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Trends in Automation

PROFINET

RealTime Ethernet

Distributed Field Devices

Ditributed Automation

Network Installation

Safety

Innovations

Summery

- Trend away from central control structures to distributed local units
- Use of Ethernet in all levels of automation
- Increase in use of open IT standards in automation
- IT and automation world are growing together

Why use Ethernet in an industrial environment?

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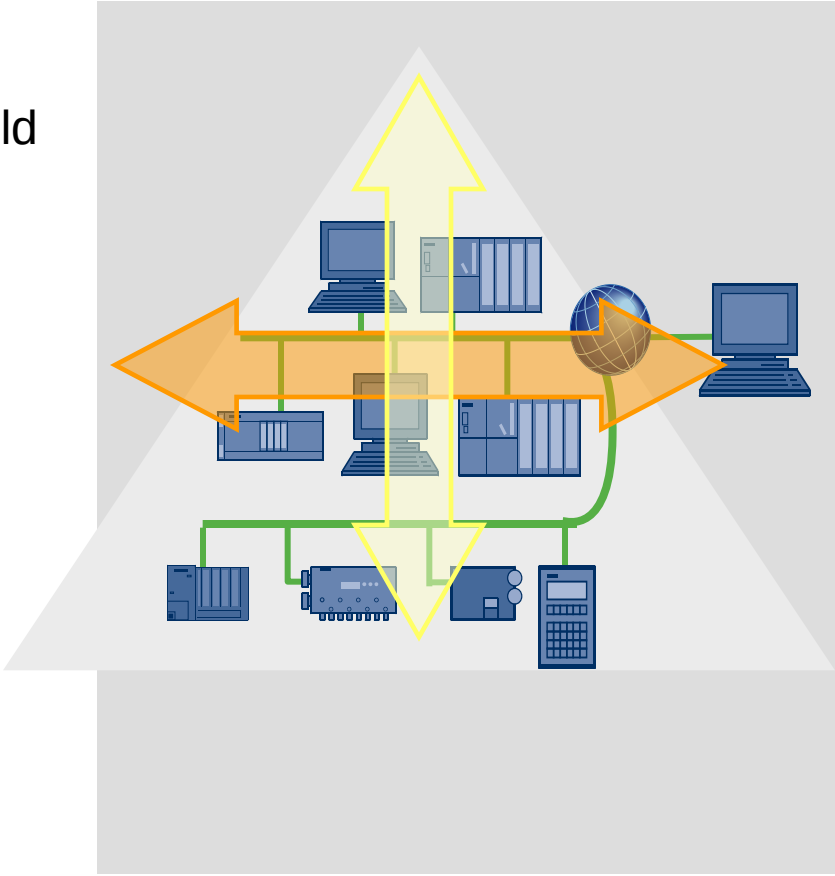
Summery

- A uniform network structure
  - Reduce the interfaces
  - Plant wide Engineering
  - Continuity through to the field level
- Use the advantages of IT-technology in the production area
  - Remote Access
  - Web services
  - Software updates
- Improvements relative to today's systems
  - High performance
  - Unlimited quantities
  - Simple handling



Special Demands for Industrial Automation

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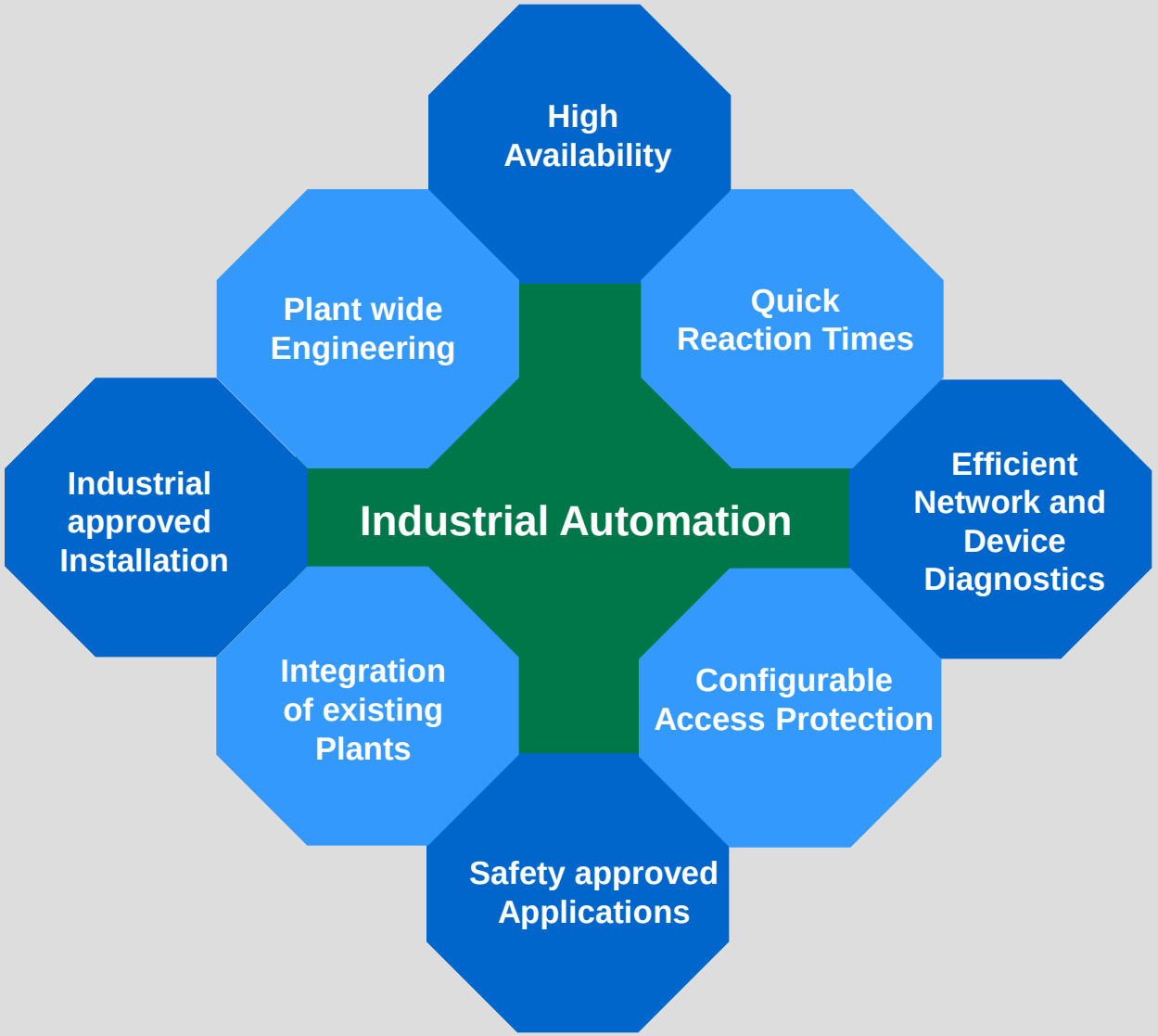

PROFINET – the solution!

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PROFINET is the open Industrial Ethernet standard from PROFIBUS & PROFINET International (PI)

PROFINET is based on Industrial Ethernet

PROFINET utilizes TCP/IP and IT-Standards

PROFINET is Real-Time Ethernet

PROFINET allows seamless integration of fieldbus systems

With PROFINET – use one bus for all your tasks!

- **PROFINET**
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- Safety
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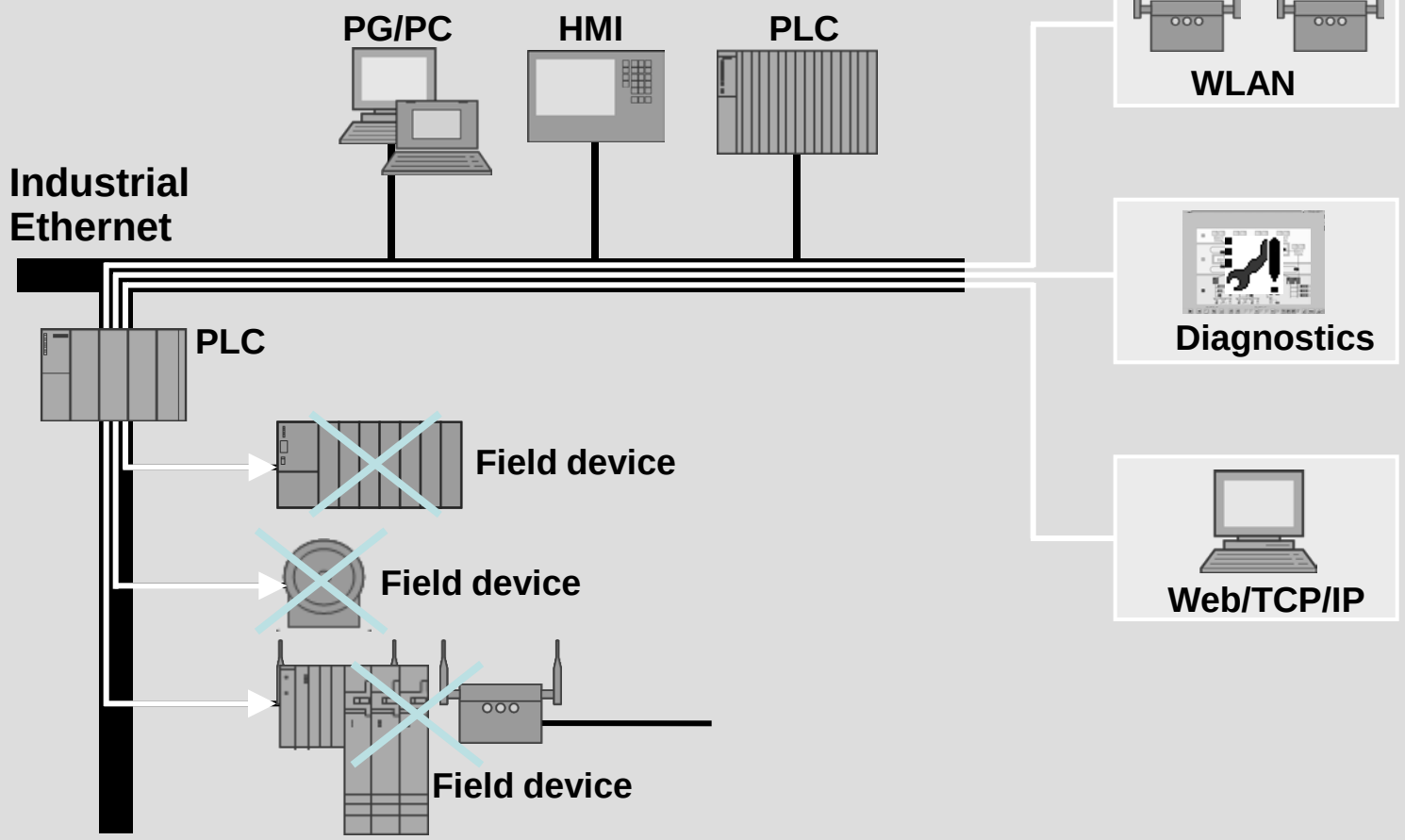
- Summery

Conventional automation topologies



With PROFINET – use one bus for all your tasks!

