PROFINET – The Open Industrial Ethernet Standard For Automation

- Functional Scope
- Communication
- Decentral Periphery
- Distributed Automation
- Fieldbus Integration
- Installation
- IT-Integration
- Security
- Safety
- Motion Control
- MES
- Certification

The Open Industrial Ethernet Standard For Automation

What is PROFINET?

PROFINET is the open Industrial Ethernet Standard for Automation of PROFIBUS International.

PROFINET covers all requirements of the Automation Technology.

PROFINET ...

- **Is Based on Industrial Ethernet**
- **Uses TCP/IP and IT Standards**
- **Is Automation in Real-Time**
- **Enables Seamless Integration of Fieldbusses**

PROFINET as Modular Technology

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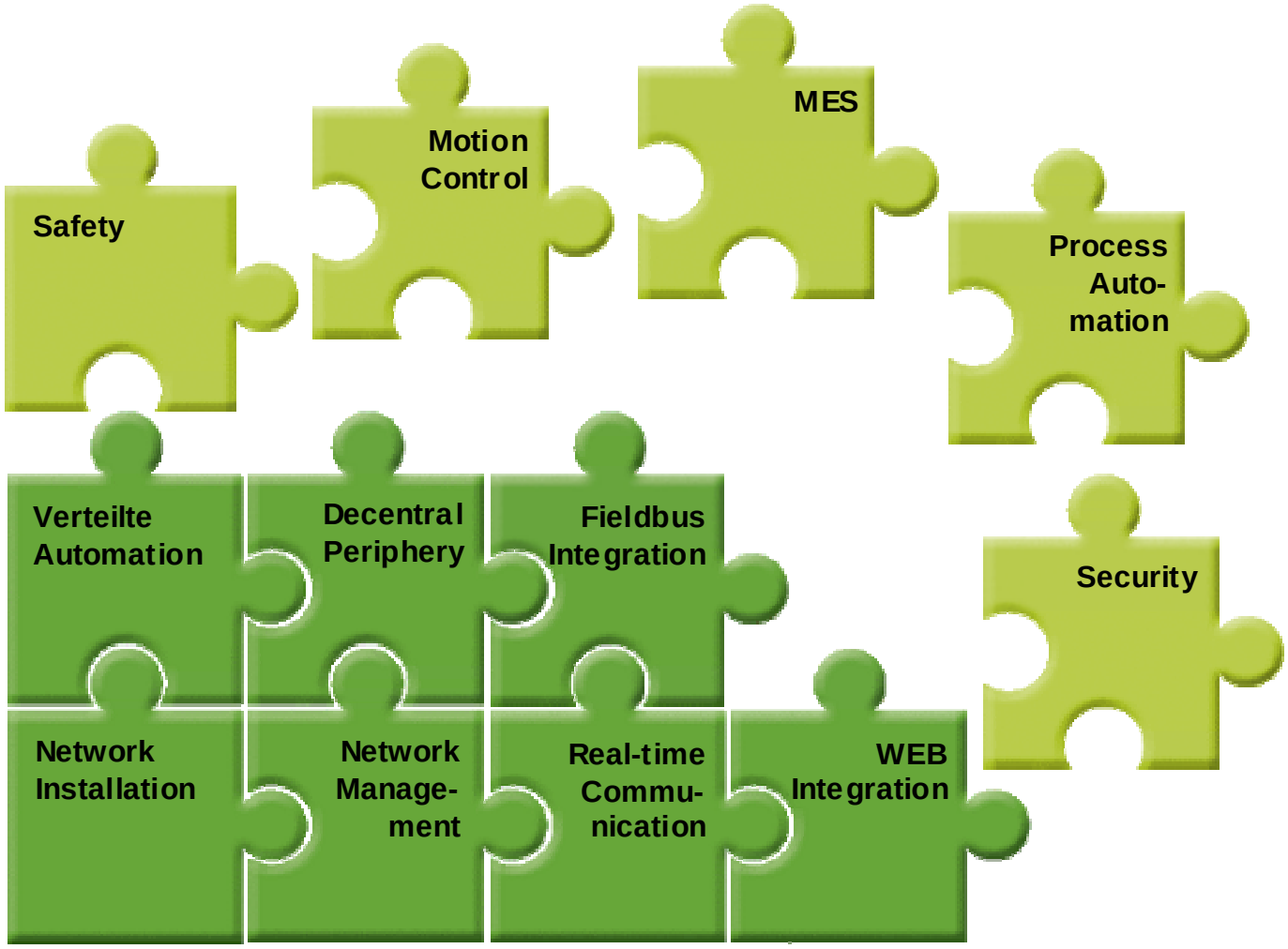

