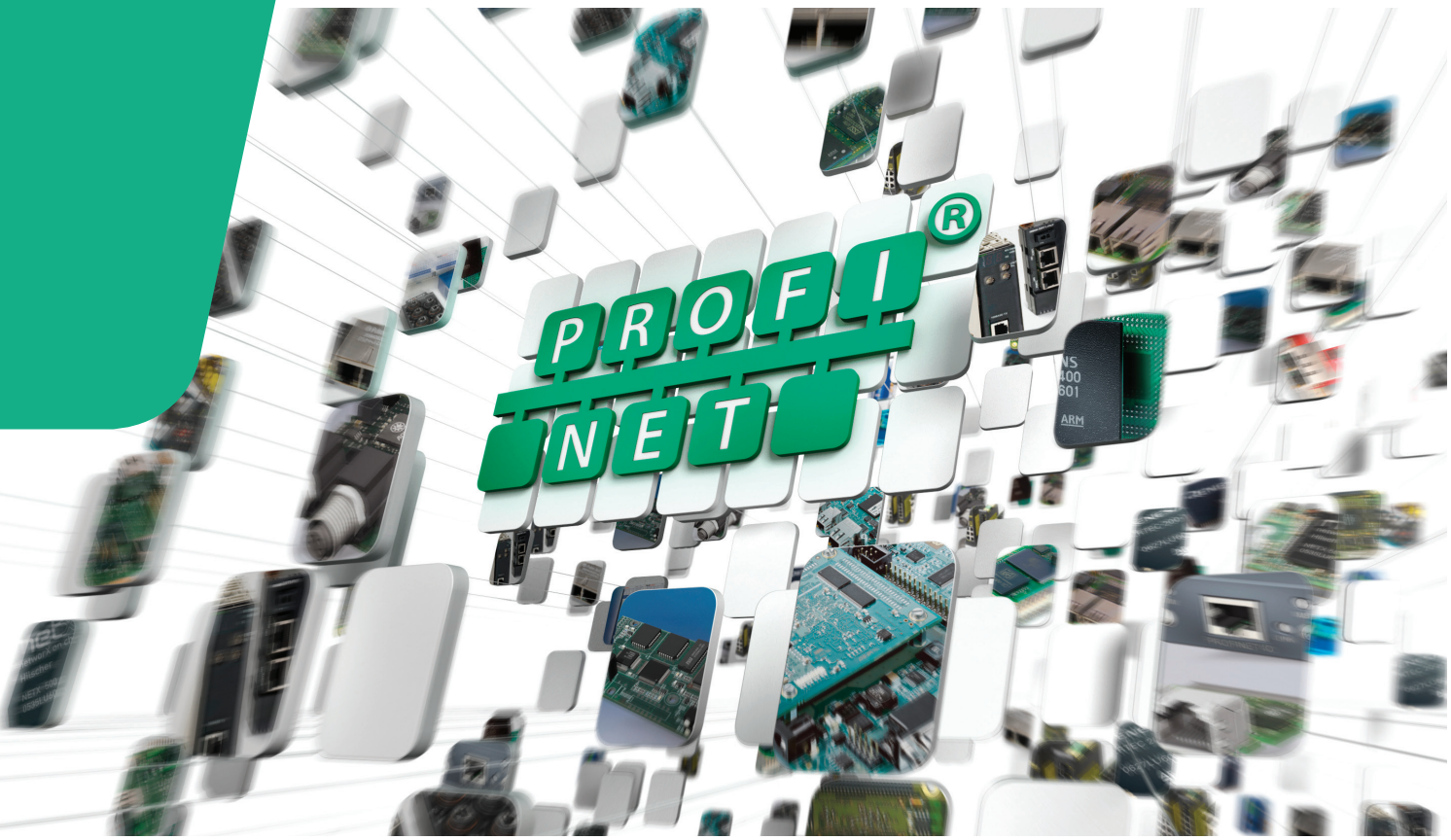


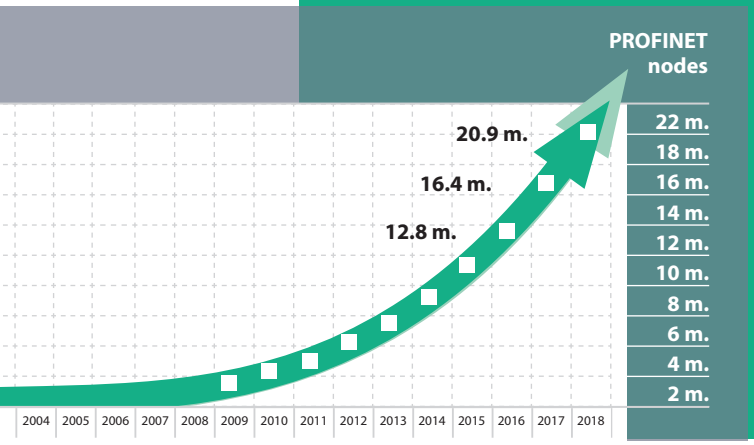
PROFINET Technology

The Easy Way to PROFINET—North America Edition

PROFIBUS • PROFINET
NORTH AMERICA

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.
- by extending functions for security, semantics and other requirements for Industry 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.

Michael Bowne
Deputy Chairman of PROFIBUS and PROFINET International (PI)
and Executive Director, PI North America

PROFIBUS & PROFINET International (PI) is backed by more than 1,400 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 Industry 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. Our technology providers and competence centers enable us to offer comprehensive support, ranging from consulting services and hardware and firmware integration to certification. The comprehensive availability of development support and for ready-to-use PROFINET basic technology makes it very easy for all companies to implement PROFINET quickly and cost-effectively.

Our Community

PI and PI North America promote the widespread use and further development of PROFIBUS and PROFINET technologies. Together they provide worldwide support.

With 25 Regional PI Associations (RPAs) in every international market and over 1,400 international member companies, PI is the largest community for industrial communications. It covers every key market of industrial automation: production automation, process automation, motion control, and safety applications. PI North America supports the community locally in all aspects with competence centers, training centers, and testing centers.

An overview of the product diversity and the strong position in the market can be found in the PI Product Finder. This catalog will soon include 4,000 registered products (**www.profibus.com/productfinder**).