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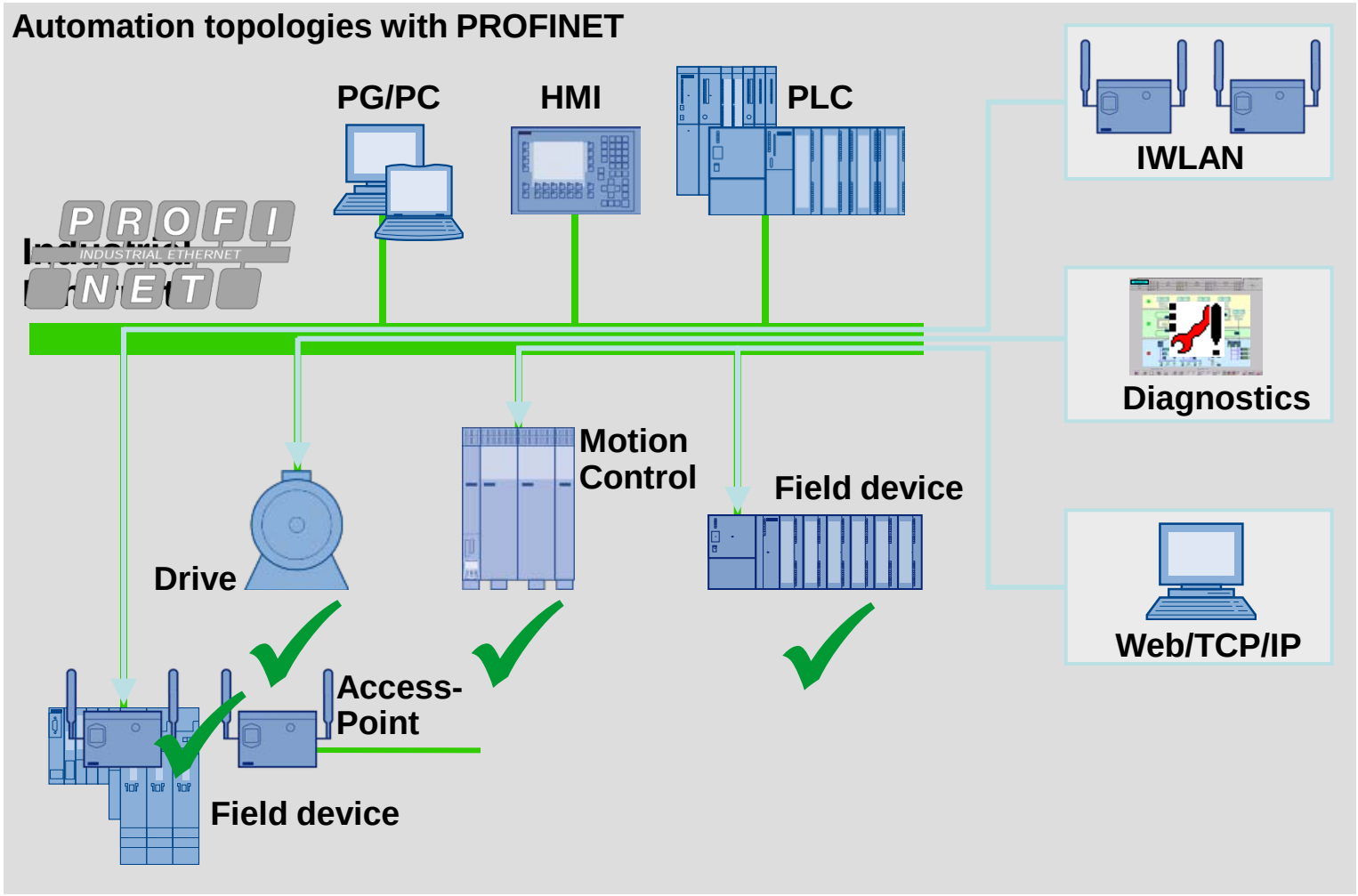

With PROFINET – use one bus for all your tasks!!

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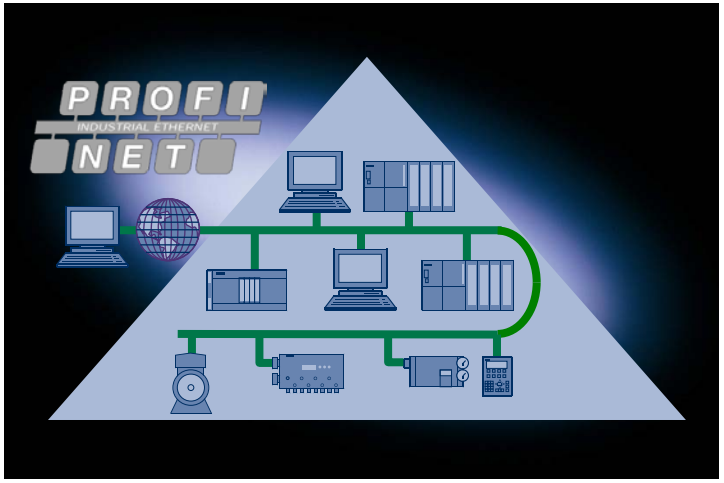
- Benefits and added value for customers
  - Connect any automation device to any point
  - All automation applications run via just one cable; Real-time and TCP/IP
  - Standard and failsafe automation via one cable; if need be, also wireless with Industrial WLAN



Flexibility and cost reduction for engineering, installation and maintenance

PROFINET – the topics

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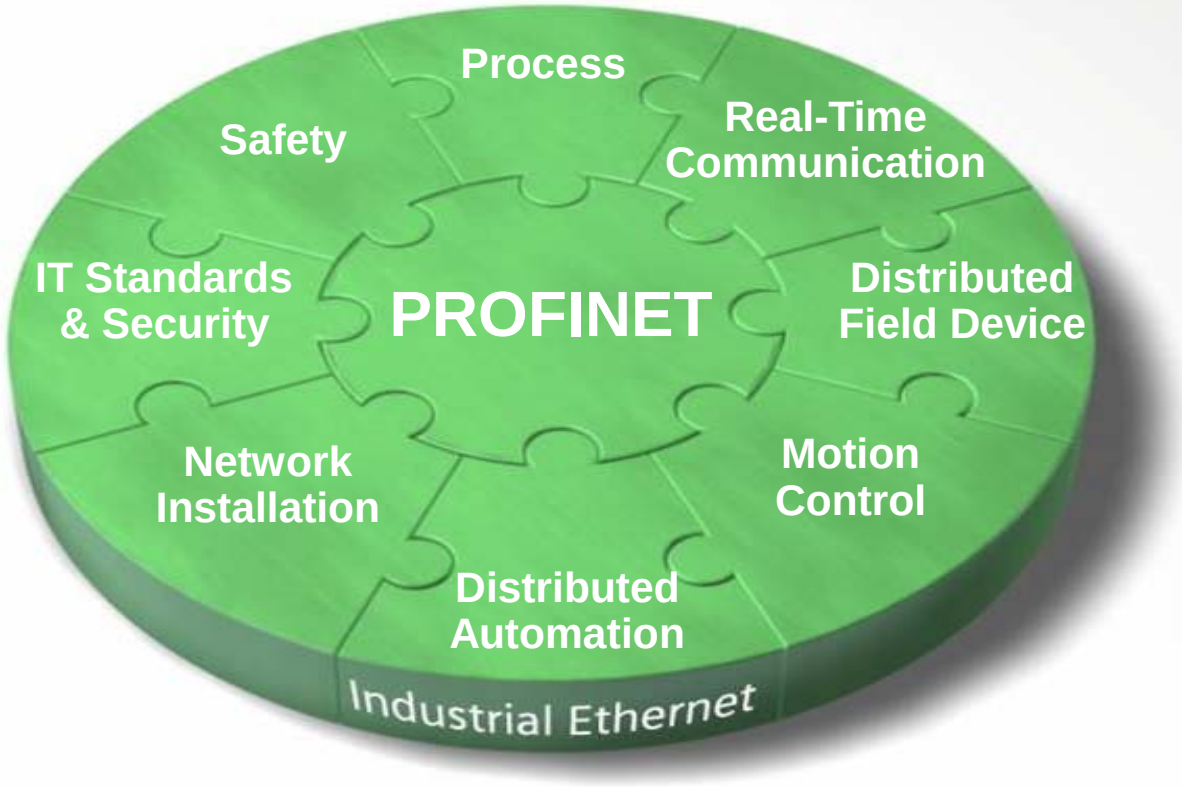

PROFINET – the comprehensive Industrial Ethernet Standard

Real-time Communication

PROFINET

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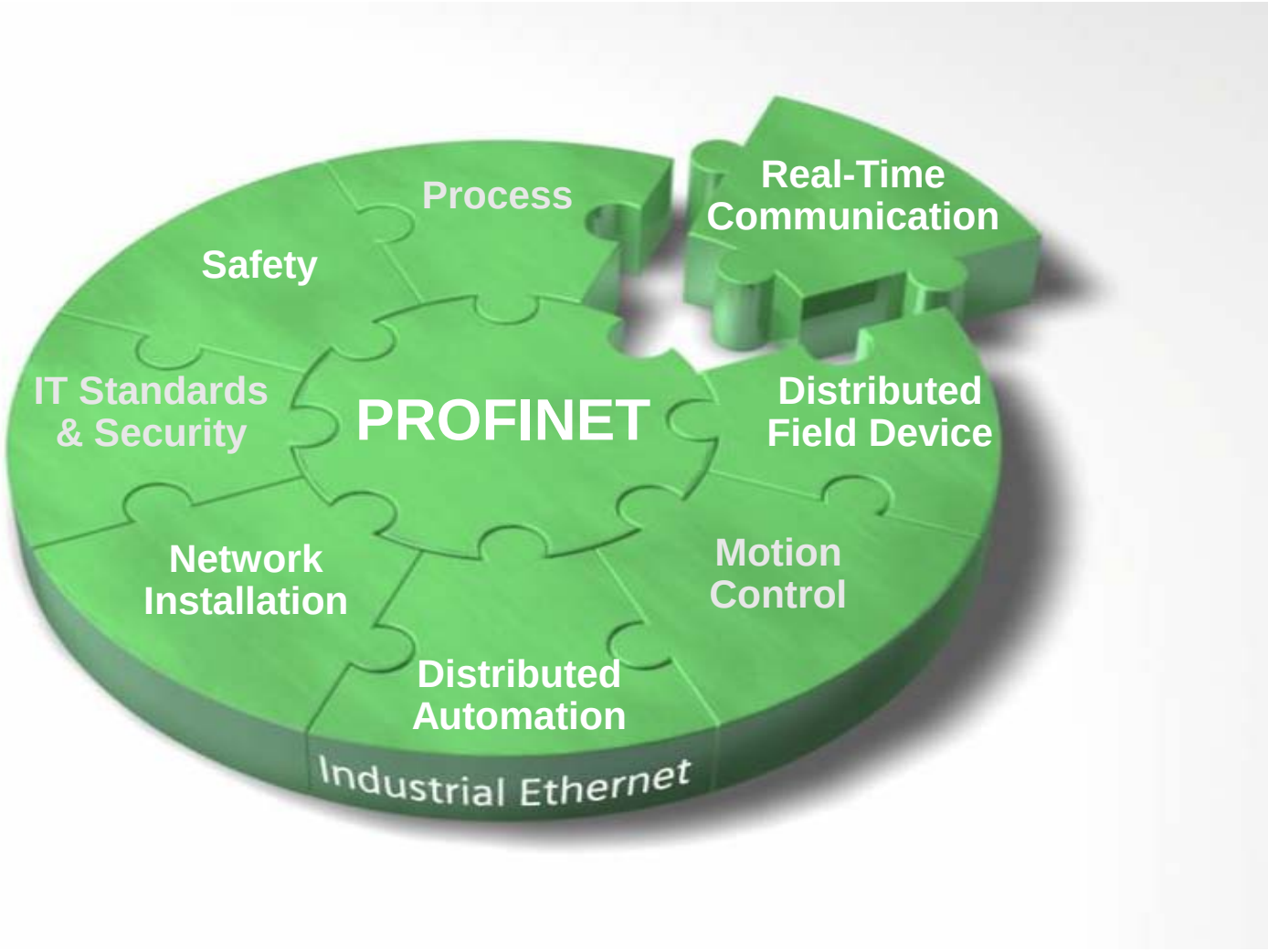

