PROFINET communication for devices to be integrated in synchronized networks.
PROFIsafe support as F-Host and F-Device is complementing the Molex technology package. This safe communication extension is available, ready to use, based on the Molex IAS4.0 safe platform, for custom integrations and applications.

Molex Industrial Automation Solutions 4.0

Molex IAS4.0 is our answer to the automation transformation that impacts the manufacturing industry in the coming years looking for more flexibility, efficiency and new emerging business models.
Molex IAS4.0 is a revolutionary solution that can distribute intelligence across devices, while also embedding safe and non-safe capabilities into a single hardware/software platform as smart and safe Interface module, Gateway or I/O module.
Molex IAS4.0 is a platform-independent industrial communication solution with the support of the different industrial ethernet protocols, OPC UA or soon PROFINET over TSN, that enables data exchange between products at all layers for seamless sensor to cloud connectivity.
Molex IAS4.0 is a suite of smart products that can be networked with each other and respond to internal and external events with learned behavior and can be deployed in the cloud, on premise and at the edge in a truly distributed architecture.

For more information please contact
E-Mail: **profinet@molex.com**
Visit the Industrial Products section
on the Website:

www.molex.com

Phoenix Contact Competence Center

Concentrated PROFINET expertise

In order to provide optimum support to PROFINET users, Phoenix Contact and the independent test lab and certification institute Phoenix Testlab make their comprehensive expertise available as a part of the Phoenix Contact Competence Center (PCCC).

No matter what PROFINET solution you are looking for, the Phoenix Contact specialists are available to answer all of your questions. The accredited PROFINET Competence Center provides manufacturer-independent support from the development phase right through to system modernization – starting from individual components through to a complete system. This gives you access to the experience of a leading automation manufacturer for your development and application. A comprehensive training program is also available.

Implementation

Use powerful technology components from Phoenix Contact when implementing your PROFINET interface. The PROFINET Software Development Toolkits (SDKs) are available for many CPU architectures and real-time operating systems. The stacks are available in the form of an object library, and in addition as a Dynamic Link Library (DLL) for Windows. This is compiled and linked for specific combinations of CPUs, operating systems, and compilers.

The PROFINET Device Chip TPS-1 reduces the implementation outlay in terms of both time and costs to an absolute minimum. It enables device manufacturers to integrate a PROFINET device interface quickly, easily, and cost-effectively as a single-chip solution at the price of a fieldbus interface. It supports conformance class C and can therefore be used for all PROFINET device performance classes.

Corresponding technology components are available from Phoenix Contact for the various PROFINET device types. You can therefore implement and certify your PROFINET interface quickly.

Testing and certification

As an accredited PI test laboratory, Phoenix Testlab will carry out all of the necessary conformance tests for you. In addition to the PROFINET conformity tests, customers also have access to numerous additional services of the accredited Phoenix Testlab test laboratories in the fields of environmental simulation, radio- and electrical device safety testing and International Type Approval. Certified PROFINET experts and trained engineers also provide consultation right from the development phase and ensure that all standards to be taken into consideration and the requirements on the product resulting from these standards are documented.

Concept and technical specification

All product requirements are validated in accordance with the relevant standards during the specification phase reducing the time to market. In order to meet the high quality standards set by the customer, specially developed controller simulation software is used as a test system.

Conformance testing

As an accredited and PI-certified laboratory, Phoenix Testlab performs certification testing for products ready for maturity phase as well as development-accompanying tests. The advantage of the latter is that any problems with the device are detected at an early stage and can be corrected during the development phase. The device developer decides which functions are to be tested and at what point. The scope of testing for a complete PROFINET conformance test (class A, B, C) includes the state machine test (also IRT), hardware test, interoperability test, GSD file and Multiport test, and EMC test.

After successful testing, the customer receives an official test report, which they can then use to apply for a certificate from the PNO. The certificates issued by the PNO are valid for three years.

Supplemental services

In addition to the PROFINET conformance test, Phoenix Testlab GmbH also provides PROFIsafe and PROFIenergy test programs. Furthermore, tests in the fields of EMC, environmental simulation, radio- and electrical safety testing, as well as international approval management can also be performed on site. Attractive individual test packages are also available in combination with a PROFINET conformance test.

The specialized test engineers at Phoenix Testlab ensure high-level testing quality. Relevant standards are the basis for PROFINET certification tests.