Innovative Power

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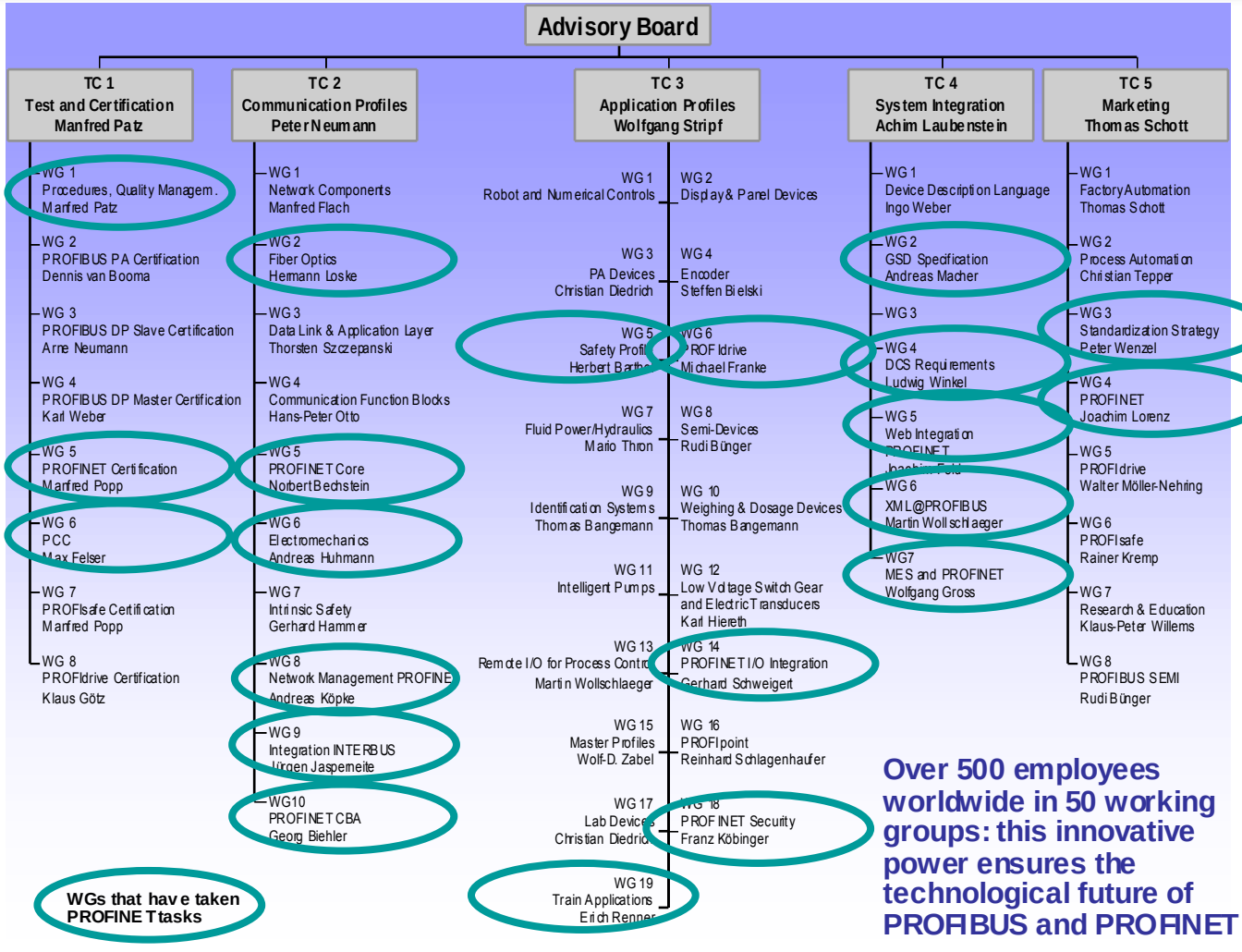