We support you during product development with specifications and technical support. With us, you will be up-to-date on the technology, have shorter development cycles and time to market. Finally, your innovations will be 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:

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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 North America 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

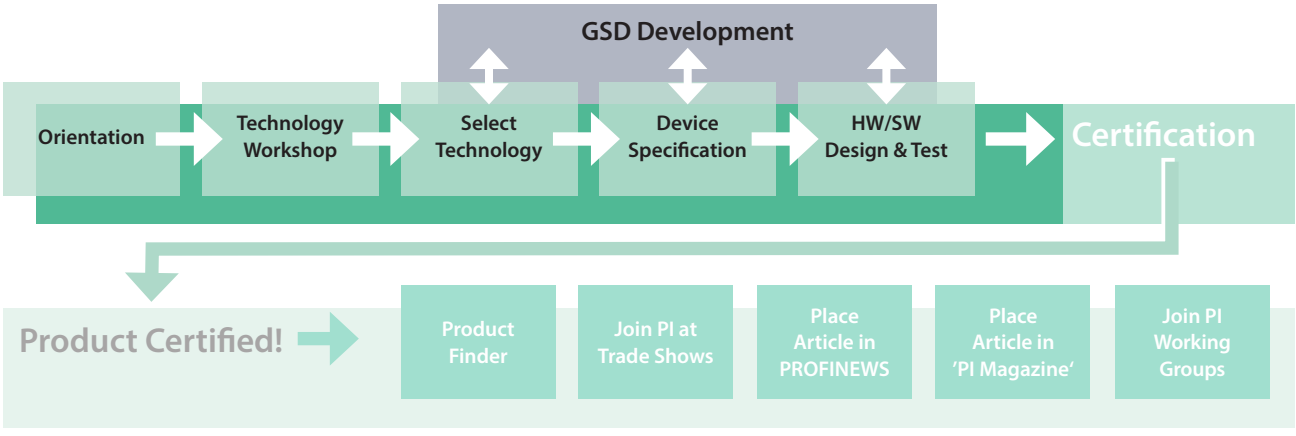
Some training courses award participants a certificate.

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 North America 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 large roles. Whether a pure PROFINET interface, or a universal interface that is also suitable for communication via PROFIBUS, is to be implemented, 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 pages 15-33).

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 North America 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.

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.

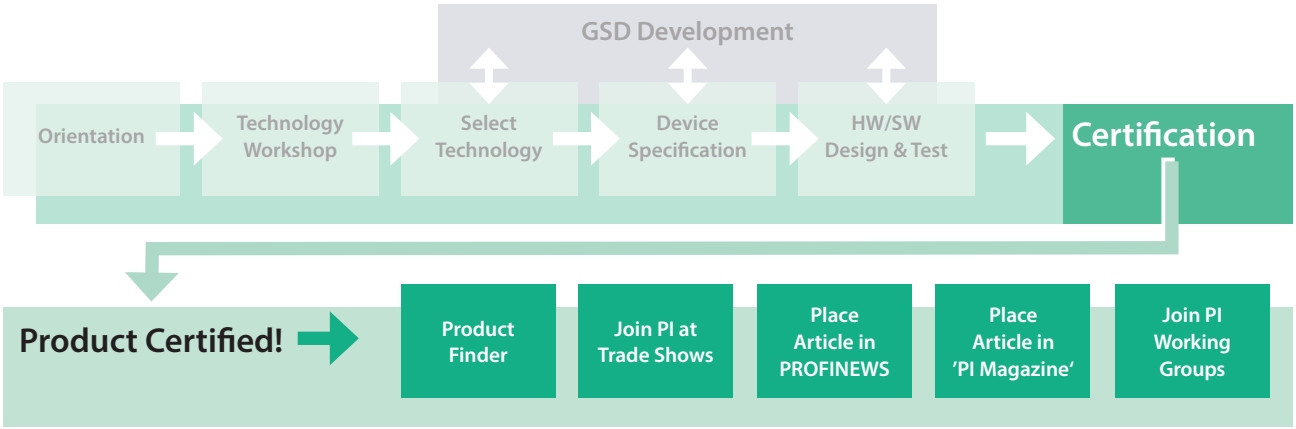
Even though every PROFINET device must be certified, the effort required for successful certification varies depending on the technology used. When pre-certified technologies are used, you do not have to be familiar with all details of the PROFINET standard. This significantly reduces the risk that problems 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 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.


Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Muster AG
Muster Str. 25, 12345 Musterstadt, Germany

the Certificate No: Z10101 for the PROFINET IO Device:

Model Name: Musterdevice
Revision: 1.0; SWFW: 1.0 HW: 1.0
GSD: GSDML-V2.2-Muster-20120611 / Version 1.0, Date June 2012
Identnumber: 0x0101/0x0101
DAP: DAP 1

This certificate confirms that the product has successfully passed the certification tests with the following PROFINET scope:

Hardware: Fiber Optic
Conformance Class B: RT_CLASS_1, RT_CLASS_2, RTA, LLDP, SNMP, MIB-II, LLDP-MIB

Test Report Number: PN012-3
Authorized Test Laboratory: Testlab AG, Musterstadt, Germany

The tests were executed in accordance with the following documents:
"Test Specifications for PROFINET IO devices, Version 2.2 from Jan 2008".
"Test Cases for PN-Tester for PROFINET IO devices, Version 2.2.2.14.10".

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".

For all products that are placed in circulation by May 19, 2014 the certificate is valid for life.

(Officer in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

President

(1. Vicepres.)

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**

PI CERTIFIED
PROFIBUS • PROFINET

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 North America 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 office of PI North America is 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

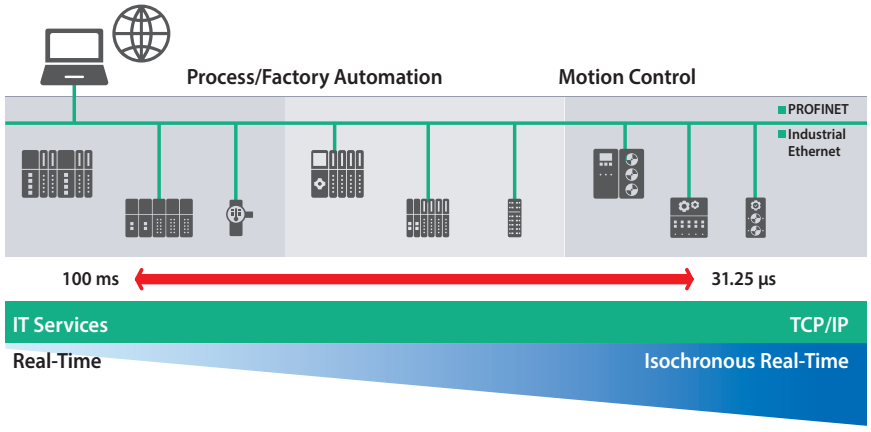
IEEE 802.3 ensures problem-free communication between PROFINET automation devices and among PROFINET automation devices and other standard Ethernet devices. For applications with very stringent real-time requirements, PROFINET offers mechanisms that enable both standard and real-time communication to 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**