Produktlinks

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PROFINET RT CC-A/B, RT-1
Single Port / Dual Port

port PROFESSIONAL INDUSTRIAL COMMUNICATION

Middleware + RT-Protocol Library für Standard Silicon

TSN in development

Port's offering consists not only from a protocol stack – experience has shown that the surrounding environment needs to fit for Industrial communication as well. Accordingly port's offering consists from the GOAL Middleware and our RT-protocol stack.
The GOAL Middleware is your central point for your complete design.

› ***Middleware and RT-Protocol for Standard Linux***

› ***Middleware and RT-Protocol for MCUs***
Cortex M und ähnlich, bare metal oder RTOS

› ***Middleware and RT-Protocol for Multicore Sytems***
Cortex M+A and similar bare metal, RTOS or Linux with Core-to-Core Communication

On the first look GOAL seems like a complication to an already not exactly simple activity. Contrary to the first perception GOAL solves serious, but yet unseen problems.

GOAL is not only a common socket resp. HAL, it is a powerful Middleware. GOAL is the central enabler for the hardware and a socket for Industrial Communication protocols (not only for port's protocol stacks).

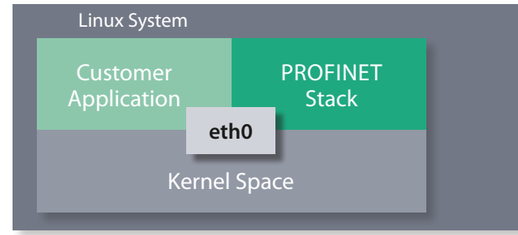
goal INDUSTRIAL COMMUNICATION MIDDLEWARE

PROFINET is powerful and has surprisingly tough requirements to the host system. While the specification is clear – the real world impact is mainly underestimated.

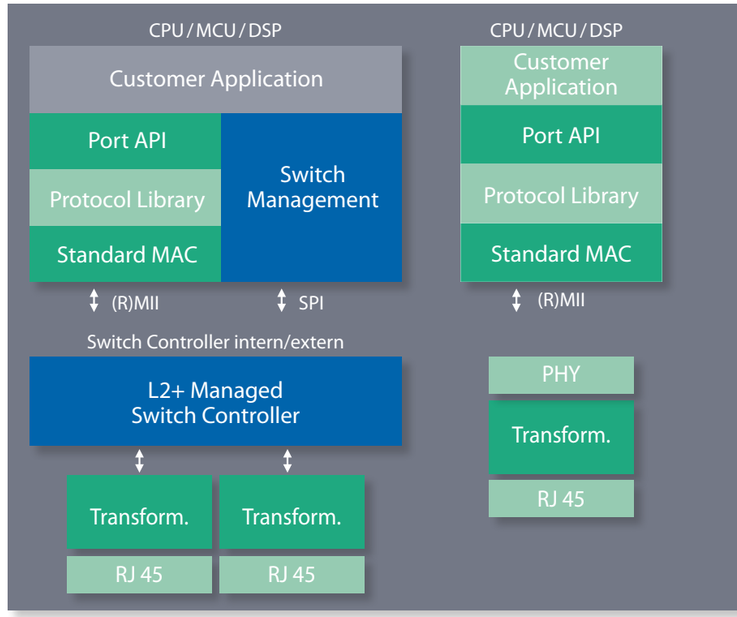
Example: A significant challenge for PROFINET implementations is usually to pass the netload tests, which expose the DUT to a storm of ARP requests, generic broadcasts and malicious traffic. Usually the TCP/IP stack is plugged up by this messages or crashes. Even if it doesn't crash - the cyclic PROFINET frames are stuck in the TCP/IP stack before retrieved from the rawSocket IF or overflow in the queue before and the cyclic PROFINET communication ceases. The DUT is supposed to at least survive or partially to keep operating. These tests are intended to strain the CPU and the corresponding TCP/IP stack and this indeed it does.
GOAL enables not only embedded platforms for compliant PROFINET communication – for example: **Port** manages with Cortex M4 platforms 1ms cycle time, the system needs about 1MByte Flash and consumes 196kByte RAM, 256kByte with CC-B (Single Port).

Optionally we can also manage an internal or external managed switch controller to enable for Line structure.