PROFINET Real-time communication

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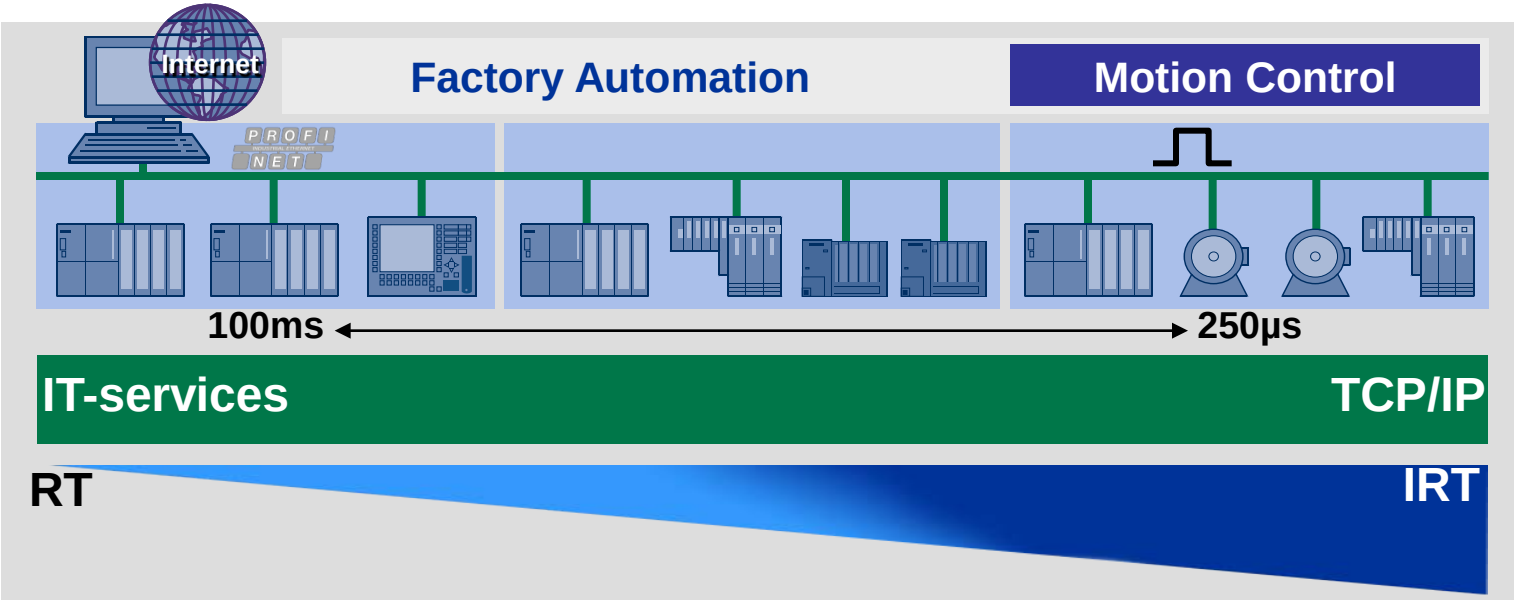
- **Uniform communication and fast reaction times**
  - Simultaneous real-time and IT-service on one cable
  - Scalable real-time communication from non-critical time applications up to high performance applications
    - Real-Time (RT)
    - Isochronous Real-Time (IRT)
  - Unlimited TCP/IP communication



Real-Time (RT)

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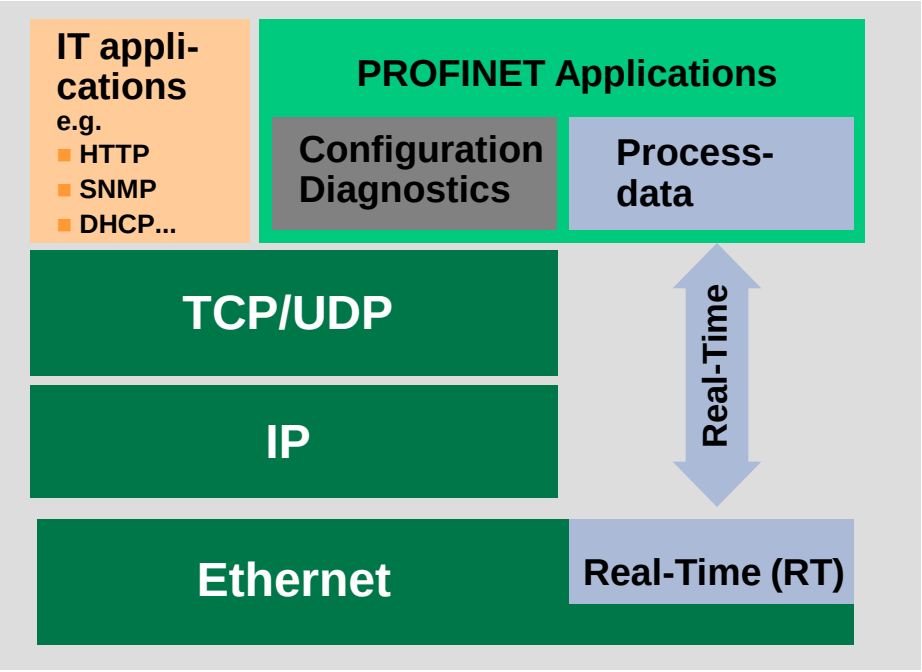
- Use of standard components, e.g. Switches
- Same performance class as today's fieldbus systems (e.g. PROFIBUS)
- Typical application is factory automation
- High Performance by minimizing the stack processing time



Isochronous Real-Time (IRT)

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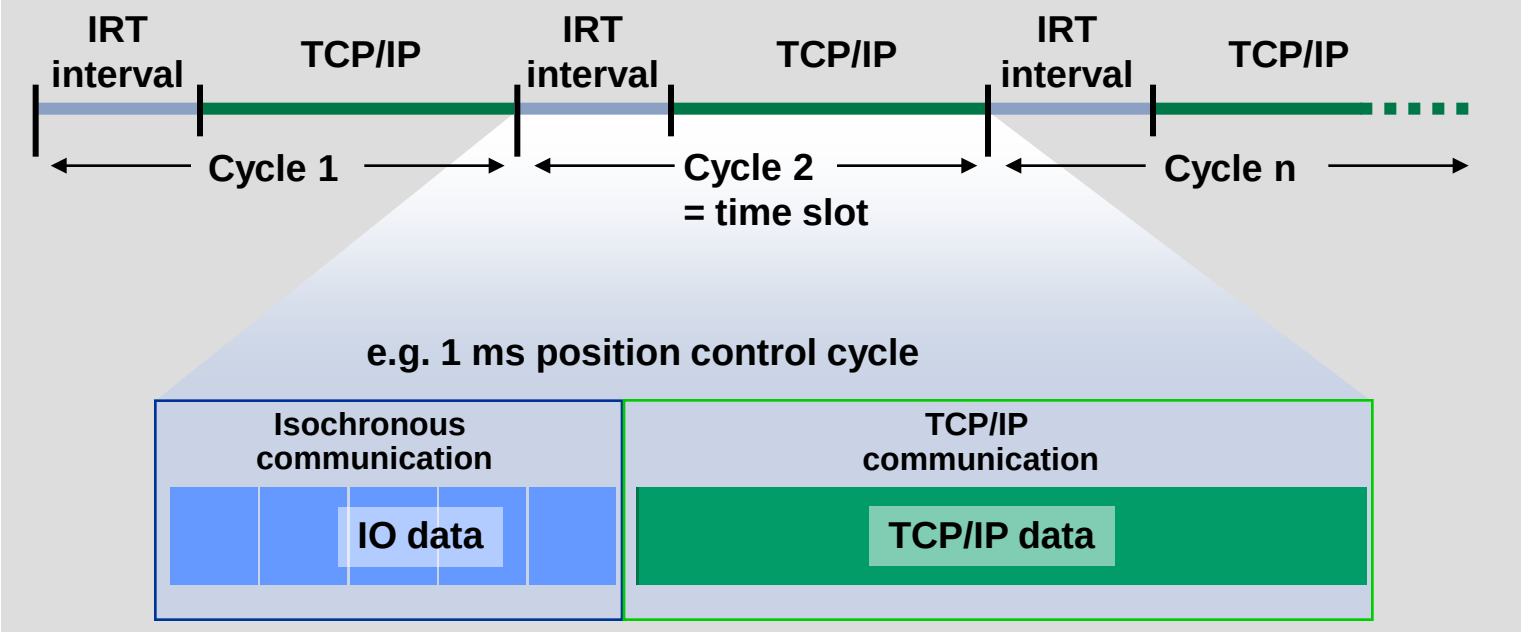
Summery

- Hardware support for the allocation of time slots for real-time message frames
  - No influence on real-time characteristics by TCP/IP or broadcast/multicast communication
  - High level of performance, even in the case of cascaded switches
  - Accurately timed data transmission
  - Basic technology for isochronous applications



Distributed Field Devices

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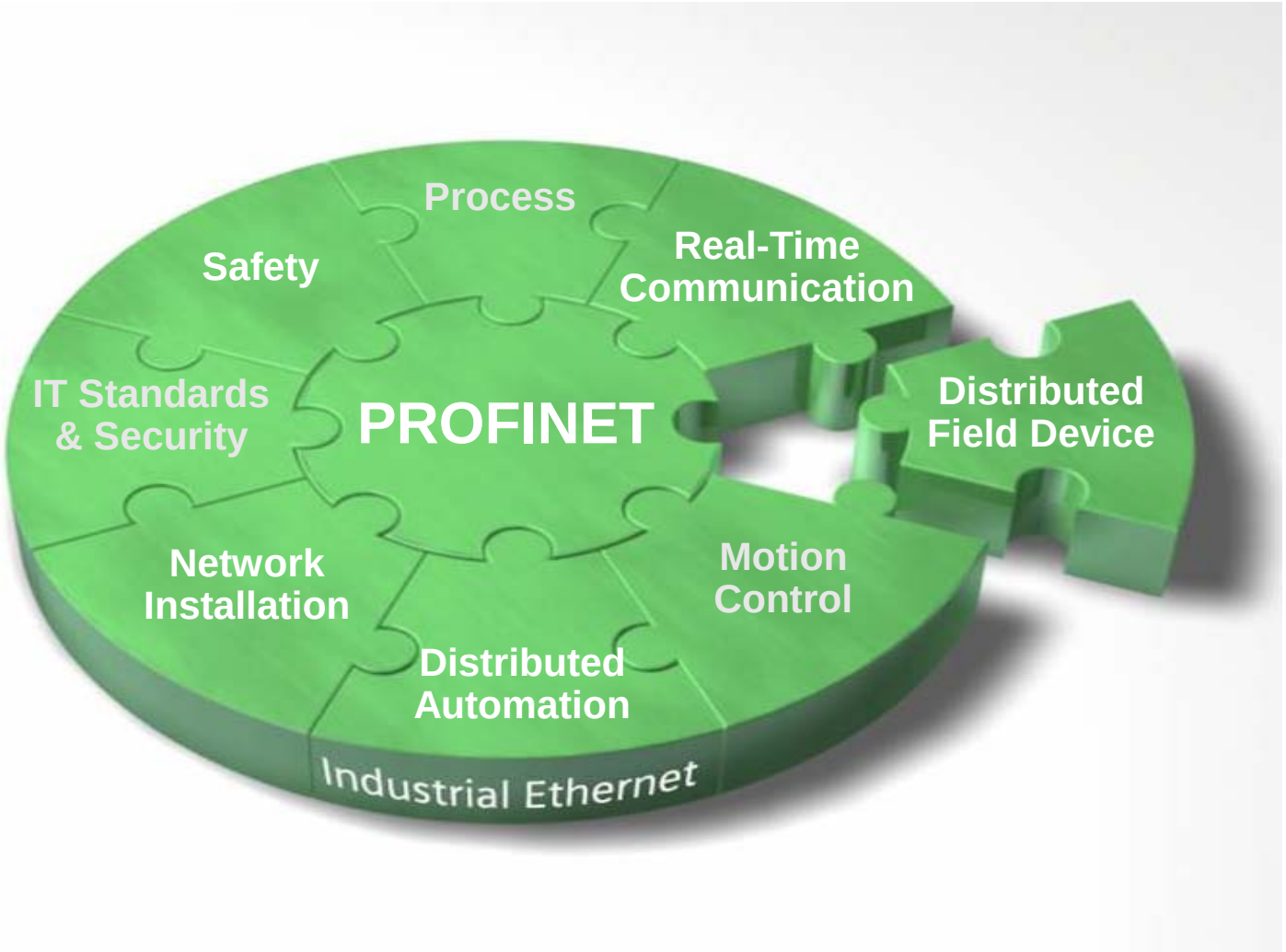