PROFINET Device Interface | Development Method

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

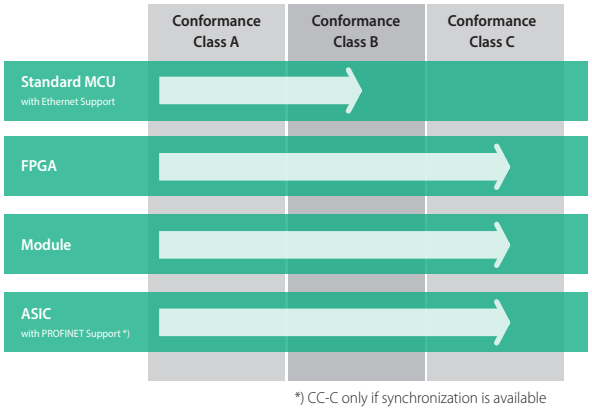
› Design › Degree of protection › Connection method › Application
› Integrated multi-port switch › Real-time properties

Implementation Options for the PROFINET Device Interface

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 at right 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.

The table shows the minimum options.

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

Conformance Class A and B provide the possibility of implementing a single-port interface. However, the economic viability of the solution should be taken into consideration.

Various basic technology components (hardware/software) are available for each of the implementation methods shown in the table. Components offered by PI North America member companies for this purpose are described in ample detail starting on page 15 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	+++	+	+++
Communication module	++	++	++
External couplers	+	+++	+

+ Lower | ++ Medium | +++ Higher

Future-Proof

Industry 4.0 **Strategy**

The aim of Industry 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) **Implementation**

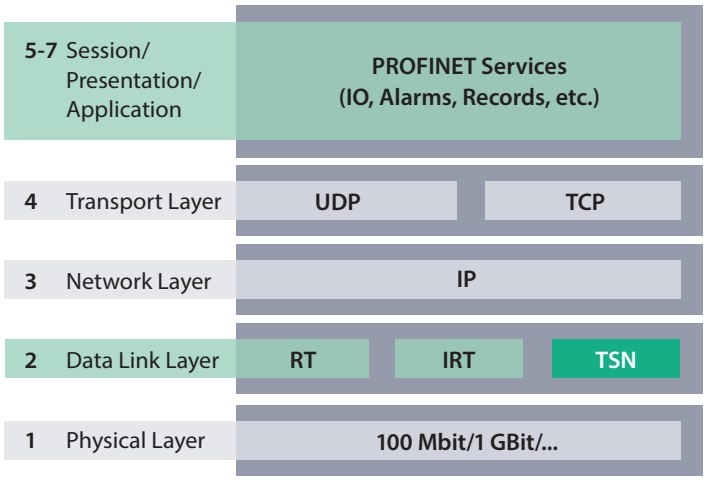
➨ **TSN and PROFINET**

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

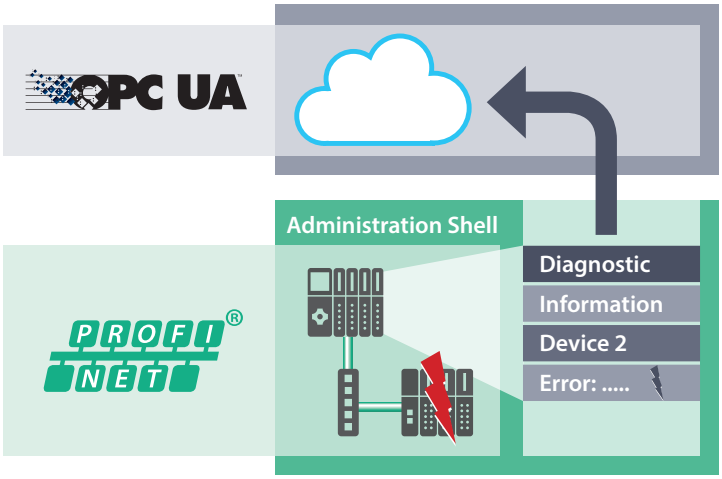
OPC UA and PROFINET

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

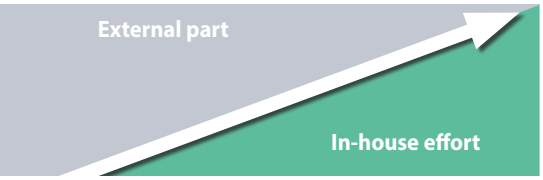
Furthermore, PI is leveraging its profiles in a joint working group with the OPC Foundation with the aim of creating open information models. These can easily be made available to IT systems via OPC UA.

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 Industry 4.0 and our PROFINET approach on this site:

- **www.us.profinet.com/industryfoursight**

In-House Development or Development Partnership



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.

PI North America member companies offer a wide range of services during the development phase. For details, see pages 15-33.

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

+ Lower | ++ Medium | +++ Higher

The Easiest Way to Connect Devices into PROFINET Control Architecture

The DeviceMaster UP Provides PROFINET IO Connectivity to Serial and Ethernet TCP/IP Devices

Comtrol has been supporting PROFINET for many years, and was among the first connectivity companies supporting this technology. Comtrol devices are used in a wide variety of industries including food and beverage, oil and gas, power distribution and factory automation with applications including automotive sub-assembly processes, machine building, fastening processes and auto-identification.

The DeviceMaster PNIO Provides PROFINET IO Connectivity to Serial and Ethernet TCP/IP Devices

DeviceMaster PNIO provides connectivity to both serial and Ethernet TCP/IP raw/ASCII devices and provides detailed diagnostic capabilities not found in other gateways. Whether you need to connect your PROFINET IO PLC to a barcode scanner, weigh scale, vision system, RFID reader or RS-422 and RS-485 smart loops, serially or from TCP/IP, the DeviceMaster PNIO will provide the solution.

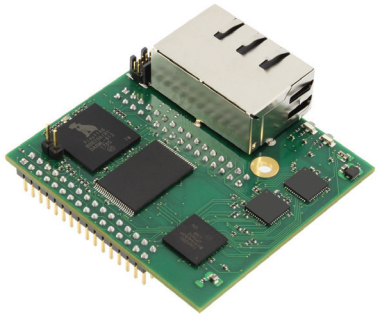
- Multiple port and connector
- DB9 connectors or terminal screws
- Integrated 2-port switch
- DIN-rail
- Support for TCP/IP devices and serial devices
- Cyclic and acyclic communications
- Class A and Class B certifications
- Diagnostic alarms
- Web based diagnostics
- Step 7 trouble shooting tools
- Extended temperature rating
- 5 year warranty
- Live U.S. based support

Comtrol Corporation
100 Fifth Avenue NW
New Brighton, MN 55112 | USA
Phone: (763) 957-6000 | Fax: (763) 957-6001
E-Mail: **sales@comtrol.com**

Robust and Reliable PROFINET Network Interface

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 upgrades of the RapID platform to support TSN and PROFINET@TSN are under development.