Port has some platforms with the on-chip switch controller fully supported, for unsupported platforms new support can be established. The main effort will result in integrating the for other platforms existing switch functionality in the new platform. The GOAL Middleware would then include support for a managed L2+ Switch controller and not only for PROFINET, even a CLI would be part of the GOAL then.



Example: *Single Port PROFINET running with Linux in the User-Space*



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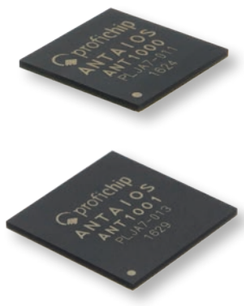
Into the Future with ANTAIOS

Flexible Multi-Protocol Solutions with a Future

More than just chips
***profichip** has been a reliable partner in the Ethernet and fieldbus world since 1999. Based in Herzogenaurach, Bavaria, we support customers all over the world with our comprehensive ASIC portfolio in the field of industrial communication and control technology. Many well-known companies not only trust in our technology, but also commission us to implement their ideas and visions. Because profichip is not just about chips, but about the whole world of automation.*
True to our motto: Automation in Silicon

For almost 20 years, the fieldbus specialists here at profichip have enjoyed great success in the PROFIBUS sector with their VPC3+ product family. As well as our renowned personalized customer support, users appreciate the versatile technical capabilities of our solutions. We are continuing this successful strategy with the ANTAIOS multi-fieldbus communication chip.

ANTAIOS primarily focuses on the efficient and flexible implementation of high-performance real-time Ethernet communication protocols such as PROFINET IRT or TSN/OPC UA. The real-time Ethernet unit is programmable, and is therefore able to support all Ethernet-based protocols. This enables quick reaction to any protocol changes and offers a high degree of flexibility and security in the future, as new features can be conveniently retrofitted via software (microcode). It means ANTAIOS is ready now for any TSN extensions that are coming up and whatever future challenges Industry 4.0 and IIoT may bring.



Setting it apart from other implementations, the I/O data is available via a hardware interface (consistency interface). Slow access times via software callback functions and long copy routines are a thing of the past. This makes the I/O data available in real-time.

Furthermore, the user has the option to separate the PROFINET consumer/provider states from the I/O data via the consistency interface. A convenient extra function is that the data can be re-sorted into virtually any order by the hardware and converted into the desired target format, which also eliminates time-consuming software routines.

Additional ANTAIOS key features:

- ARM® Cortex® A5 processor, 32/32kB cache, 288MHz
- 2-port real-time Ethernet switch with integrated PHYs
- Gigabit Ethernet MAC with external PHY
- DDR2 SDRAM (max. 256 MB)
- QuadSPI controller (96 MHz)
- Parallel host interface consisting of:
  - Consistency interface for I/O data
  - FIFO interface for acyclic functions
- Serial host interface:
  - SPI slave (max. 24 Mbps)
  - High-speed UARTs (up to 12 Mbps)
- Classic fieldbuses:
  - PROFIBUS Master
  - PROFIBUS Slave
  - CAN
- SliceBus Master
  - I/O system with up to 64 modules

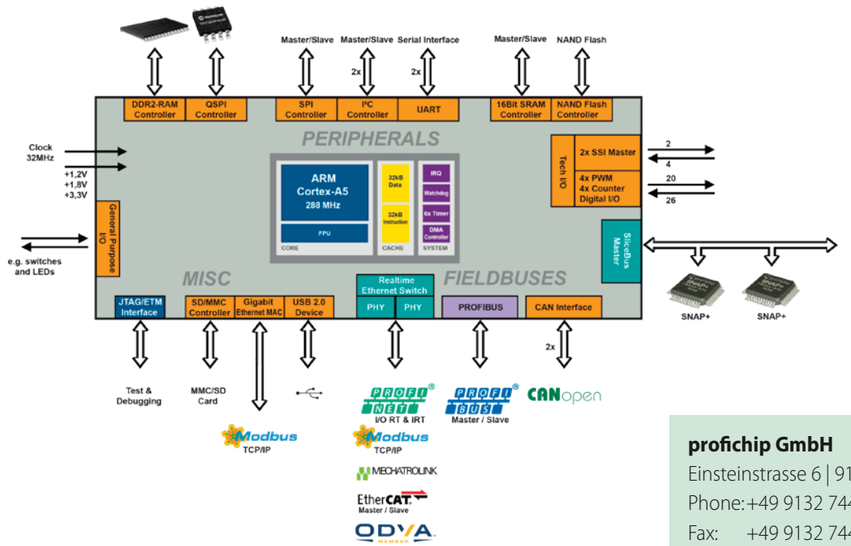
profichip offers easy access to PROFINET with an evaluation board comprising the following components:

- Free development environment
  - eCos 3.0 operating system
  - GNU GCC compiler 5.4.0
- PROFINET I/O device stack
- PROFINET examples:
  - Simple slave (certificate number: Z11905)
  - Compact slave
  - Modular slave
  - Isochron Mode

In this way you can develop your software entirely on the evaluation board while simultaneously working on your hardware. Our reference circuit diagrams are available to you as a basis for your hardware design. Before you create your layout, we offer a free review of your circuit diagram.

profichip gives you the support you need:

- Individual consultation before you purchase development packages or software
- Phone or email support free of charge during development
- Expert after-sales service
- Assistance with creating GSDML files
- Free review of circuit diagram
- PROFINET conformity test in our own test laboratory
- Assistance with certification
- Contract development
- Workshops, training courses and on-site support by appointment
- Access to our experts in ASIC design and software development



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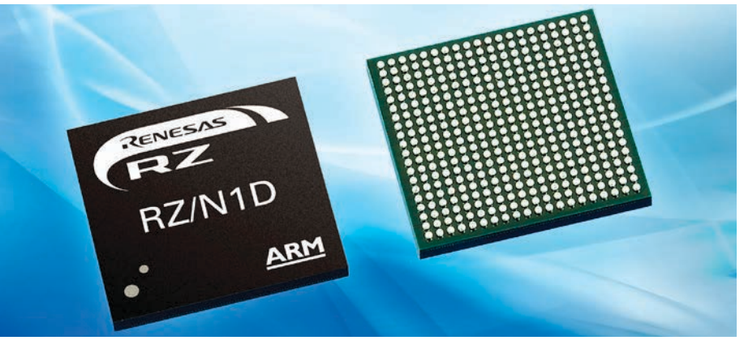
Electronic components for PROFINET solutions



The majority of the PROFINET communication devices are based on semiconductors coming from Renesas Electronics. This makes us the automation industry's preferred supplier of industrial Ethernet solutions. From dedicated PROFINET IRT devices, through the family of multi-protocol industrial Ethernet controllers, we offer a wide range of scalable application specific products with long term availability.

Both the TPS-1 device and the Enhanced Real-Time Ethernet Controller (ERTEC) allow developers to create PROFINET IRT compliant designs that are interoperable with equipment from the world's leading automation suppliers. In addition, the RZ/N1 and RZ/T1 family devices offer highly BOM optimized access to a variety of Industrial Ethernet flavors.

Beyond the world of PROFINET, Renesas invests in own TSN compliant technology. A Renesas TSN demonstrator is currently being tested for interoperability in various Testbeds, making sure that the next generation industrial Ethernet devices are fully TSN compliant.

PROFINET IRT solutions

The TPS-1 and ERTEC devices from Renesas deliver superior real-time performance by including an intelligent on chip network switch. This switch performs the time slicing required for IRT, creating the fast lane that guarantees real-time performance.

The TPS-1 targets slave applications on the factory floor. It is a single-chip PROFINET IRT interface integrating a CPU, a 2-port switch and Ethernet PHYs. The corresponding PROFINET software stack is provided by Phoenix Contact at no additional cost.

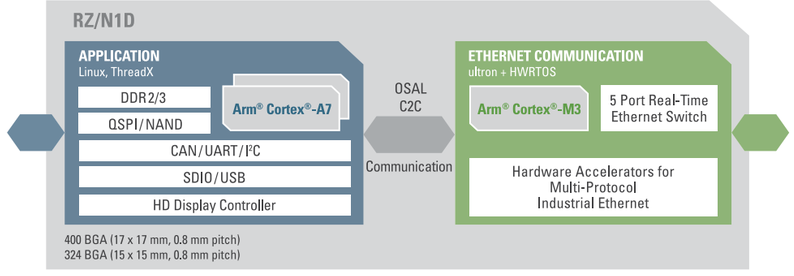
ERTEC is currently available in three versions, ERTEC200/ERTEC200P offering two Ethernet ports including PHY, and ERTEC400 offering four Ethernet ports. All are based on the Fast Ethernet (100Mbps) standard delivering high bandwidth for both real-time and non-real-time data.