PROFINET – Connection of Distributed field devices

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RealTime Ethernet

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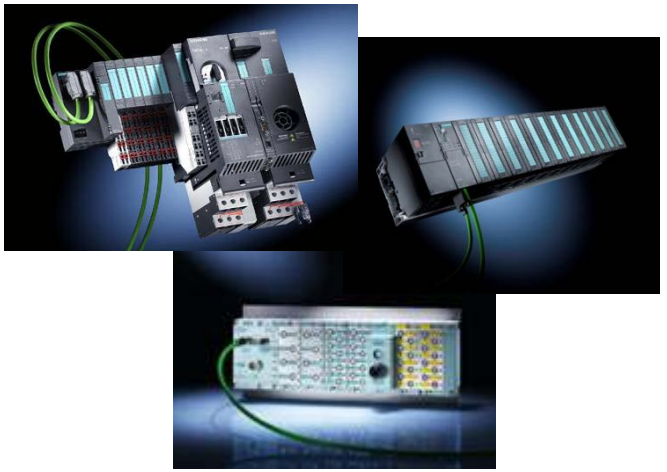
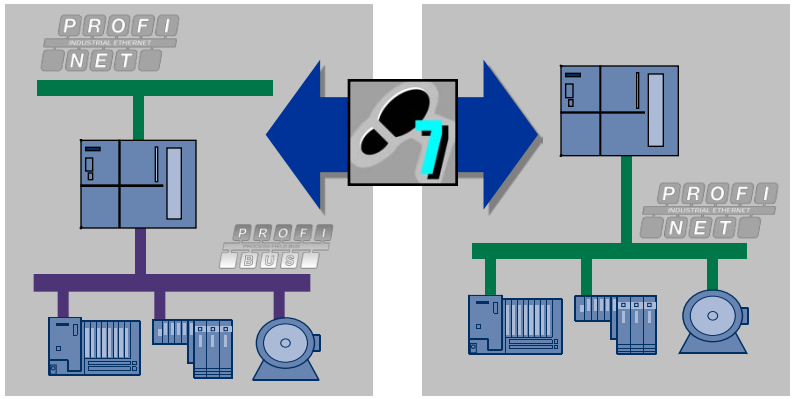
Innovations

Summery

- PROFINET IO Device with integrated 2-port switch for building line structures
- Use existing I/O modules without changes





- Device configuration in the familiar way
- PLC user program with known commands

Flexible use of distributed field devices on PROFIBUS and PROFINET

PROFINET Device Classes

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RealTime Ethernet

Distributed Field Devices

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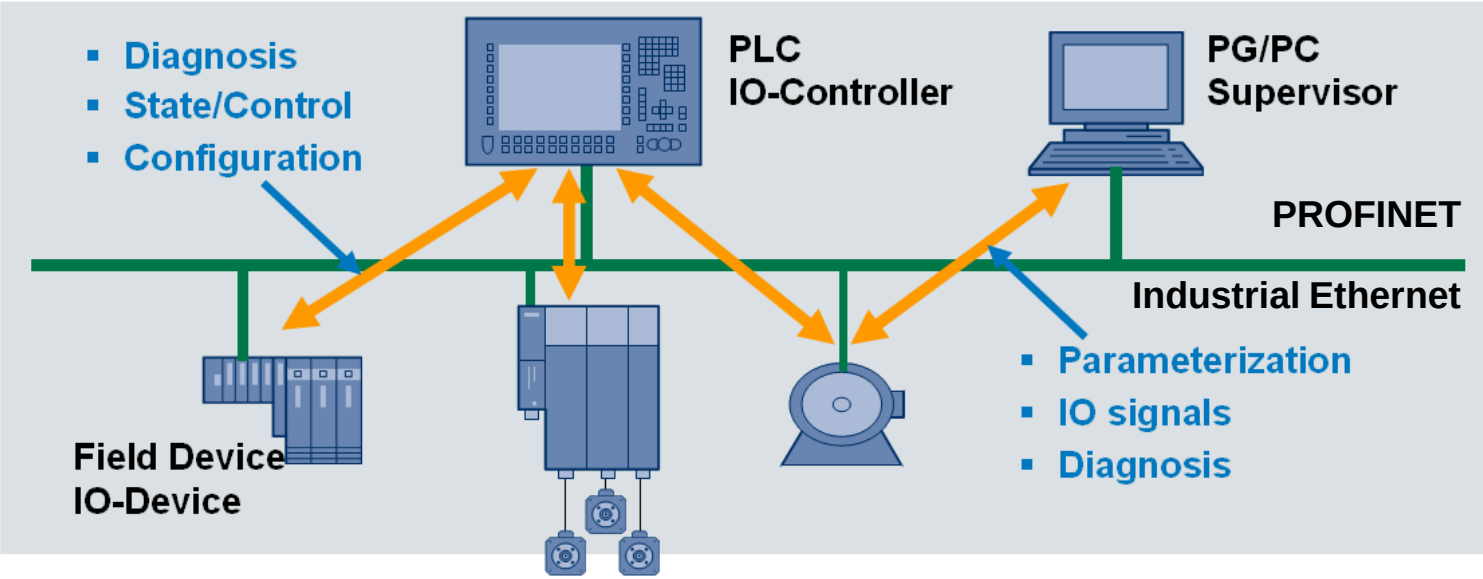
Innovations

Summery

- PROFINET IO-Controller:
  - Exchange of I/O signals with field devices
  - Access to the I/O signals via the process image
- PROFINET IO-Device:
  - The field device allocated to the IO-Controller
- PROFINET IO-Supervisor:
  - HMI and Diagnostics station



Configuration in Engineering

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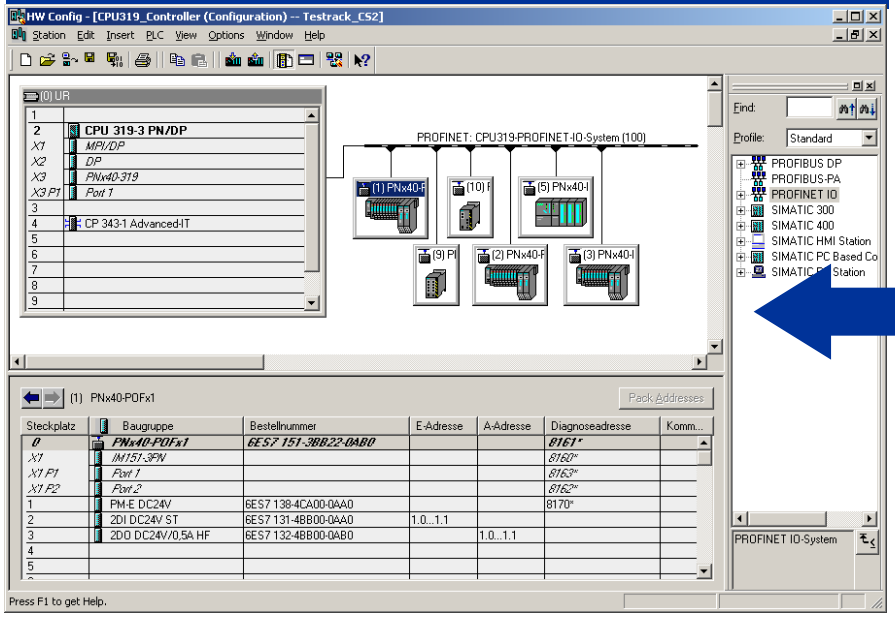
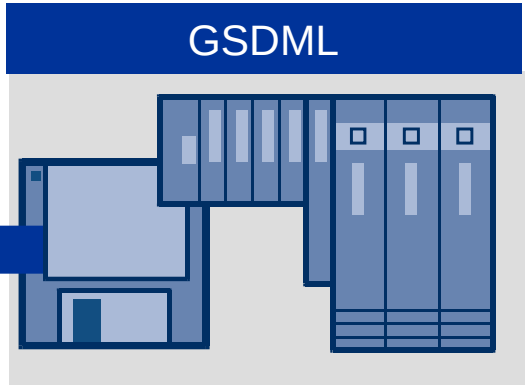
Summery

- Same configuration view for PROFIBUS and PROFINET

HW-Config



GSDML



GSD + XML = GSDML

Quick start in PROFINET through the use of existing user know-how

Standardized Device Description

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Innovations

Summery

- Description of device properties in the GSDML (Generic Station Description):
  - Pluggable modules (Number, Type)
  - Configuration data of the module (e.g. analog input)
  - Module parameters (e.g. 4..20mA)
  - Diagnosis information (e.g. wire break)

- The GSDML is XML-based
  - Creation with every available XML-Editor
  - Standardized XML method defines the content and format
  - The structure of the GSDML corresponds to the ISO 15745 standard

Structured diagnostics information

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Summery

PROFINET-device diagnostics in three levels:

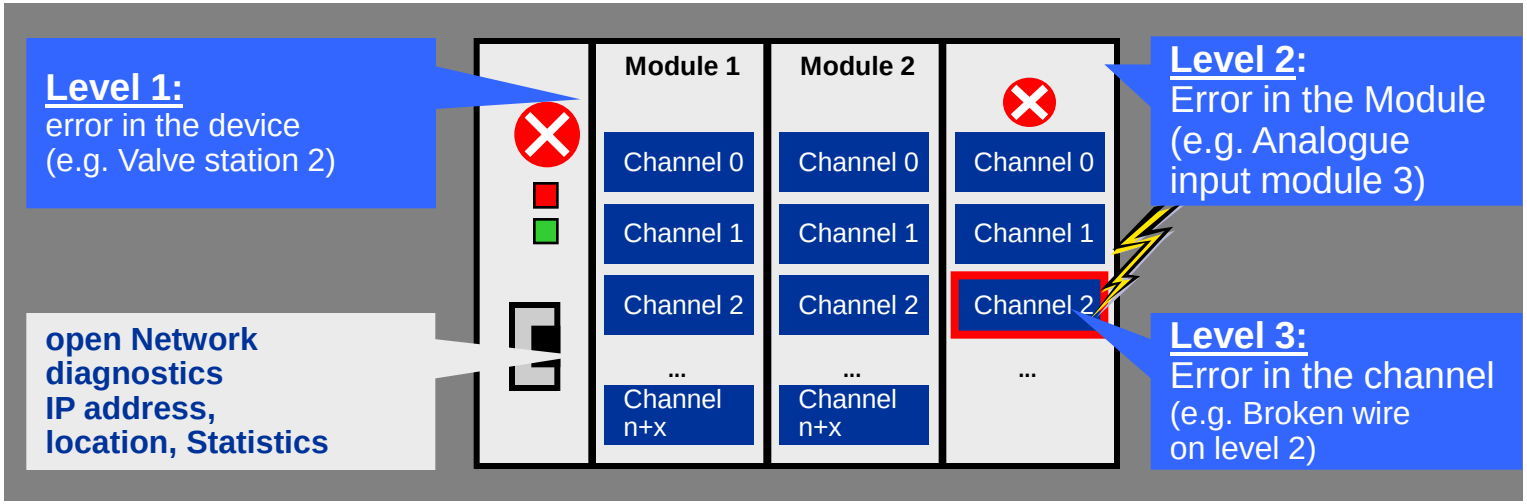
- device
- slot
- channel

for network components:

- address
- location of error

Open Network diagnostics

- SNMP
- Web



PROFINET- diagnosis of devices in STEP7

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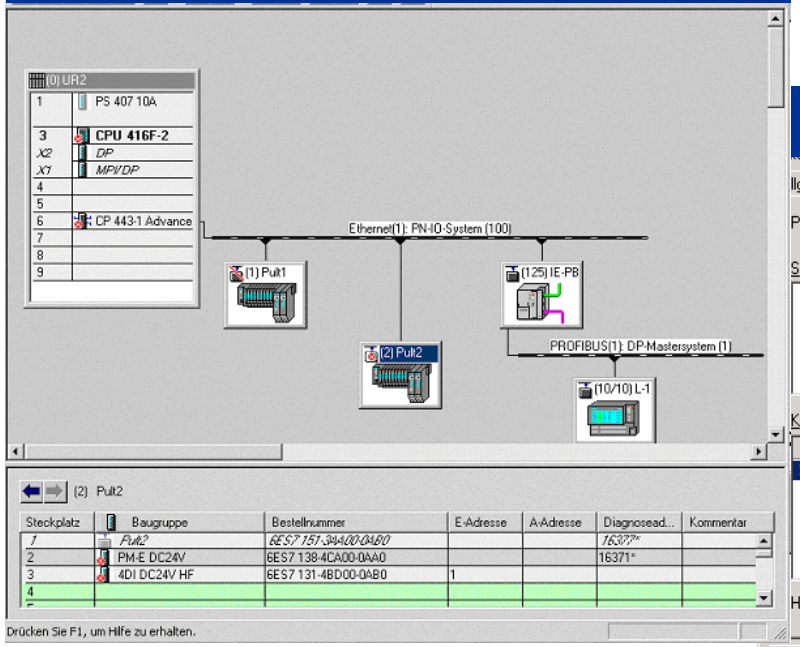
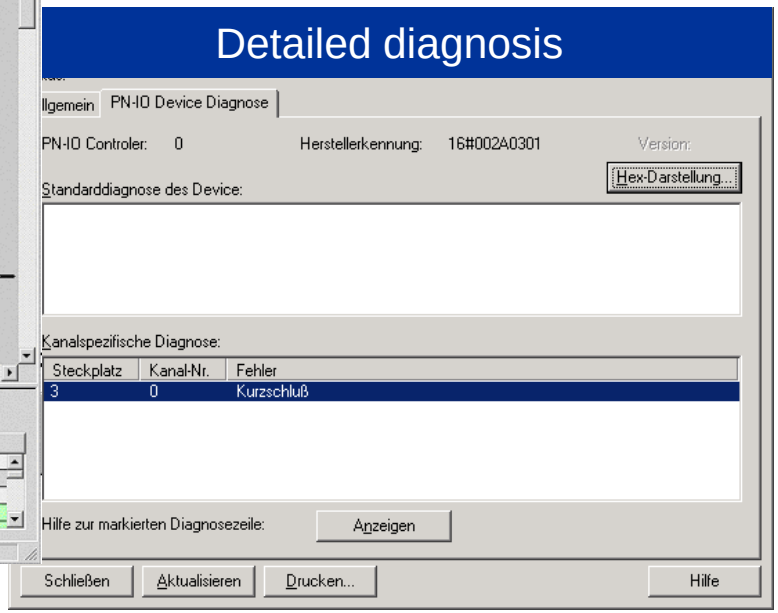
Same diagnostics view for PROFIBUS and PROFINET