To find out more, go to:

- **http://www.analog.com/en/products/fido5100.html**
- **http://www.analog.com/en/products/rapid-v2x07.html#product-overview**

Analog Devices Inc.
5635 Jefferson St. NE, Suite A
Albuquerque, NM 87109 | USA
Phone: (505) 883-5263 | Fax: (505) 883-5477

Communications Solutions Pave the Way to a Flexible and Secure Industry 4.0

Hilscher's Scalable and Future-Proof Products Are Your Path to PROFINET and IIoT

Hilscher Solutions: From Multiprotocol Chips to Industry 4.0

- ***netX "system-on-a-chip" multi-protocol network controller***
- ***netIOT Interfaces and netIOT Edge Gateways to add Industry 4.0 functionality***
- ***Coupler, Gateway and Proxy protocol converters***
- ***PC cards for direct connection to networks and controllers***
- ***Embedded solutions for fast integration of network protocols***
- ***Custom PROFINET solutions tailor-made for your devices***
- ***Simple analysis of real-time Ethernet networks***

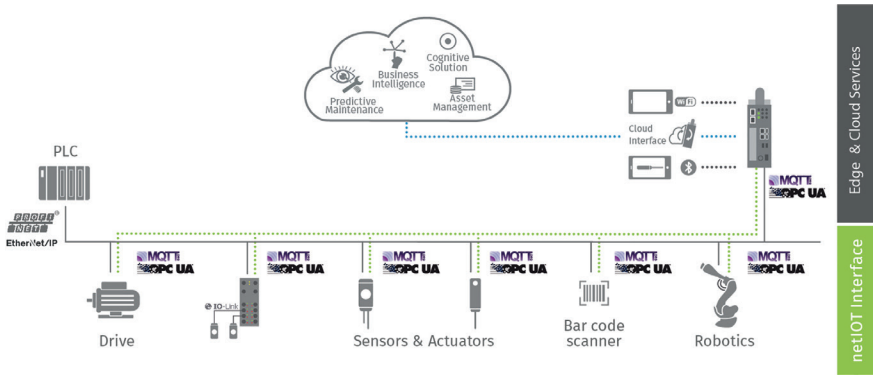
Hilscher is a global manufacturer of network connectivity solutions for device makers, OEMs and end-users. At the heart of every Hilscher product is our own netX "system-on-a-chip" network controller, which allows for universal Master and/or Slave connection to all popular industrial communications, including fieldbuses, real-time Ethernets and IIoT protocols.

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

The netX 90, a groundbreaking addition to Hilscher's netX family of multiprotocol SoC's, is the latest and most advanced connectivity chip yet for Slave devices. It comes in a 10mm x 10mm package with a dissipation below 1 watt.

The chip addresses the fact that a large proportion of installed Slave devices will have to be replaced or updated if cyber risk threats are to be adequately countered for IT and cloud-based applications. 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.

In addition to PROFINET I/O device and other Industrial Ethernet and fieldbus protocols, netX90 supports IIoT data communications via OPC UA and MQTT, and offers a comprehensive set of peripherals like EnDat, BiSS and IO-Link.



netIOT Solutions: PROFINET and OPC UA for Industry 4.0

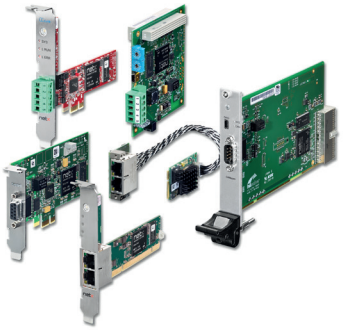
To capitalize on the benefits of Industry 4.0 and IIoT, Hilscher has developed the netIOT family of products: netIOT Interfaces for IoT-enabling automation devices and netIOT Edge Gateways for aggregating and processing IIoT data over factory networks.

netIOT Interface is a scalable solution for embedded designs and supports PROFINET, OPC UA and MQTT in compact platforms. Options include the multiprotocol chip netX, 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 for multiple channels of communication: 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 via cloud applications or on-premises. An OEM version of the Edge Gateway allows customization for applications such as predictive maintenance of machines and devices.

Coupler and Gateways: PROFINET Connectivity to other networks

Hilscher's gateway and proxy products are self-contained protocol converters with simple plug-in connections and Master and/or Slave configurations. netTAP gateways bridge fieldbus to fieldbus, fieldbus to industrial Ethernet, such as PROFIBUS to PROFINET, and industrial Ethernet to industrial Ethernet. As coupler, netTAP connects a PROFINET network with a CC-Link IE network via a Slave-to-Slave protocol conversion.



PC-Cards: PROFINET Connectivity and PC-based Controls

Hilscher cifX PC Cards come in all popular PC card formats for direct connection to any industrial network or controller. Besides PROFINET I/O IRT as device and controller, cifX cards support all popular Industrial Ethernet systems and fieldbuses as Master or Slave. Formats include: 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 and RTX are available.

Embedded Solutions: Easy PROFINET Integration in Field Devices

With Hilscher's embedded solutions field devices can easily be equipped with a multi-network interface. Besides PROFINET I/O device and controller for highest conformance- and netload-classes, all leading Industrial Ethernet systems and Fieldbuses are supported as Master or Slave.

The embedded products include the netRAPID netX chip-carrier to jump-start your design projects with easy network integration in days, rather than months. The netIC, comX and netJACK option modules allow you to quickly add or change network protocols in a device.

Process data is exchanged via a Dual-Port-Memory, which is accessed by either an 8-/16-bit bus interface, a 50 MHz SPI interface or PCI Express.

Custom PROFINET Solutions: Tailor-made for Your Device

Hilscher offers extensive engineering services to develop custom solutions tailored to your exact specifications. All developments are based on proven netX technology with its comprehensive set of development tools. Contact Hilscher for more information on how we can support your devices and applications.

Diagnostic: Ethernet analysis made easy

netANALYZER is Hilscher's tool for simple analysis of real-time Ethernet networks. It consists of a capture-hardware for recording telegrams on the network plus a graphical user software with extensive analysis functions. Important key data such as station lists, alarms, process values, network load and telegram jitter are measured without affecting the network.