PROFINET Real-time Communication

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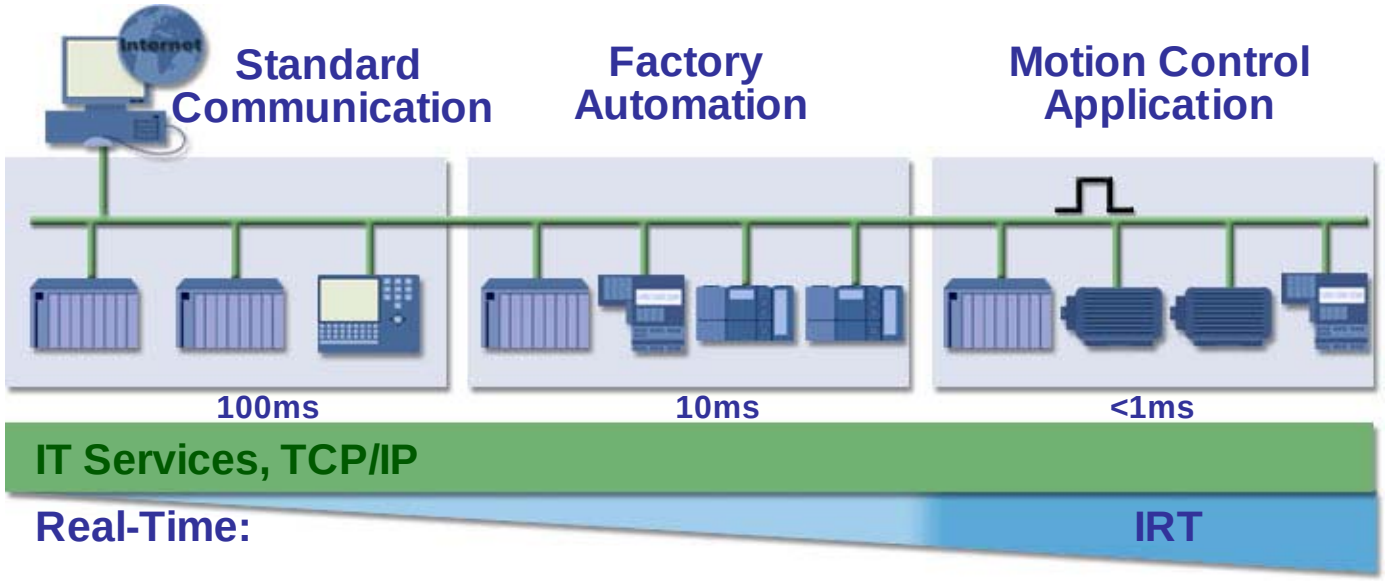

Uniform communication for all customers need

- **scalable Real-time communication from high-performance to isochronous**
- **IT Services and TCP/IP openness without any restrictions**
- **and everything on <u>one</u> cable**

Communication Channels at PROFINET

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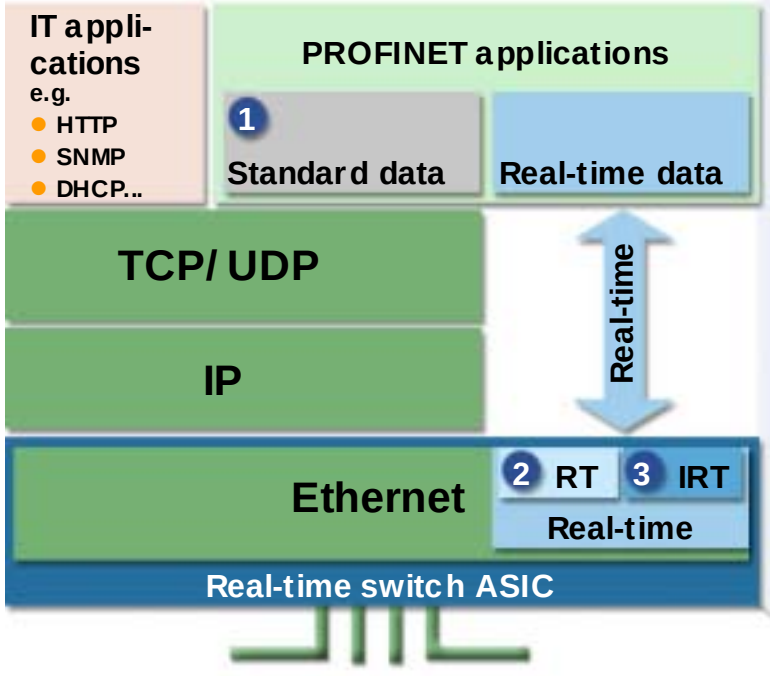
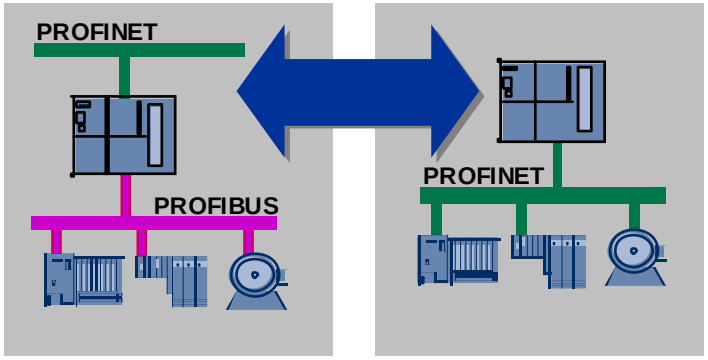


