Integration of PROFINET interface in devices
PROFINET Technology

... for device manufactures

- Support in all phases of the development
- Different implementation possibilities
- Quality by certification

... for operators

- Training
- Support
- Worldwide

easy to implement
Support in all phases of the development

... the view of the device manufacturer

1. Consultation
2. Development environment
3. HW/SW design
4. GSD file

Use in plant

Device + GSD

Certification test

PNO issues certificate
Implementation

**FPGA**

- Application SW
- Operating system (e.g. eCos)
- PN stack
- TCP/IP
- IO-Data (RT/IRT)
- FPGA – Hardware

**Standard Microcontroller**

- Microcontroller with "Ethernet on Chip"
- RAM
- FLASH

**Modules and Boards**

- Driver SW from module manufacturer

**ASIC and Development Kits**

- Easy setup
- Firmware design
- Hardware design
Properties of the different implementation

**FPGA**
- Flexible setup of functionality
- CPU integration
- Ethernet hardware switch
- Easy updates during development phase

**Standard Microcontroller**
- Cost effective
- MII and/or PHY on Chip
- No integrated hardware switch
- Software switch solution possible
- Only one Ethernet port on Chip

**Modules and Boards**
- Short development cycles
- Easier device certification with pre-certified modules
- High degree of flexibility
- Low development risk

**ASIC and Development Kits**
- Support of applications with high-performance
- Integrated hardware switch
- Support of all Conformance Classes
- PROFINET functionality in hardware
Support of Conformance Classes

**Agenda**
- Development Phases
- Implementation
- Certification
- Operators
- Support

**Performance & Functionalities**

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<th>Eye-Tracker</th>
<th>Conformance Class A</th>
<th>Conformance Class B</th>
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<td>FPGA</td>
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<td>ASIC/Dev. Kits (Own Device Development)</td>
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*CC-C: Synchronization with IRT requires special HW support (e.g. ERTEC 200, ERTEC 400, TPS-1 and netX)
The classification into conformance classes allows:

- Easy choice of components with required properties by the end user/system integrator
- Secured functional scope in the device class
- Basis for certification

There are three Conformance Classes defined

- Class A
- Class B
- Class C
**Conformance Classes – Grading**

- **Class C:**
  - Highest deterministic data transfer
  - Certified devices and network components
  - Topmost performance

- **Class B:**
  - Certified devices and network components
  - Topology determination and upload
  - Comfortable Diagnostics, redundancy

- **Class A:**
  - Standard Ethernet Network components
  - Certified Devices and Controller

  - Application Class: non isochronous
  - Communication Class: TCP/IP, RT
  - Redundancy: RedClass 1 optional

  - RedClass 2 optional

  - Non iso. + isochronous
  - TCP/IP, RT, IRT
  - RedClass 1 mandatory
  - RedClass 2 mandatory
### PROFINET Technology

#### Protocols
- Defined way to transfer data within a network

#### Profiles
- A Profile is a special and optional add-on, tunneling data by using the standard protocol

#### Functions
- A function is an optional configurable change of the device behavior

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<td>TCP (Transmission Control Protocol)</td>
<td>PROFIenergy</td>
<td>Fast Start Up (FSU)</td>
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<tr>
<td>UDP (User Datagram Protocol)</td>
<td>PROFIsafe</td>
<td>Ident. &amp; Maint. (I&amp;M)</td>
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<td>DHCP (Dynamic host config. Protocol)</td>
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<td>SNMP (simple network mgmt protocol)</td>
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<td>LLDP (Link Layer Discovery Protocol)</td>
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<td>MRP (Media Redundancy Protocol)</td>
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The PROFINET Technology has a core functionality. Additionally there are optional expandable protocols, profiles or functions (modular communication technology)
Established Certification Procedure

- Certification according to proven system by accredited test laboratories
- Certification as a prerequisite for market introduction of PROFINET products
- Complete testing scenario with uniform testing range and uniform testing system
- Test for compliance with specification
- Test for interoperability with other PROFINET devices

Certification is mandatory for PROFINET

AnfData  ComDeC  itm

PIC  Phoenix Testlab
... the view of the plant operator

1. Consultation
2. Choice of Product
   List with all certified products
3. Device + GSD
4. Engineering
5. Installation of the plant
6. Plant

... the view of the plant operator

PROFINET Technology
Goal: To establish a worldwide standardized training program for:

- Certified PROFINET Engineer
- Certified PROFINET Installer
- Certified PROFIsafe Designer

Stipulations:

- Uniform learning target
- Required learning aids
- Standardized examination catalogue
- Guidelines for Training Centers
- Accreditation procedure for the Training Centers
Hardware - Software - Consulting - Implementation

- Trainings and consulting of the PROFINET Competence Centers
- Implementation of PROFINET-Stacks incl. porting and configuration
- Hardware and/or software development
- Project Management
- Error analysis
- Certification
- And more…

Your strong partners

and others…
PROFINET Information

- PROFINET Technology Flyer
- PROFINET System Description
- Book: “Industrial Communication with PROFINET”
- www.profinet.com
  - downloads
  - trainings
PROFINET Technology

Integration of PROFINET interface in devices

The easy way to PROFINET