Industrial Ethernet Controllers with Multi-Protocol Support

The RZ/N Series of industrial communication microprocessors significantly simplifies the industrial network application development. With the performant dual Arm® Cortex®-A7 application core and the power efficient Arm® Cortex® M3 communication core it is ideal for use in industrial network devices such as programmable logic controllers (PLCs), operator terminals or gateways. RZ/N integrates multiple industrial networking technologies within a single chip, allowing support for a variety of industrial network protocols. One of the key enablers is the consistent application programmable interface (API) for different industrial Ethernet technologies.

The RZ/N1 Solution Kit is a complete development package that includes the hardware and software to enable faster prototyping of leading industrial Ethernet protocols without any additional up-front costs or complexity.

The RZ/T is a controller dedicated for Servo/Drives applications with integrated encoder interface and industrial Ethernet connectivity. It features the ARM® Cortex®-R4F core which allows low latency and a rapid response to interrupts. The integrated tightly-coupled memory ensures a high-speed access from the CPU without passing through the cache memory.



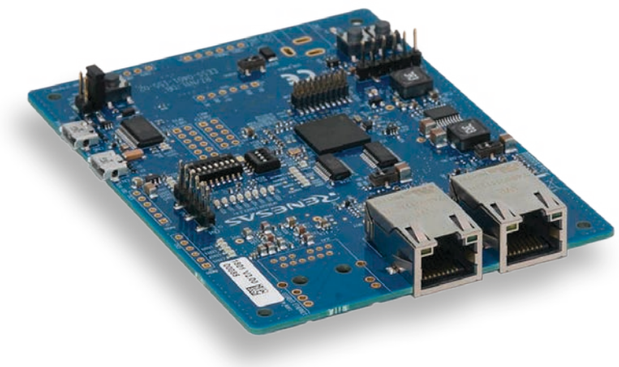
The RZ/T1 Solution Kit is a includes an RZ/T1 evaluation board and a dual channel 3-phase inverter to support dual channel servo motor control with current and position feedback. The kit also supports incremental and absolute encoder over A-format™, BiSS®, EnDat, and Tamagawa protocols.

IO-Link Master Gateway

Based on the RZ/N1S, Renesas Electronics developed an IO-Link Master to PROFINET gateway. While conventional solutions require a separate chip for the real-time industrial protocols and a microcontroller for the IO Link master, Renesas' RZ/N1S reduces these components count down to a single integrated device. A 12x12mm package integrates an Arm® Cortex®-A7 application core running the IO Link Master stack and an Arm® Cortex® M3 communication core running the PROFINET stack on a single chip. An RZ/N1S IO-Link Master board with a SW sample, IO-Link tool and related documentation is available for easy evaluation and prototyping.

Renesas Eco System

Renesas offers an extensive set of evaluation boards including various protocol stacks from leading vendors. Furthermore Renesas' local support team helps you speed up your time-to-market. Renesas is an active member of several working groups in PROFINET and IO-Link organizations. In addition, we work closely with industry's leading players to create robust networking solutions for automation applications.



For more information please visit
www.renesas.com/eu/en/solutions/industrial-automation.html

DATAEAGLE makes PROFINET wireless

Do sparks fly between you and PROFINET?

PROFINET and Wireless, two cutting edge technologies united by DATAEAGLE

„Wireless Inside“ from the beginning

For more than 30 years, and concurrent with PROFIBUS, Schildknecht AG has worked as an equipment manufacturer and system provider within industrial radio transfer of data. We offer patented and highly stable radio transfer of data for water management, cable cars, crane and stage technology, and automated guided vehicles. Furthermore, new applications are emerging in IIoT and Industry 4.0. To cover this versatile „Wireless Market“ Schildknecht develops its range of DATAEAGLE radio modules to integrate with PROFINET, PROFIBUS or PROFIsafe, utilising Bluetooth or mobile radio (2G, 3G, 4G).
Combining this equipment technology with 30 years of application experience, Schildknecht develops strong „Wireless PROFINET“ solutions. This includes in-depth project consulting and tailor-made soft- and hardware.