General diagnosis



Detailed diagnosis



Efficient error localization and removal through integrated system diagnostics

Topology information

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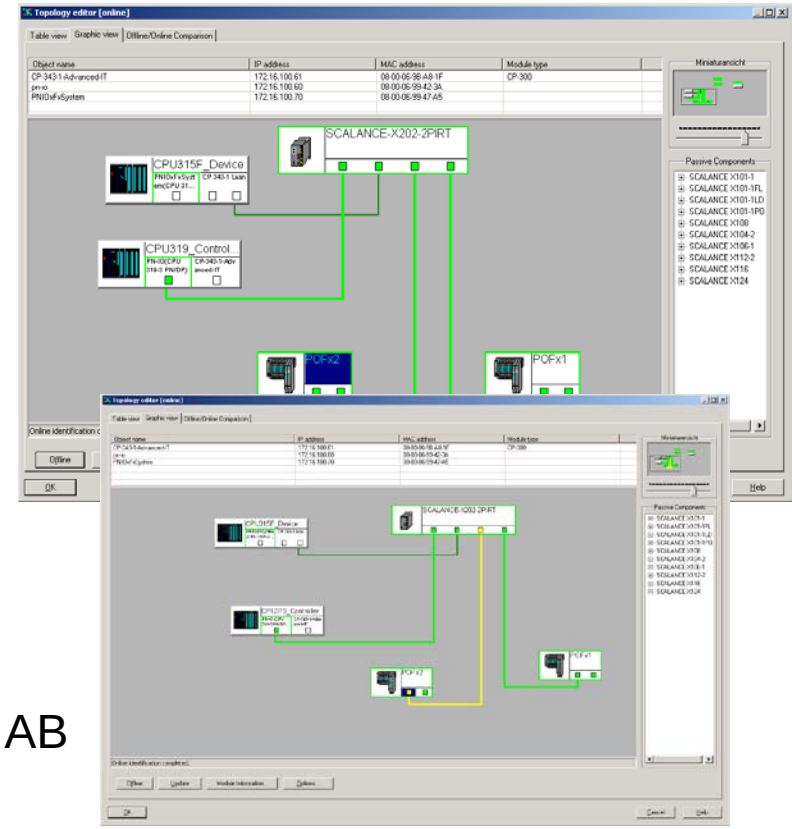
Innovations

Summery

- Use of topology information for ...
  - easy commissioning due to good plant overview
  - comprehensive diagnostics
  - easy device replacement
  - documentation support
  - more production transparency
- ... in Engineering Software Based on standards
  - LLDP protocol to IEEE 802.1 AB



Cost savings in commissioning, maintenance, operation

Webdiagnostic

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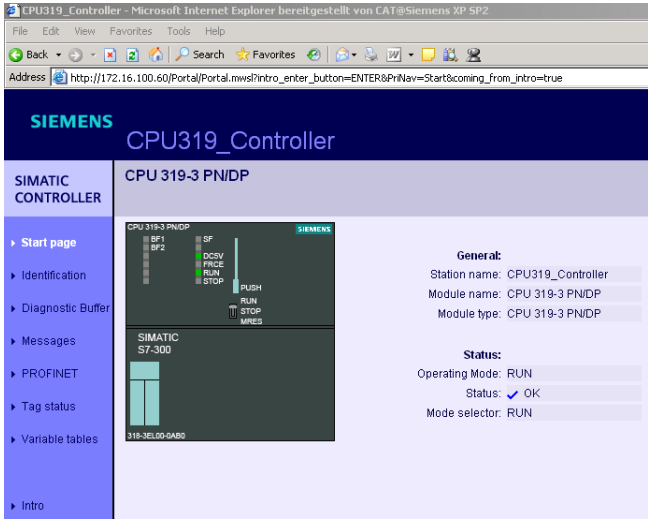
Summery

Diagnostics whenever required

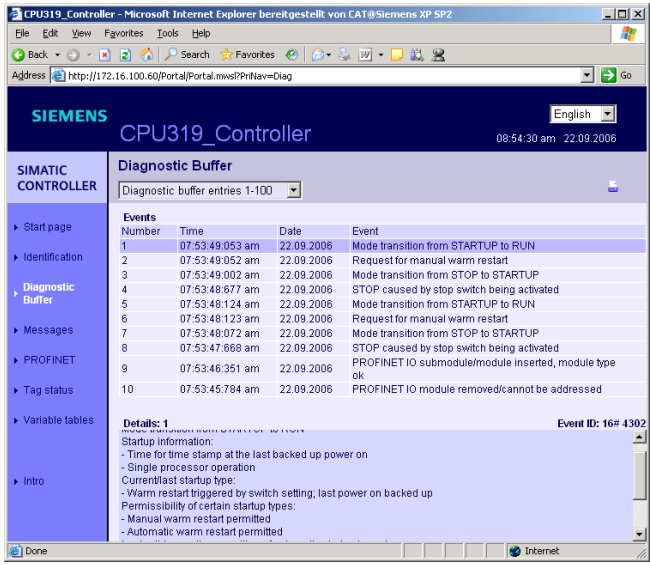
- Via an integrated PROFINET interface
- Read access via the Internet browser
- Display optimized for PCs, Panels, PDAs

Easy access to diagnostics data at any location



Increased plant availability

- Web contents
- Module identification
  (MLFB, FW version, etc.)
- Operating status, diagnostics buffer
- Display of messages (Alarm S)
- Ethernet parameters and statistics



Integration of PROFIBUS in PROFINET

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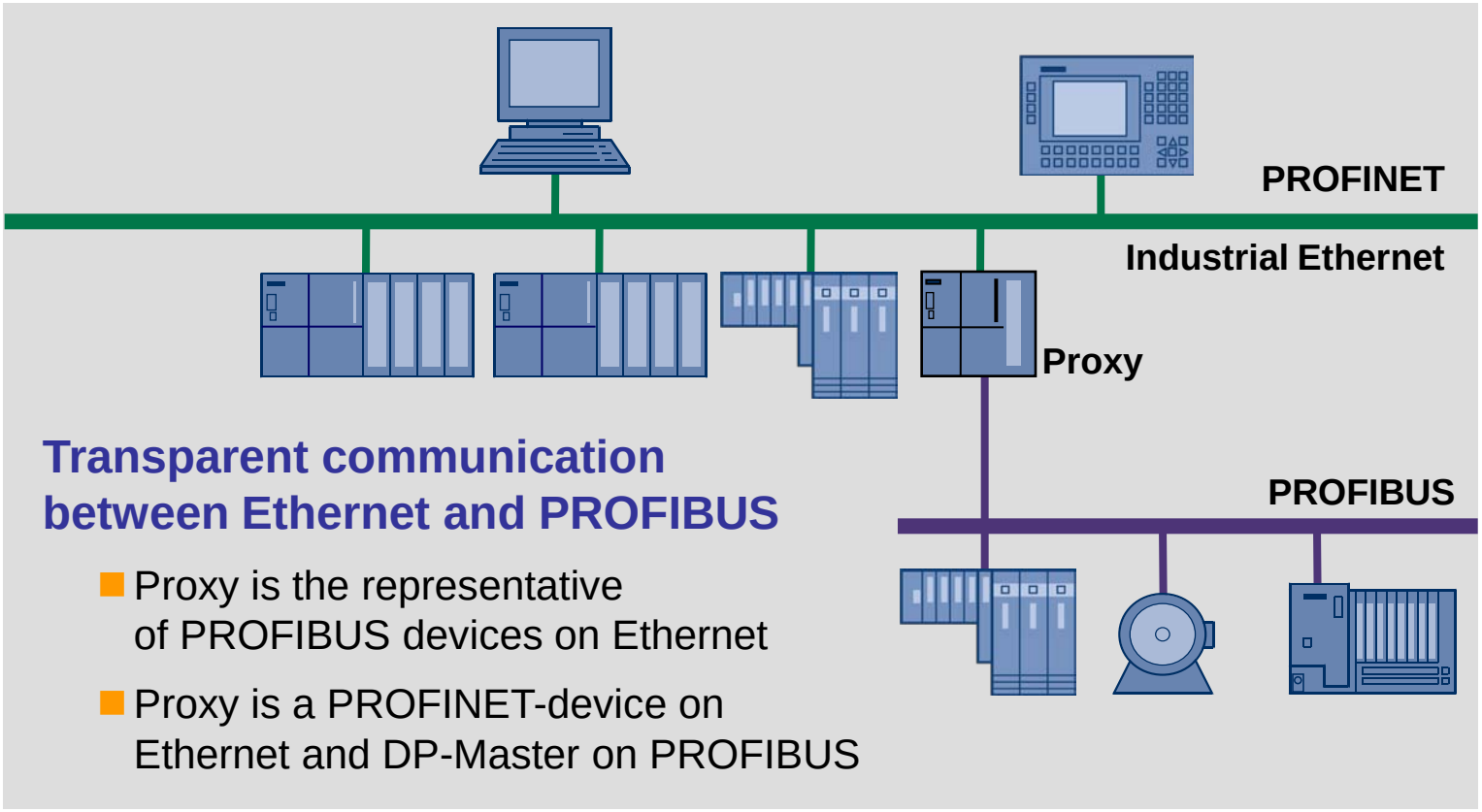

Transparent communication between Ethernet and PROFIBUS

- Proxy is the representative of PROFIBUS devices on Ethernet
- Proxy is a PROFINET-device on Ethernet and DP-Master on PROFIBUS