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Lisle, IL 60532 | USA
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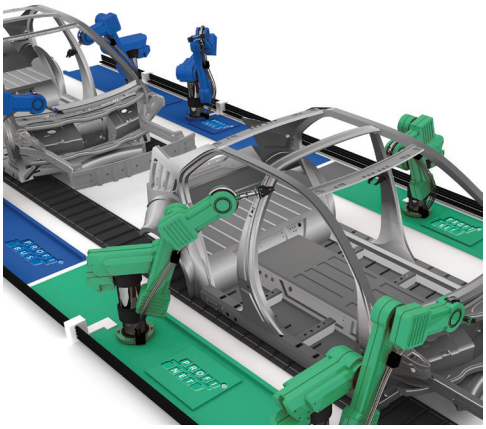
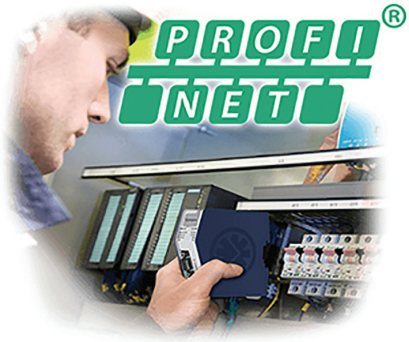
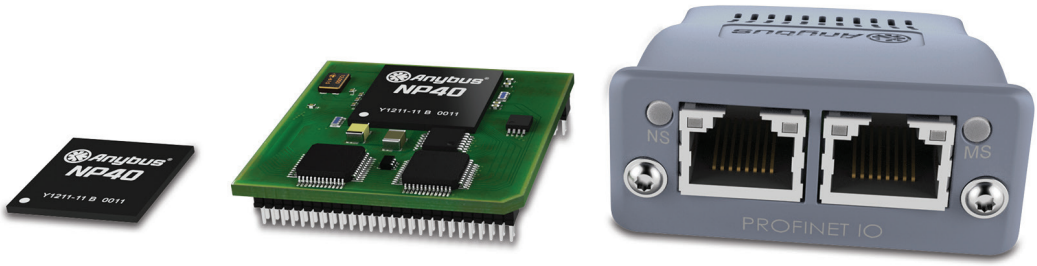
HMS Industrial Networks—Connecting Devices™

HMS is the leading independent supplier of products for industrial communication, with the product brands Anybus,® IXXAT® and eWON.® HMS products make it possible for industrial machines and devices (hardware) to connect with control systems and Internet (software). Our motto, Connecting Devices,™ provides the foundation for realizing the full benefits of Industrial Internet of Things. If you want to connect "Things" to the Internet, you need solutions that enable communication between the hardware and software. This is precisely what HMS offers.

The HMS Networks Market Share 2018 report displays that PROFINET has taken 12% of the industrial communication market due to multiple factors. Firstly, PROFINET is built on Ethernet allowing it to support a high node count, faster data rates and larger data packets. It also has the flexibility to be used over a variety of media such as wired coppers, fiber optic cables, and on standard 802.11 wireless connections. This does not require any proprietary wireless adapters, enabling you to mix and match suppliers. Commissioning a PROFINET device is easy due to plug and play nature of the network. PROFINET devices use auto-negotiation to query and determine the speed and duplex mode of the network. Currently, these parameters are 100Mbps full-duplex.







PROFINET devices can also contain one or two Ethernet ports. Devices with dual Ethernet ports have a built-in switch that allows you to daisy-chain other PROFINET devices on the same line. This line topology is like the standard bus topology found in PROFIBUS and can reduce wiring costs compared to a typical star topology. With the combination of the topology discovery feature and other IT features, you can map out your network and have a visual representation of your network topology. This feature allows much quicker diagnostics and can be used to visualize incidents such as wire breaks and loss of communications. Furthermore, this topology does not require the use of additional switches, reducing overall costs. Through Anybus® CompactCom,™ you can give your industrial device PROFINET network capability with various physical form factors. Available in Chip, Brick or Module form factors, our cutting edge CompactCom 40 series is based on our award-winning Anybus NP40 network processor. It is ideal for both general purpose and for high-end PROFINET-IRT applications with fast network cycles and synchronization demands. Overall, implementing PROFINET is a great way to ensure your device's continued success and HMS Industrial Networks is with you every step of the way. Thanks to the help and support of PI (PROFIBUS and PROFINET International), we predict that PROFINET will continue to meet the needs of the automation marketplace and we are creating solutions to help device manufacturers to stay connected.

Learn more about PROFINET Technologies:

› **https://www.anybus.com/technologies/industrial-ethernet/profinet**

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E-Mail: **info@hms-networks.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.

Company Background

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.

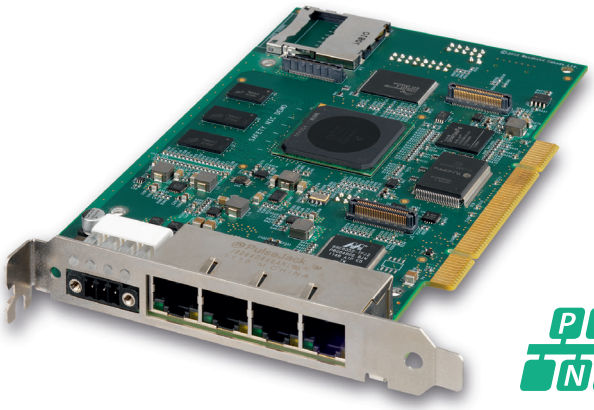
Aiming to advance global Industry 4.0 initiatives, Molex Industrial Automation Solutions add communication and networking to the production process and support the drive toward smarter machines and factories.

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, and complete the infrastructure offering for both in-cabinet and on- machine applications.

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.

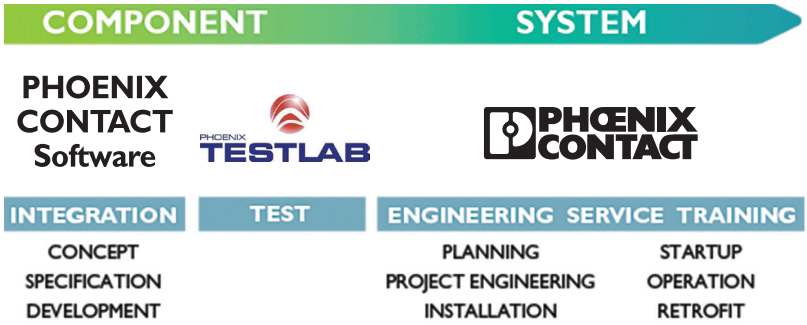
Molex IAS4.0 is a platform-independent industrial communication solution with the support of the different industrial Ethernet protocols, OPC UA or soon PROFINET over TSN, that enables data exchange between products at all layers for seamless sensor to cloud connectivity.