Connecting wirelessly to the cloud with PROFINET
Remote Monitoring by means of existing PROFINET installations

The rise of IIoT and Industry 4.0 leads to new business models for maintenance and monitoring of machines. If these machines are installed around the world, global connectivity is needed, especially if you need to reach out to remote areas! The IoT Edge Gateway DATAEAGLE 7050 offers far-reaching and robust connectivity through its global eSIM card giving access to 400 mobile radio providers. By means of Unsteered Roaming the eSIM card transmits condition data from systems and machines collected e.g. via PROFINET to the cloud. There the data is made available to authorized users for analysis. By 2019 interfaces to OPC UA, Accon AGLink (Delta Logic) and CODESYS (3S) will be available to further expand the application possibilities of PROFINET and IO-Link.

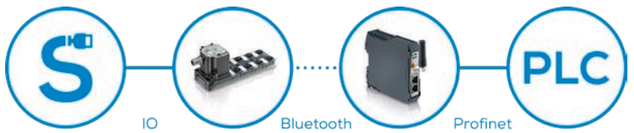
Replacing cables – with „Wireless PROFINET“
Reliable PROFINET radio paths with DATAEAGLE 4000

As a rule, machines at field level transmit sensor data to a control unit. If moving parts are involved, e.g. in sewage plants or cranes, you can use a radio link aligned with the corresponding fieldbus: The modules of the DATAEAGLE 4000 series „speak and understand“ PROFINET, with or without support from PROFIsafe. The patented data pre-processing and filtering function guarantees exceptionally high machine availability. (For PROFIBUS we recommend the DATAEAGLE 3000 series).

Building sensor networks - with „Wireless PROFINET“
Designing more efficient processes and process technology with DATAEAGLE 2730

So far Bluetooth Low Energy has been used to connect Smartphones, Tablets or PCs. But recently it has evolved and is now gaining access to automation technology as well. For this Schildknecht has built a high-performance radio system, the DATAEAGLE 2730. It receives sensor data wirelessly over Bluetooth and forwards it via „Wireless PROFINET“ to the control unit.

With the Bluetooth-enabled IO distributor box DATAEAGLE X-treme IO 2730, data from cabled sensors can be collected and forwarded via Bluetooth. If you work with automation of processes and production, this particular blend of cable and radio connectivity offers high flexibility and efficiency.



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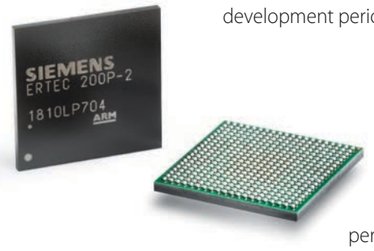
SIEMENS
Ingenuity for life

Efficient development of RT/IRT controller and device

You want to integrate PROFINET into your field devices as easily as possible and achieve maximum performance? PROFINET technology from Siemens offers you maximum performance and can be scaled exactly to your requirements. In addition, you receive full support throughout the entire product development cycle: from individual support to certification.

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.

	ERTEC 200P-2
Integrated IRT switch	2-Port
Integrated PHYs	✓
Support for copper and fiber-optic cable	✓
Minimum cycle time	125 µs
ARM CPU	ARM 926
Max. clock frequency	250 MHz
Assignable IOs, General-purpose IOs	max. 96
Housing size	17x17 mm
Ball Pitch	0,8 mm

› **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 evelopment 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
- PROFINET performance upgrade with a minimum cycle time of 125 µs
- MRP/MRPD
- The latest technology certificatet

› **Development package for standard Ethernet controller**
This development package allows PROFINET devices with RT to be developed without the need for a special ASIC. An existing Ethernet interface can be used for integration of PROFINET. This PROFINET stack can be ported to any real-time operating system.

› **PROFIsafe StarterKit**
Fail-safe field devices can be implemented with the PROFIsafe StarterKit. Sample implementations are available for the PROFIsafe stack for easy connection to ERTEC platforms.

PROFINET driver for IRT-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 RT for cycle times above 1 ms, as per the standard Ethernet interface.
Alternatively, PROFINET IRT can also be used for cycle times above 500 µs in combination with the CP 1625 controller development kit.

Stay up to date
When you choose a development package from Siemens you will always stay up to date on the latest developments. You will receive all updates available for your development package free of charge.

Benefit from the reliability of certified field devices
A significant portion of PROFIBUS and PROFINET certifications come from the accredited test labs ComDeC in Germany, PIC in the USA, PIC in China, and an Testlabs in the Czech Republic. The certification ensures that devices in the field always conform to the demands of industrial environments. Device manufacturers are thus assured that their PROFINET devices installed worldwide do not require expensive service calls.