Openness through integration of existing fieldbuses

Investment protection for device suppliers and end-customers

Network Installation

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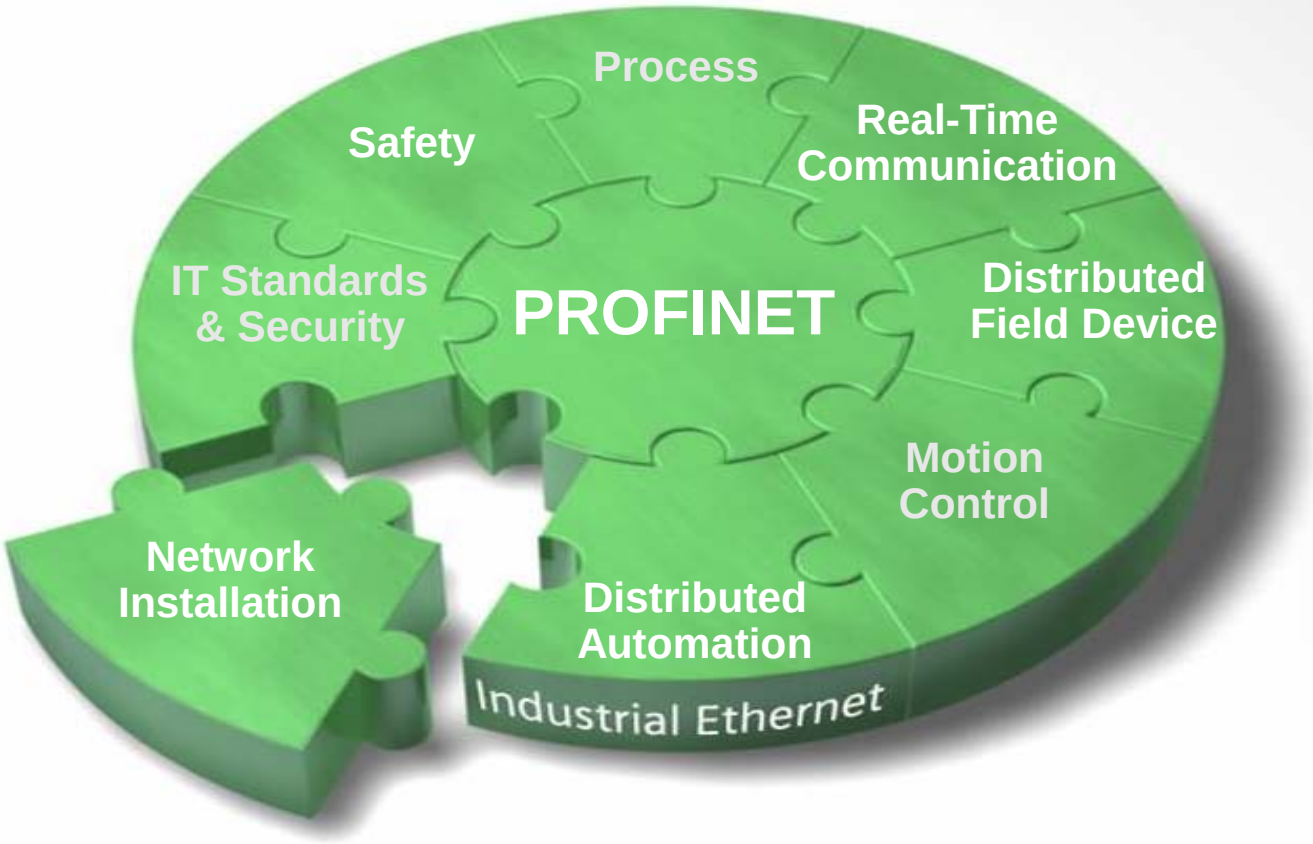

PROFINET Installation Guide

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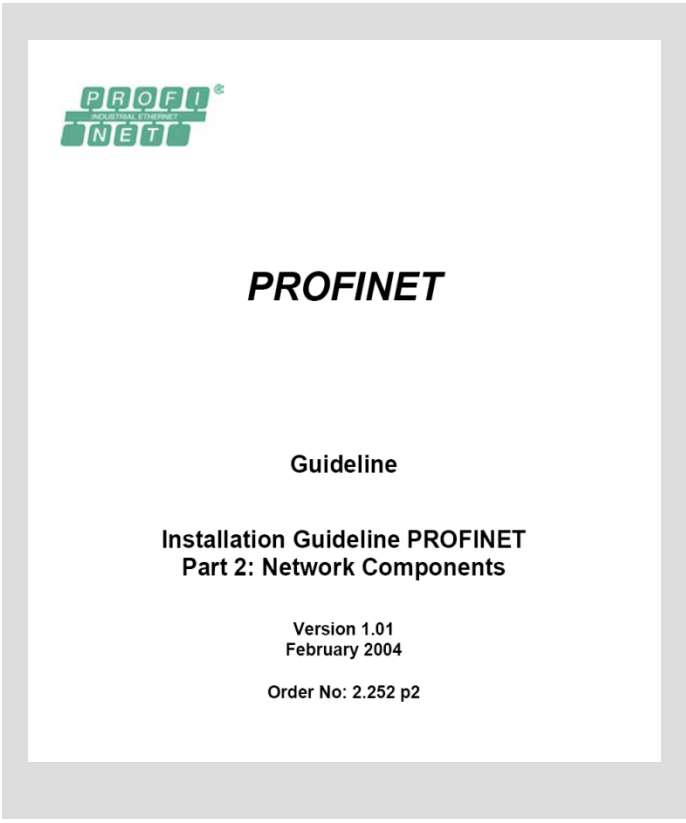
The “PROFINET Installation Guide“ supplements the standards for structured building cabling to meet the special requirements of the industrial sector

- Network operators:
  - Simple rules for network installation
  - No network specialist knowledge required for the installation of PROFINET
- Device manufacturer:
  - Definition of accurate information for the device development
  - Mechanical and electrical features of interfaces



Industrial Ethernet - topologies

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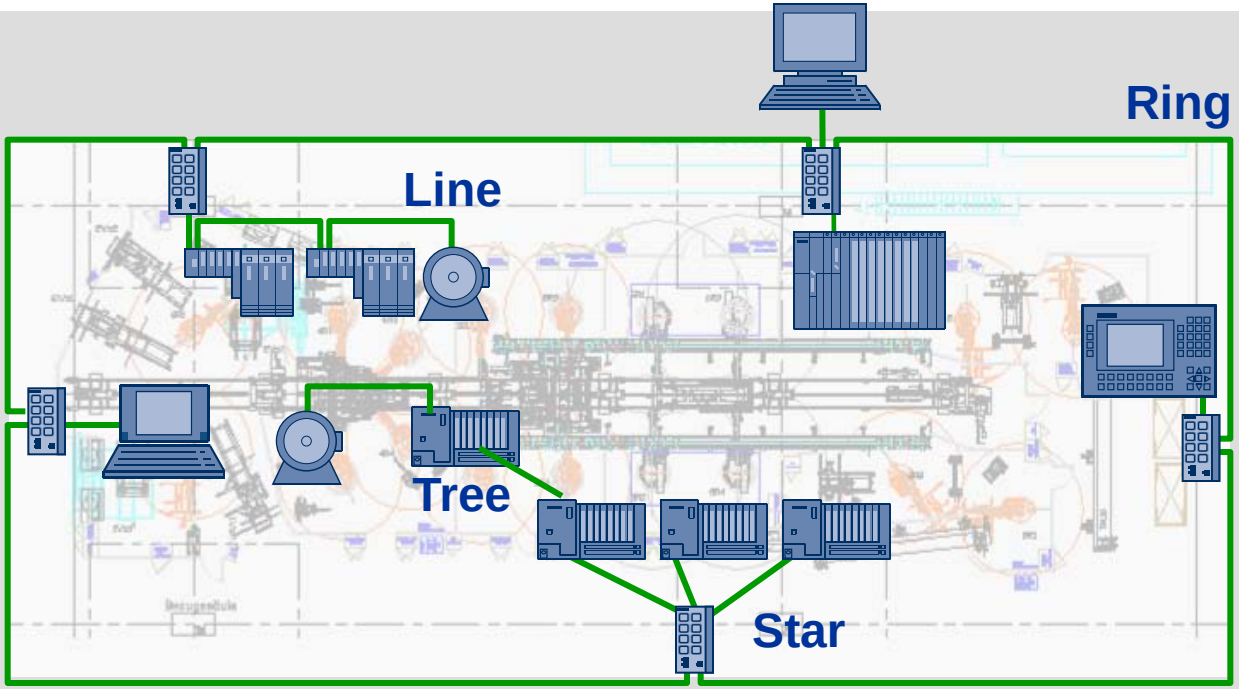
- All topologies can be used
  - Ring structure guarantees high availability
  - Line minimizes the cabling overheads
  - Robust physics (Cable, Connectors)



Optimized network structures for cost savings in all applications

New PROFINET applications with Industrial Wireless LAN

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Innovations

Summery

- Wireless communication: mobility for new applications
  - Automatic guided vehicle systems
  - Monorail conveyors
  - Inaccessible installation locations
  - Bridging buildings and streets
  - Mobile terminals
- Additional highlights for industry
  - Redundancy
  - Determinism
  - Robustness
  - Wireless standard IEEE 802.11a/b/g & h

Just as safe and reliable as wired systems!

Wireless advantages

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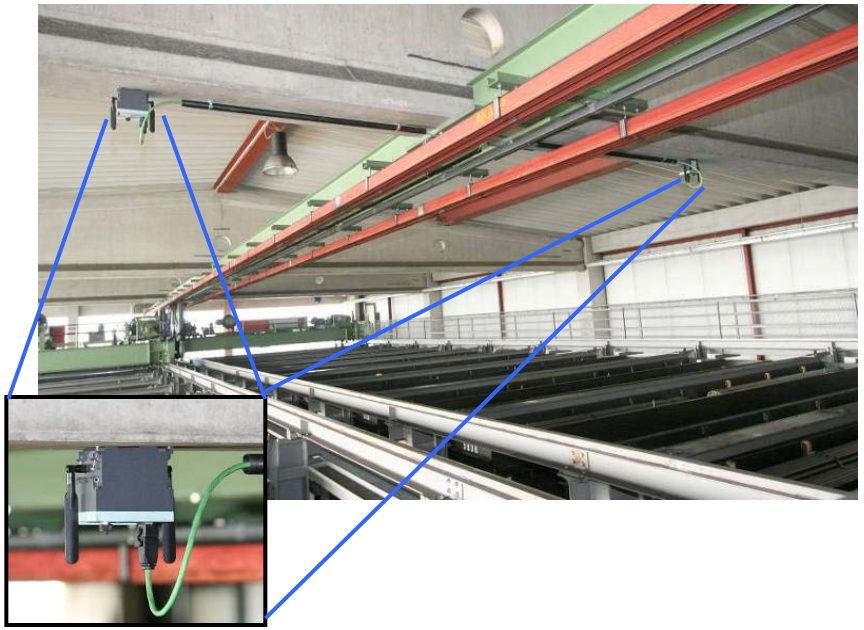
Summery

- Customers have…
  - **Expensive trailing cables or sliprings**
  - **Low flexibility & not enough space**
  - **High maintenance costs**

- Customers want…
  - **Easy linking with difficult to access locations**
  - **More space & high flexibility**
  - **Low maintenance costs**



IWLAN reliability

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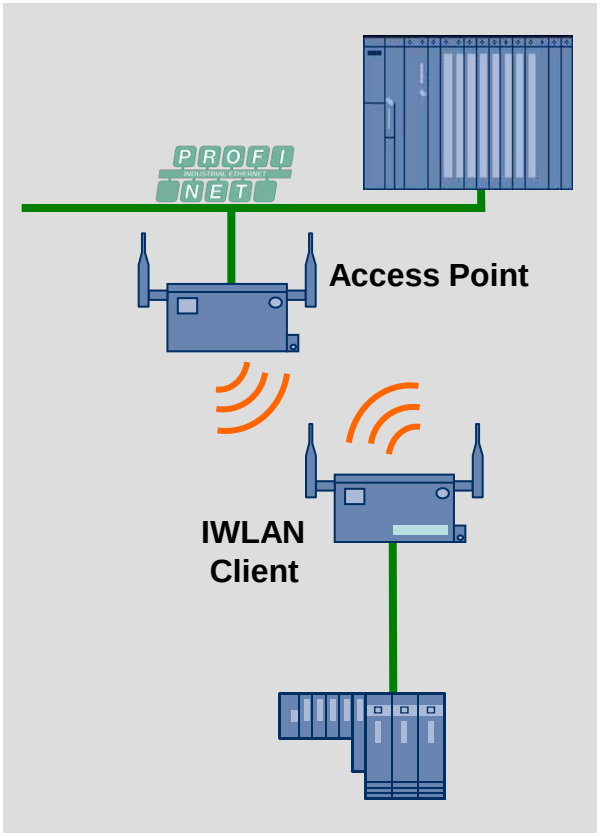
- **Redundancy**
  - Thanks to access points with 2 radio cards: 2.4GHz and 5 GHz
- **IWLAN in real-time**
  - SCALANCE W data allocation enables cycle times of < 15 ms.
- **Rapid Roaming**
  - For application monorail conveyor as replacement for contact conductors



New possibilities thanks to PROFINET and IWLAN!