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.

Molex
2222 Wellington Court
Lisle, IL 60532 | USA
Phone: (800) 78-MOLEX

Software, Hardware and Engineering Expertise

Phoenix Contact is a developer of PROFINET technology and a producer of PROFINET components using this technology. In addition, the accredited Phoenix Contact Competence Center (PCCC), together with PHOENIX CONTACT Software and Phoenix Testlab, offers comprehensive services for all aspects of PROFINET.



The Phoenix Contact Competence Center: a complete range of services over the entire lifecycle from the single component up to the whole system.

For continuous propagation of PROFINET and support for PROFINET users, Phoenix Contact has combined their efforts as a solution provider for automation technology with those of the independent testing and certification institute Phoenix Testlab. Phoenix Contact is an accredited PROFINET IO Competence Center (PICC) with the PROFIBUS user organization (PUO) which includes the profiles of PROFIsafe and PROFIdrive.

Phoenix Contact offers a complete product and service portfolio during the entire life cycle of a device or system—from the specification, technology integration, and certifications of I/O devices including planning, start-up, and retrofit of complex production systems. In addition, comprehensive training programs are offered.

Specifications and Development

Phoenix Contact's PROFINET group supports device manufacturers and solution providers with special products and services during the development phase. High-performance and reliable components are offered for the development of PROFINET IO controllers and devices. Phoenix Contact supports the integration and porting for special requirements in close consultation with our customers.

The PROFINET IO Controller Stack provides convenient context management for the communication connection, Application Relations (AR), as well as comprehensive diagnostics. Extending to a PROFINET IO device component allows quick and direct communication of several PROFINET IO controllers with each other. Typical applications for this are redundant or hierarchically organized automation networks. In order to realize a PROFINET device interface, it is also possible to use only the PROFINET device component without PROFINET controller functionality.

The PROFINET IO device chip TPS-1 reduces the time and resources to an absolute minimum and enables device manufacturers a fast, simple and cost-effective integration of a PROFINET IO Device interface—as a single chip solution for the price of a Fieldbus interface. The TPS-1 supports conformance class C and can therefore be used with all PROFINET IO device performance classes.

Concept for a production system: The professionals at the Phoenix Contact Competence Center fully support their customers—starting with qualification measures and continuing with configuration to startup and maintenance of the system.

Phoenix Contact will support all project phases during the integration of a PROFINET interface in the form of:

- Concept development
- Technology integration on a wide range of platforms
- Support and Maintenance
- Updates and Upgrades

Testing and Certification

As a PUO accredited test lab for PROFINET IO devices, the Phoenix Testlab GmbH in Blomberg, Germany provides device manufacturers with a flexible range of services in all areas required for certification. At the start, all product requirements are validated according to PROFINET standards which reduces "Time-to-Market".

In order to meet the high quality standards set by our customers, specially developed controller simulation software is introduced as a test system.

The PROFINET IO test, based on IEC 61158 certification, can be carried out during the development phase or as final test.

To ensure the interoperability of certified devices, a multi-vendor wall with different controllers and engineering systems is set up as a test assembly. All specified test cases will be carried out by professional engineers.

Planning, Operation and Maintenance of Systems

The services offered by Phoenix Contact Electronics in Bad Pyrmont, Germany are focused on the application of PROFINET products: from planning and configuration during installation, startup and operation, to system modernization.

Protocol testing in the laboratory—the relevant standards form the basis for PROFINET certification tests.

Product Links:

- **www.phoenixcontact.com/software**
- **www.phoenix-testlab.com**
- **www.phoenixcontact.com**

Phoenix Contact Software
500 Avis Drive
Ann Arbor, MI 48108 | USA
Phone: (734) 205-5132 | Fax: (717) 702-4036

Phoenix Testlab
Königswinkel 10
32825 Blomberg | Germany
Phone: +49 5235-9500 82 | Fax: +49 5235-9500 10

Precision Systems, Inc.

PROFINET Integration & Environment Simulation

In business since 1979, Precision Systems, Inc. (PSI) has designed and developed numerous embedded, real-time, and PC-based mission- and safety-critical industrial systems that cannot fail. PSI has extensive experience developing PROFINET-related solutions including integrations, as well as PSI's latest product, SIMPLE PN.

Why PSI?

We are committed to helping our clients by increasing their market share through the integration of various protocols, most notably, PROFINET. As the industry continues to adopt PROFINET and roll out more redundant & reliable products, clients recognize the importance of such integration.

Embedded device development is difficult and expensive. Integrating PROFINET in this mix can seem daunting as it is a powerful protocol with numerous applications requiring a high level of understanding. As a PROFINET Subject Matter Expert (SME), PSI is here to help on both the device and controller side. Our extensive knowledge of embedded and real-time systems, as well as redundancy and process control, will be transferred to your project, ensuring a worry-free PROFINET integration.

500+ Projects

Founded 1979

100+ Clients

US-Based

Product Design & Development

As a device manufacturer, you know your customer's needs and how to create hardware platforms that satisfy the market. We are intimately familiar with the firmware requirements, design and implementation that brings your control systems, gateways, and I/O devices to life. Working closely with your team, let us help you bring your product to market, built right the first time.

Project Consulting

Our consulting process begins with a comprehensive assessment of your company's and clients' specific needs as well as an evaluation of areas for improvement within your current application. Our goal is to build your project better, faster and more affordably without compromising functionality.

Project Rescue

The occasional technically-strained project can seem insurmountable as challenges of scope, budget, and schedule arise. The source of these issues can trace all the way back to the requirements, or within the overall code design. We have helped numerous great companies get back on track to meet project deliverables as our experience is largely focused on beginning, executing, and completing such projects. If your project needs assistance, we are here to help.

Stack Integration

Have you recently purchased a software stack or are currently looking for one? PSI can help evaluate the right stack for you. Once your stack is selected, PSI can integrate any stack with your existing firmware or with firmware currently in development to add PROFINET functionality to your product.

Environment Simulation

In critical environments, users are unable to replicate situations without effecting the active control system, lack appropriate resources to train and onboard employees, and are unable to test in a consistent, predictable way. SIMPLE PN will seamlessly get you over these hurdles.

What is SIMPLE PN?