Service and Support – Our experience saves you time and money
With Siemens you receive the support you want:
- Individual consulting before purchasing a development package
- Free support by phone or e-mail during development
- Free evaluation kit training
- On-site support by arrangement
- Support for certification

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www.siemens.com/ertec

Easily connect to PROFINET

optimize! softing

Well connected with Softing's industry proven products and services

Softing has been developing digital communication solutions for automation technology for more than 30 years. We have played an important role in the specification of PROFIBUS, were actively involved in the development and implementation of PROFINET from the very beginning, and are engaged in current developments in the fields of OPC, TSN and APL.
Softing customers around the world rely on solutions in the following areas:

- ***Gateways for integration of PROFIBUS devices in PROFINET***
- ***Gateways for connecting PROFINET devices and systems to EtherNet/IP***
- ***Permanent monitoring and diagnostics of PROFINET networks and devices***
- ***Protocol software and IP cores for FPGAs for integration into customer products***

Connect and integrate with gateways

The **pnGate PB** connects PROFIBUS PA and DP devices with PROFINET controllers. Devices with up to four PROFIBUS PA segments can be controlled directly via PROFINET without a DP / PA coupler.
In addition, pnGate PB enables Asset Management Systems access to the connected field devices.

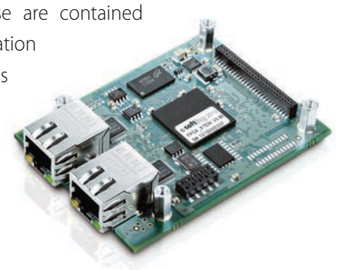
Devices and plant components that use PROFINET for communication can easily connect through **epGate PN** with EtherNet/IP controllers. Simultaneous with the projection of PROFINET controllers in the epGate PN, an import file is generated automatically for the EtherNet/IP controllers. The PROFINET process data and the automatically provided current-state information by the gateway are then instantly available in the control program.

Ensure plant productivity with network monitoring

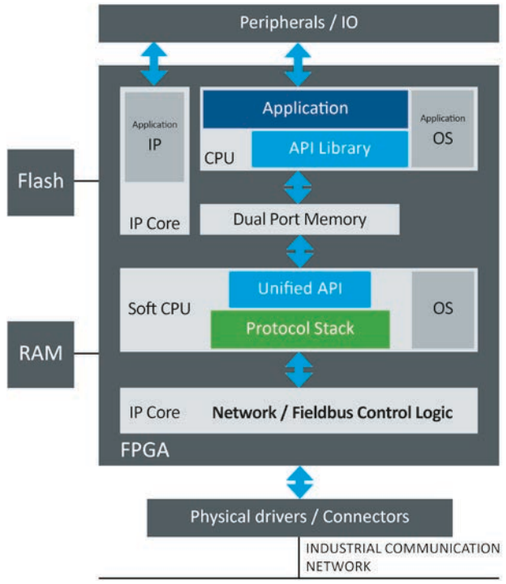
The **TH LINK** network interfaces, in combination with the monitoring software **TH SCOPE**, analyze the network status and provide the basis for reacting to identified errors. Device information, diagnostic messages, error statistics and network utilization of all PROFINET networks in your system can be recorded and evaluated at any time. This enables the preparation of a predictive maintenance plan and an automatic alarm for acute problems.

Integrate a PROFINET connection into your device

Softing has packed all of its PROFINET know-how into an easy-to-integrate component for FPGAs. This will enable you to integrate PROFINET into your product in the blink of an eye. All components required for this purpose are contained in a complete communication subsystem, which contains both a PROFINET switch and the ready-to-use protocol software on an encapsulated softcore processor.



For your device application, a simple and universal software interface largely reduces your tasks for setting up a PROFINET communication. You can therefore completely focus on your application know-how.



The pre-certified communications subsystem takes advantage of the flexibility of FPGA technology: This includes saving resources, as you can easily disable unneeded features. You can place proprietary intellectual property and software inside the same building block.
Due to the fact that the logic properties of an FPGA are loaded at the start, any future changes and extensions can easily be implemented at any time. This allows different Industrial Ethernet protocols and also PROFIBUS to be realized on the same hardware. Softing also supports this on application level through the protocol-independent software interface (API).