IWLAN communication possibilities

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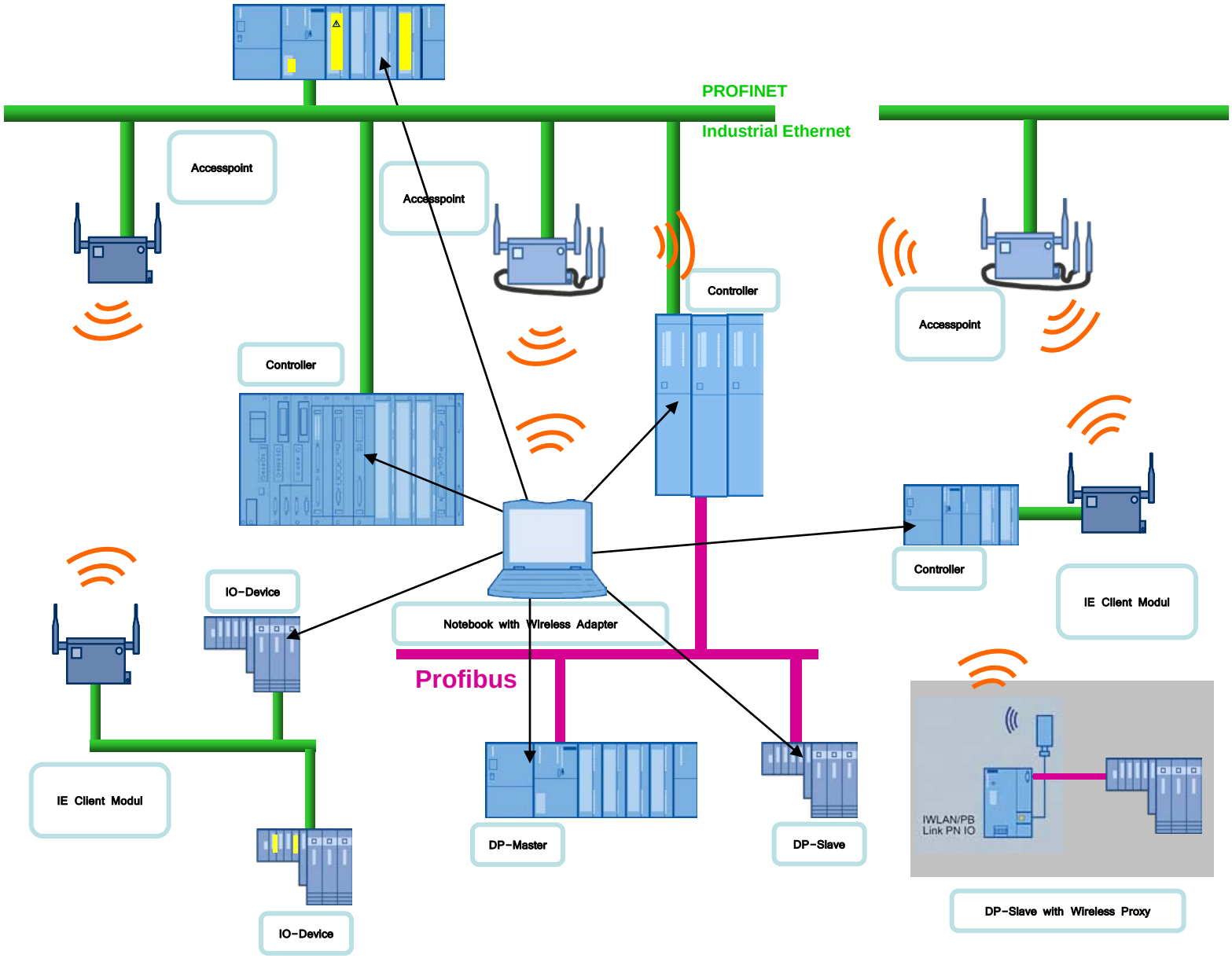

Planning Software application

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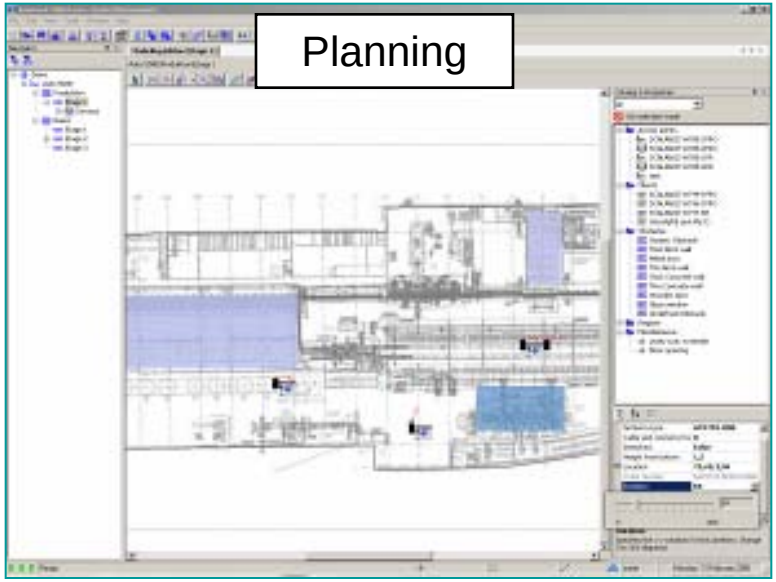

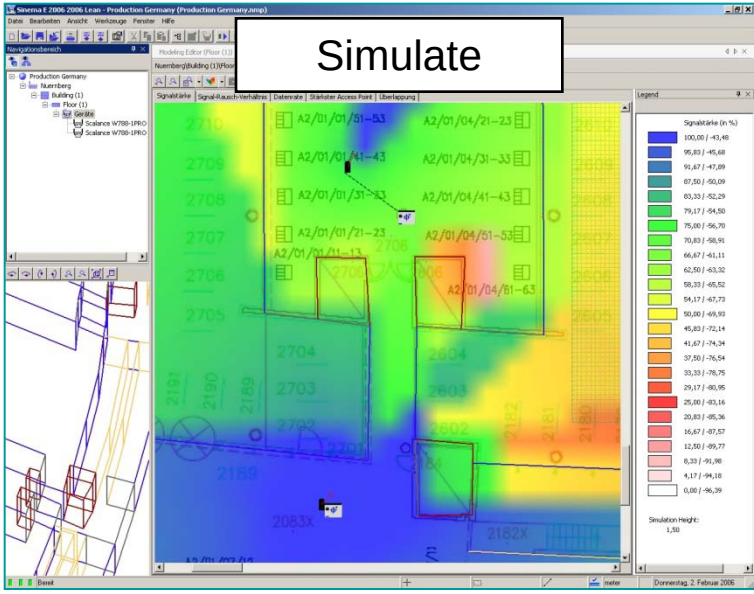

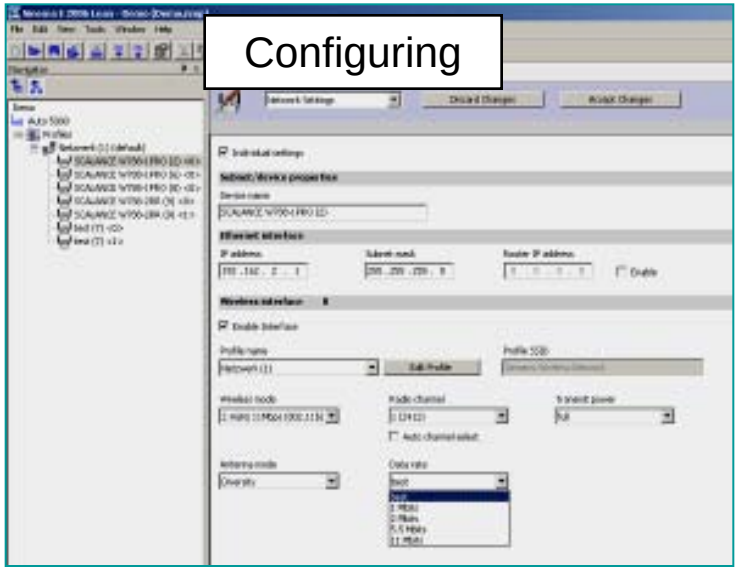

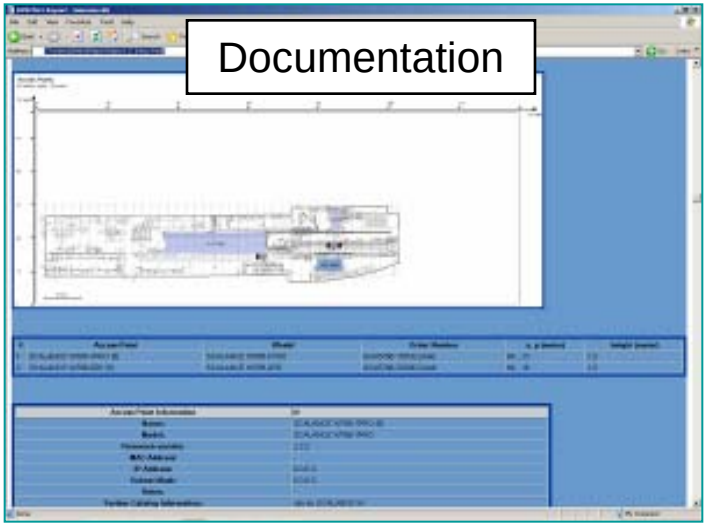

Safety

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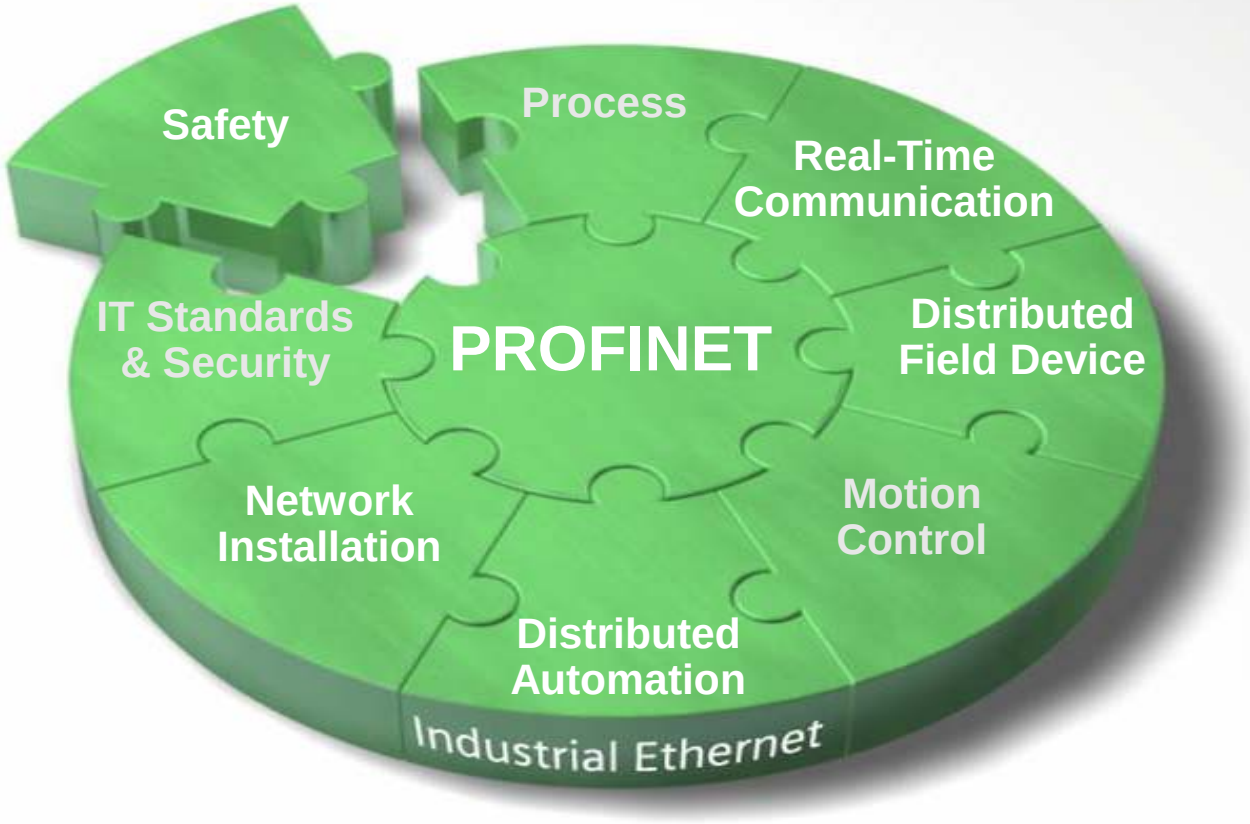

Fail-safe communication via PROFIsafe

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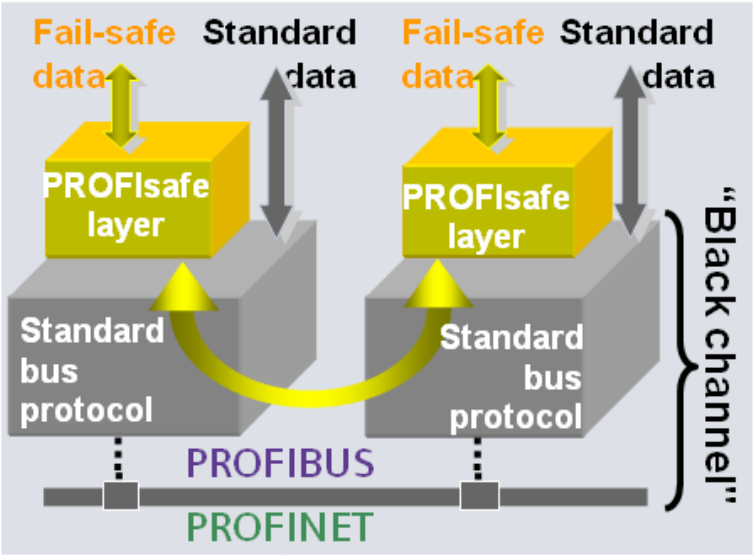
Innovations

Summery

- First standard of communication in accordance with safety standard IEC 61508
- PROFIsafe-Profile supports the safe communication for the open standard bus PROFIBUS and PROFINET
- The PROFIsafe-Profile meets possible faults like address adulteration, deceleration, data loss with
  - Serial numeration of PROFIsafe-telegram
  - Time monitoring
  - Authenticity monitoring via unique addresses
  - Optimized CRC-checking



Approved by BGIA

PROFIsafe supports standard- and failsafe Communication by one medium

Fail-safe communication,even wireless !