The short version: PROFINET Simulators

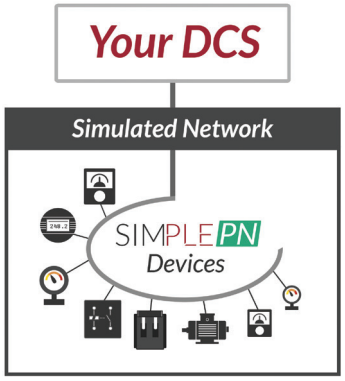
SIMPLE PN is a scriptable, scalable, coordinated, and flexible suite of simulators used to imitate PROFINET controllers and devices. They can be used by device manufacturers, system integrators, OEMs, and end users to create simulated environments for the development, testing, and integration of their devices and systems before, during, and after development.

How Will You Use SIMPLE PN?

OEM & System Integrators—Simulate the networks and connections on the machinery you design and build, prior to production to anticipate system loads and data flows.

Device Manufacturer—Reliably and repeatedly function and stress test new devices under development with near infinite variety and scale to ensure your devices will perform in any target market environment.

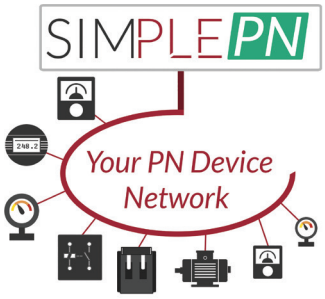
End Users—Simulate controllers and devices, digitally, to envision and mitigate risk on your next factory or line build.



SIMPLE PN device side

SIMPLE PN

- Easy-to-use graphical interface
- Import GSDML files or create configurations from scratch
- Scriptable test environment for consistent and repeatable tests
- S2/R2 redundancy and CiR/Dynamic Reconfiguration support
- Support for both cyclic & acyclic data
- Custom alarm USI and channel error support
- DCP live list generation and commands
- Support for multiple CRs for systems with large amounts of cyclic data
- Customizable gauges panel for graphical display of data
- Create and control multiple controllers or devices from a single application



SIMPLE PN controller side

Interested in learning more? Contact PSI for additional information and pricing.

Precision Systems, Inc.
1355 Business Center Drive, Suite C
Horsham, PA 19044 | USA
Phone: (215) 672-1860
E-Mail: **info@psi-software.com**

Rely on Real Time Automation to move your data from an automation device to PROFINET IO, or from your PROFINET devices to a variety of other networks, where, when and how you want it.

It's likely your business isn't industrial networking, and it shouldn't be. You make products, design systems, or manage processes. Whatever it is that you make, monitor or install, it inevitably creates data.

Who is Real Time Automation?

RTA is a small, US-based company, keenly focused on helping Control Engineers and Systems Integrators connect automation products to industrial and building networks. Working with 3-person shops all the way up to Fortune 50 companies, RTA solutions can be found in more than 45 countries.

Why Real Time Automation?

After 30 years in existence, we've learned the more things change, the more things stay the same. It boils down to creating systems that perform a simple function in an application. Why pay for a Swiss Army knife, when all you need is a butter knife? Many of our competitors create similar products with tons of various features, but it is time consuming learning what each part does. Sometimes, a simple butter knife gets the job done efficiently and pain free. RTA views its products as the "butter knives" of industrial automation. From software to gateways, we have a solution for you to make your job easier.

The RTA 460 series easily moves your PROFINET data to and from other devices.

What Makes RTA Different?

To be completely honest, you can be successful with any of the solutions in this brochure. Every one of these companies make great products, but we're unique in that:

- RTA is USA-based. We're located in the great state of Wisconsin, making our midwest location convenient for anyone in North America. You may even notice some of our fabulous midwestern accents over the phone!
- We're a small company of about 20 employees. You can count on your project receiving the utmost attention, more than it may receive elsewhere. Want to talk to the engineer who wrote the code? You got it. Speak to the same support person every time you call? Not a problem. RTA strives to provide the best experience possible and is here to help every step of the way.
- RTA gateways are in stock and ready to ship. Every box will bring a smile to your face and a sense of relief once you realize how easy our solutions are.

Curious About Our Solutions?

- Call us at 800-249-1612: you may notice our fabulous midwestern accents over the phone!
- Email us at solutions@rtautomation.com: this is not an 'automated reply' box-a live person will respond to you quickly.
- Visit our website at **www.rtautomation.com**: you'll find product information, videos, training, case studies, blogs, books and more.

From gateways to software, custom solutions and training,
Real Time Automation knows how to move your data.

Real Time Automation
N26W23315 Paul Road
Pewaukee, WI 53072 | USA
Phone: (800) 249-1612
E-Mail: **solutions@rtautomation.com**

Your Only Combined Certified Competence Center, Training Center, and Test Lab in North America

- *Do you need to connect your field devices to PROFINET quickly and easily?*
- *Do you want to gain a PROFINET competitive edge over your competitors?*
- *Siemens and the PROFI Interface Center can help you from choosing your PROFINET implementation to Certification Testing!*

The Right Advice Right from the Start

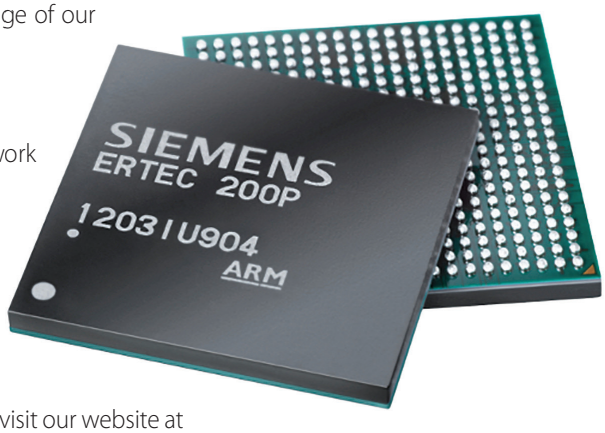
We can provide comprehensive information on PROFINET technology, implementation and certification. We also offer various trainings and classes for all PROFINET training needs.

Work with the PROFINET experts when it comes to:

- Understanding how PROFINET works, from features to GSDML files
- Choosing the best PROFINET implementation for your product
- Streamline your development and certification process

These PROFINET knowledge offerings are delivered by the PROFI Interface Center (PIC) in North America and by ComDeC (Communication, Development and Certification) in Europe. There are several ways to take advantage of our PROFINET offerings:

- Free webinars on demand
- Free one-day training classes
- Week-long PROFINET Certified Network Engineer classes
- 2-day PROFINET Fundamentals classes
- Developer training on demand
- Customized and on-site training available as well



For more details and training schedules visit our website at

- **www.profiinterfacecenter.com**

SIEMENS

The Easy Route to PROFINET implementation

With Siemens' PROFINET technology solutions you have everything you need to realize a PROFINET field device or PROFINET controller. All our development kits come with the PROFINET software stack and comprehensive documentation to ensure a quick start for your development. Whether you want to integrate a PROFINET RT interface on a standard Ethernet hardware or a PROFINET IRT interface on a dedicated ASIC, Siemens has what you need - free support included!