Customer focused services for integration projects

Softing can support you with accelerating the completion of your integration project. Our approach considers your specific needs and would be based on the following services:

- Technology Training: Here we provide basic knowledge about PROFINET.
- Evaluation System: In conjunction with standard FPGA development kits you familiarize yourself with our communications subsystem. Software, IP Cores and design samples are available for free download from our website.
- Implementation Workshop: Together with our experts, you discuss your project and define the implementation process and the relevant properties.
- Support: Our experts will assist you if questions arise during your project.
- Pre-Certification: Before sending your device to the certification lab, we will review it with the official test software and assist you in evaluating and resolving any errors.
- Production: We are also happy to produce the corresponding component.

Advantages of the FPGA-based PROFINET Subsystem	
FPGA	› Independent of special ASICs › Can be reloaded
Flexible	› Not constrained to a specific FPGA family and size
Integrated Switch with Firewall	› Compact hardware › Reduce load of the application
Hardware Support	› Conformance Class B and C › Media redundancy MRP or MRPD › DMA for cyclic data › Cyclic times down to 250 µs
Integrated Protocol Software	› No porting required › Easy update

Other Industrial Ethernet protocols and PROFIBUS are possible on the same hardware

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Lateral Thinking. Coaching. Implementing.

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Technologie und Engineering

We master technology.
The technical experts at TMG have many years of development experience and ensure that new technologies are effectively and efficiently used. And implement these for you.

What we can do

For more than 30 years TMG Technologie und Engineering has very successfully supported national and international companies in the conception, specification, implementation and certification of development procedures in industrial communication technology. We master the following technology: PROFINET, PROFIBUS, IO-Link, as well as TCI, FDT and EDD, further field bus and industrial Ethernet systems.

Our technology products

We have developed our own technology components, which we make available to our customers. We offer communication stacks for PROFINET IO (Device), EtherNet/IP (Adapter), PROFIBUS (Master/Slave), and IO-Link (Master/Device). We work with the leading semiconductor manufacturers to provide reference implementations and starter kits based on our software.

Time to Technology™ / Time to Market

We will help you to find the right time for your company to introduce new technology and ensure the right time for the market introduction. We will also support you with the integration of your field device into engineering software or process control systems.

PROFINET

TMG TE has long standing experience in PROFINET technology. We realize protocol stack solutions and integrate PROFINET technology into devices of our customers. We are open and independent in the way of realization and help you to fi nd the best solution for your project plan as well considering the commercial aspects. We can support you sustainable from a simple In Design of a communication module to the point of a complex technology development.

In the process, we support you in all phases, starting with the preparation of your projects in Marketing and Product Management and continuing with the specification, basic technology selection, and development phases, all the way to certification and market introduction.

We offer a PROFINET Device Stack that can be integrated in a wide range of platforms. We always support at least Conformance Class B. On the Sitara platform from Texas Instruments, we also support Conformance Class C (IRT). For Renesas RZ/N and Texas Instruments Sitara we offer ready-made platform packages that ensure a fast, simple and successful adoption of the technology. The stack is also compact enough to be used on single chip microcontrollers. On the aforementioned platforms or in combination with our IO-Link technology, we also offer solutions with other industrial communication protocols, including Industry 4.0 and IOT.

We can look back on a long and successful history in process automation with PROFIBUS PA. It is for this reason that we again occupy this field with PROFINET. As a result, we are today already able to offer system redundancy and dynamic reconfiguration and are working on solutions with Profile 4.0.

TCI Device integration with justifiable effort

The demand for more fl exibility in production and more diagnosis and functions for preventative maintenance can result in even simple actuators and sensors having communicative abilities. A very good example here is the development of IO-Link. These devices need a user interface which is comfortable and easy to operate.

We also support you when integrating your PROFINET devices into engineering software through creation of the GSD and device descriptions such as EDD (e.g., for SIMATIC PDM), or we develop device tools based on FDT/DTM or your proprietary interfaces as a stand-alone solution or TCI. The Tool Calling Interface (TCI) is a simple software interface that enables you to start device tools directly from the engineering system (e.g., STEP 7).

Apart from directly linked device tools, technology such as EDDL and FDT can be used via the corresponding adaption software. TMG Technologie und Engineering began very early with the implementation of device tools on the basis of TCI. Our IO-Link device tool is therefore our reference implementation.
As well for PROFINET TCI offers an easy way to integrate existing device tools better or to develop new device tools with man ageable costs.

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Notes

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