PROFINET

RealTime Ethernet

Distributed Field Devices

Ditributed Automation

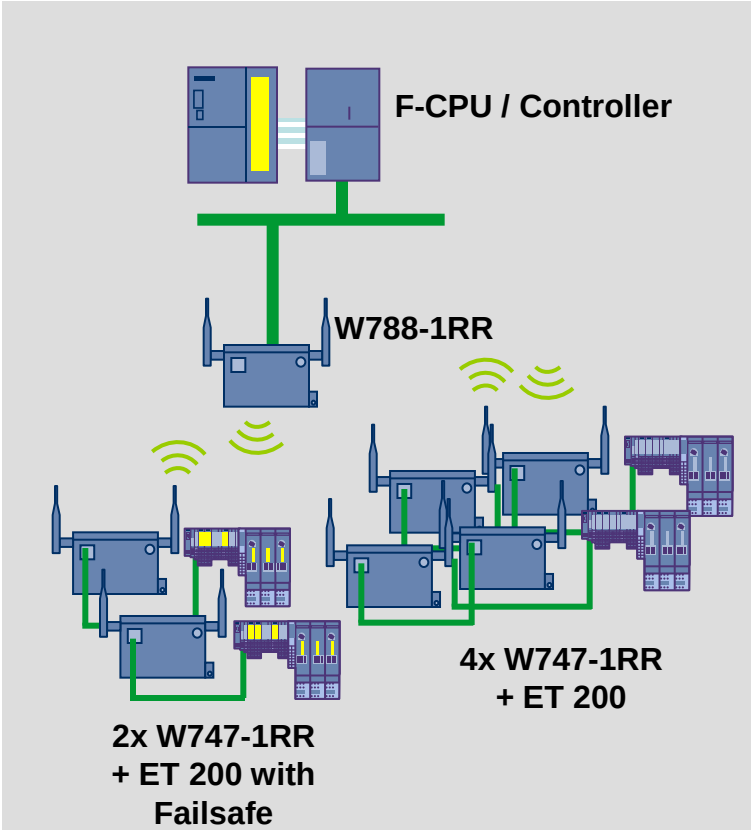
Network Installation

Safety

Innovations

Summery

- Safety data and standard data over radio link
- High-quality radio link with extremely short response times thanks to Industrial Wireless LAN and Rapid Roaming (RR)
- Perfect interplay between automation components and network components from one source
- Wired and wireless transmission technology in one communication link



Safety technology, even wireless, for new applications for mobile, remote or hard-to-access units

Innovations
and
Room for new
Solutions

Future proven, Innovative

PROFINET

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Distributed Field Devices

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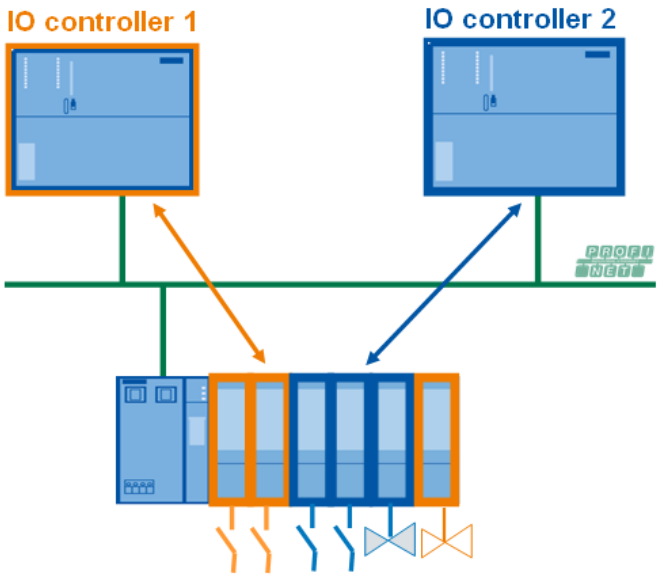
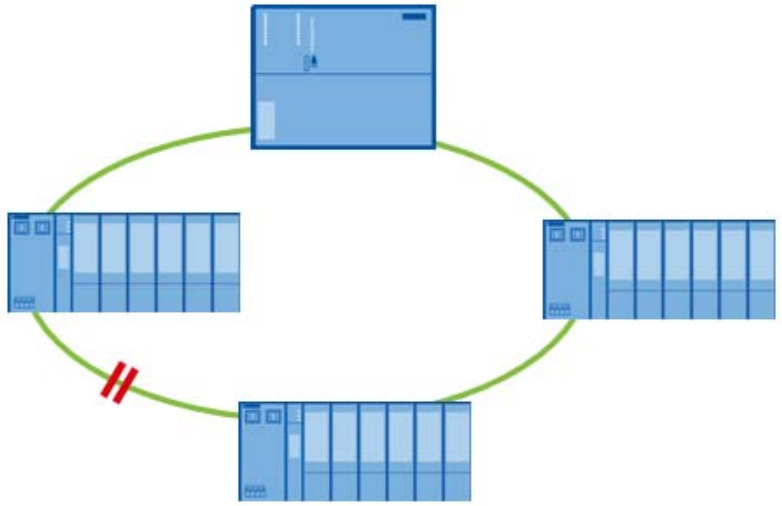
Shared Device



Media Redundancy



Future proven, Innovative

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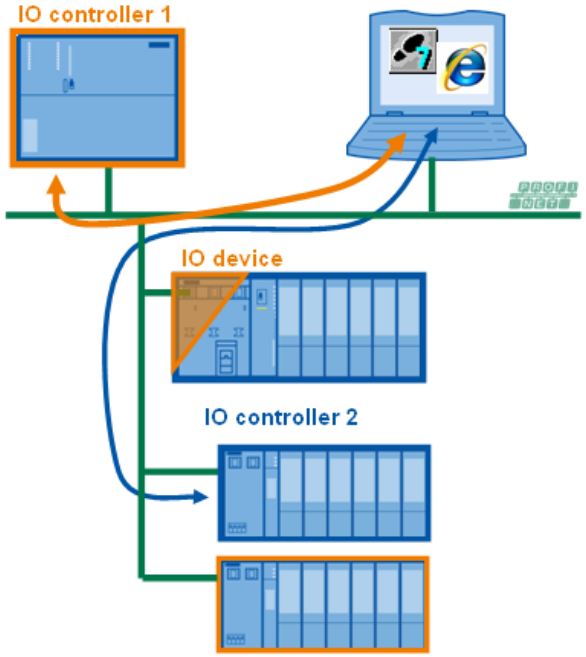
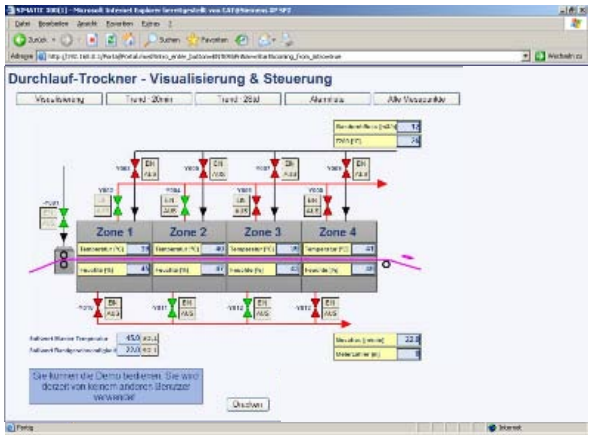
I-Device



Webapplications on Controller



Conclution

Increase in productivity thanks to ...

PROFINET

RealTime Ethernet

Distributed Field Devices

Ditributed Automation

Network Installation

Safety

Innovations

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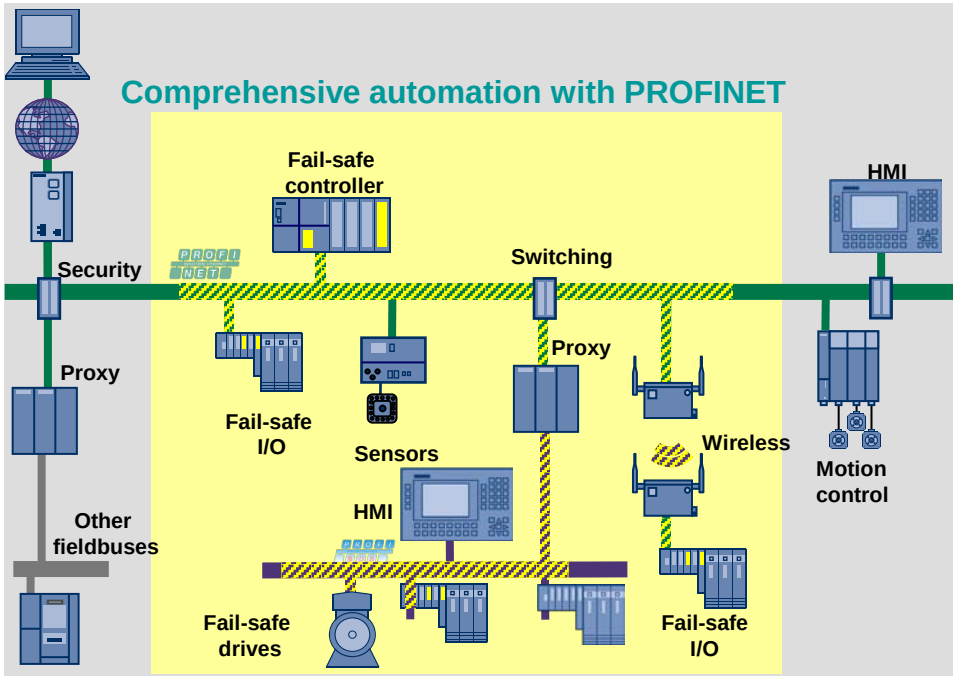
- Use of standard buses, even for fail-safe communication
- Fast fault diagnosis and rectification thanks to uniform, integrated diagnostics
- High flexibility thanks to bus-based safety technology



Reduced installation overhead , reduced spare-parts warehousing

Investment protection thanks to migration of existing solutions

Innovative solutions with wireless communication

Summery

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Distributed Field Devices
Ditributed Automation
Network Installation
Safety
Innovations
Summery

PROFINET - The Industrial Ethernet Standard for Automation

Data — I/O — Motion — Safety — iWLAN

- **PROFINET is the solution for all requirements**
- **in automation**

- A sole supplier for our customers
  - PROFIBUS - the world's leading fieldbus
  - PROFINET- the innovative and comprehensive Industrial Ethernet Standard

  - PROFINET - Flexible in use, with new innovative functions to make your application faster, more robust, reliable and safe.

PROFINET®

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Thank you for your attention!

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- http://edge.mfi.org.ph/profibus-symp