PROFINET Development Kits (DK's) from Siemens support a wide range of PROFINET implementation methods:

- **Software based:** Using our PROFINET RT software stack on a standard microcontroller with Ethernet interface allows PROFINET implementation on existing hardware platforms.
- **Hardware based:** The ERTEC 200P ASIC offers best in class performance for PROFINET device integration with cycle times down to 125us. Thanks to the on-board ARM9 CPU and an integrated PROFINET IRT switch, a PROFINET field device can be implemented even without an external host CPU. PROIFNET RT and IRT field devices with 2 ports can be realized with the ERTEC 200P chip (Development Kit available).
- **PC based:** Communication Cards like the CP1625 PCI Express card can be used to implement PROFINET Controller and/or Device functionality on Windows or Linux PC's (Development Kit available).

  The PROFINET driver software allows the integration of a PROFINET Controller interface on a standard PC-based or embedded system (Windows or Linux operating system). The PROFINET configuration can be made by using the license-free version of TIA Portal or the PROFINET-ConfigLib.

For the implementation of fail-safe field devices, a **PROFIsafe Starter Kit** is available, including the PROFIsafe driver software and an implementation example.

PROFIdrive Reference Implementation and application examples are available free-of-charge for a straight-forward integration of the **PROFIdrive profile** (AC1-AC4) in your field devices.

Benefit from a Smooth Certification Process

To ensure interoperability of PROFINET products, Certification Testing is mandatory before new devices can be introduced in the market. The PIC is the only PI accredited Test Laboratory in North America. Our 25 years of experience with communication integration and certification testing for field devices will be your advantage.

Your goal is our goal—the successful and efficient certification of your PROFINET product!

Service and Support: Our Experience Helps You to Save Both Time and Money

Siemens provides device manufacturers with the support they need:

- Knowledge transfer
- Development
- Certification
- Phone and email support

PROFI Interface Center
PROFINET & PROFIBUS

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Connect PROFIBUS to PROFINET
Get PROFINET Protocol Stacks for your OEM Products

Softing—Your Source for PROFINET and PROFIBUS Solutions

Softing has been designing digital data exchange solutions for industrial communications for over 30 years. Softing contributed substantially to the PROFIBUS specification and has actively participated in the development and implementation of PROFINET from the beginning. Customers around the globe trust Softing solutions in the following categories:

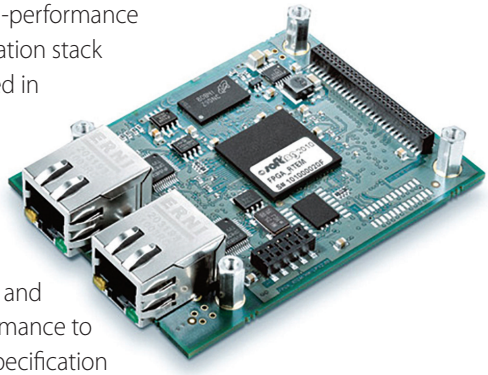
- ***Continuous monitoring of PROFINET network health and PROFINET device health***
- ***Gateways integrating PROFIBUS to PROFINET***
- ***Protocol stacks for FPGAs so you can embed PROFINET in OEM products***

Gateways integrate PROFIBUS to PROFINET

pnGate PA from Softing is part of a portfolio of connectivity solutions for PROFINET. Connect up to four PROFIBUS PA segments to your PROFINET network without a DP intermediate segment. pnGate PA will also connect your PROFIBUS segments into plant asset management systems such as Emerson's AMS Device Manager and other GSDML, FDT/DTM compliant tools.

Portable Protocol Software—Communication Software for Existing Hardware Platforms. Softing's portable and scalable protocol software stacks strictly conform to the latest PROFINET specification.

Customers with existing hardware platforms can integrate these stacks into their products. Softing has developed a sophisticated worksheet to assist software engineers in estimating the integration eff ort. On request, Softing will assist in evaluating the worksheet to provide further guidance on feasibility and implementation eff ort.



The portable, yet high-performance PROFINET communication stack has been implemented in compliance with the official Conformance Class B specification covering the functionality of a Controller, Supervisor, and a Field Device. Conformance to the official protocol specification is critical for a successful integration of any communication stack into a field device. Softing's device stack has been officially tested and has easily passed all conformance test cases. Softing's extensive experience in writing conformant protocol software stacks is accompanied by stringent quality control measures to ensure interoperability. This fact is often pivotal in tipping-the-scale when device vendors are deciding on a reliable supplier.

FPGA-based Communication Interface— A Flexible Solution for Field Devices

A FPGA (Field Programmable Gate Array) is a customizable solution to fit a multitude of requirements by loading appropriate hardware functions (also referred to as intellectual property [IP] cores). Softing has developed IP cores for PROFINET and other industrial protocols. The target platform for these IP cores is the Altera Cyclone FPGA family.

Softing offers the FPGA solution in two versions:

1. COTS communications module—This communications module is designed for easy integration into existing devices or for vendors that do not want to invest heavily in developing a new hardware platform.

On request, Softing will customize the form factor, hardware interface, etc. according to customer specific requirements.

2. Integration package—Softing offers a complete developers package that includes:

- Complete tool-chain for the Altera Cyclone FPGA family
- Evaluation board based on the Altera Cyclone III FPGA
- Communication IP cores for PROFINET and additional industrial Ethernet protocols
- IP Core—Implementation of an Ethernet switch
- IP Core—32-bit embedded-processor (NIOS II)
- Sample Code and documentation

PROFINET Controller

Softing's protocol software solution for PROFINET controllers is available for integration as well as on a COTS communication module based on FPGA technology. The offer is complemented with a configuration software package that is also available as a set of software libraries for integration into vendor specific PLC programming software packages.

Product and Service Summary

For more information please visit our web page at **industrial.softing.com/us** or contact us.

Product and Service	Description
uaGate PA	› Gateways integrating PROFIBUS to PROFINET
PROFINET protocol software for integration into existing hardware designs	› Portable, scalable, and pre-qualified stacks for device, controller, and supervisor functionalities
PROFINET integration into existing devices	› Customizable FPGA-based communication modules for use in existing devices
PROFINET controller functions	› Protocol stacks and communication modules with configuration software as stand-alone application of as set of libraries for integration into existing PLC programming software packages

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Notes

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