1 Open TCP/IP channel
- Device parameterization
- Reading of diagnostics data
- Loading of interconnections
- Negotiation of the communication channel for user data

2 Real-time channel RT
- High-performance transfer
- Cyclic data
- Event-controlled signals

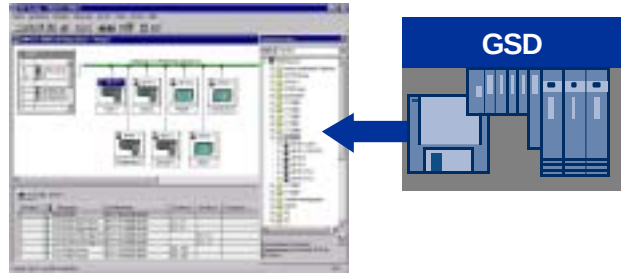
3 Real-time channel IRT
- High-performance transfer
- Data in isochronous mode
- Jitter <1µsec

Decentral Periphery – How is PROFINET Implemented



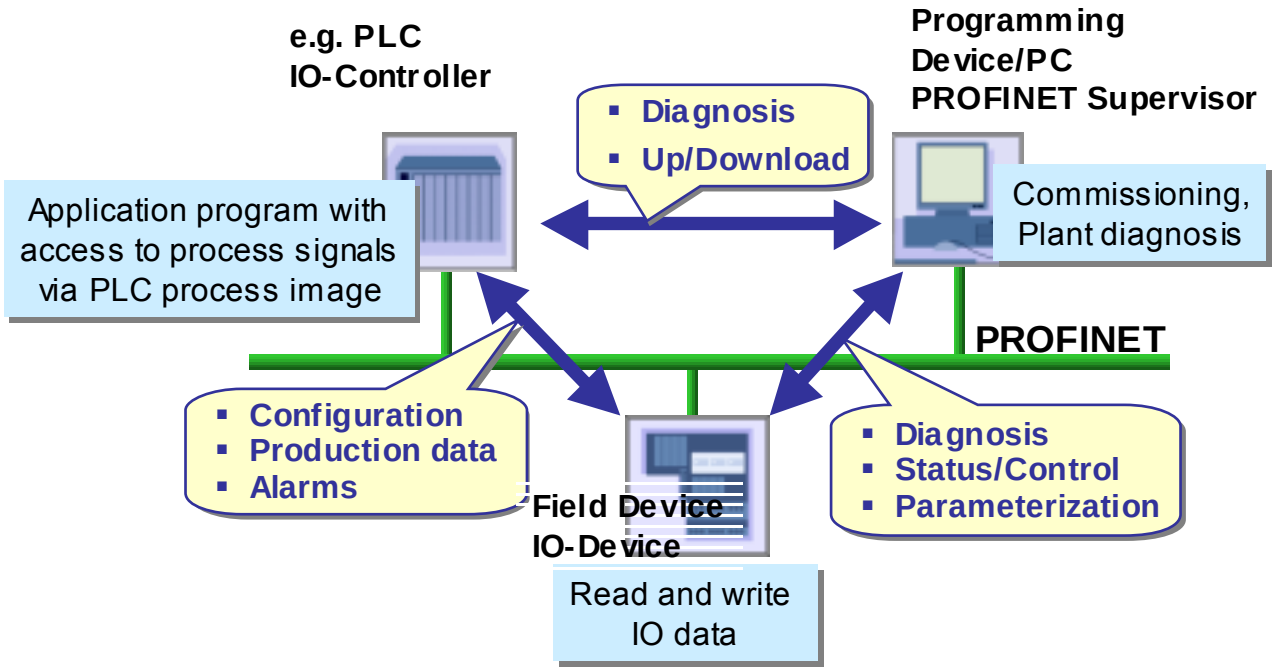
- **Decentral Periphery: only the bus interface changes**
- **Periphery boards can be used universally**

- **Device Configuration**
  ➡ **in well known way**
- **PLC-User program**
  ➡ **in well known way**



Flexible integration of decentral field devices on PROFIBUS and Industrial Ethernet possible → Investment Protection

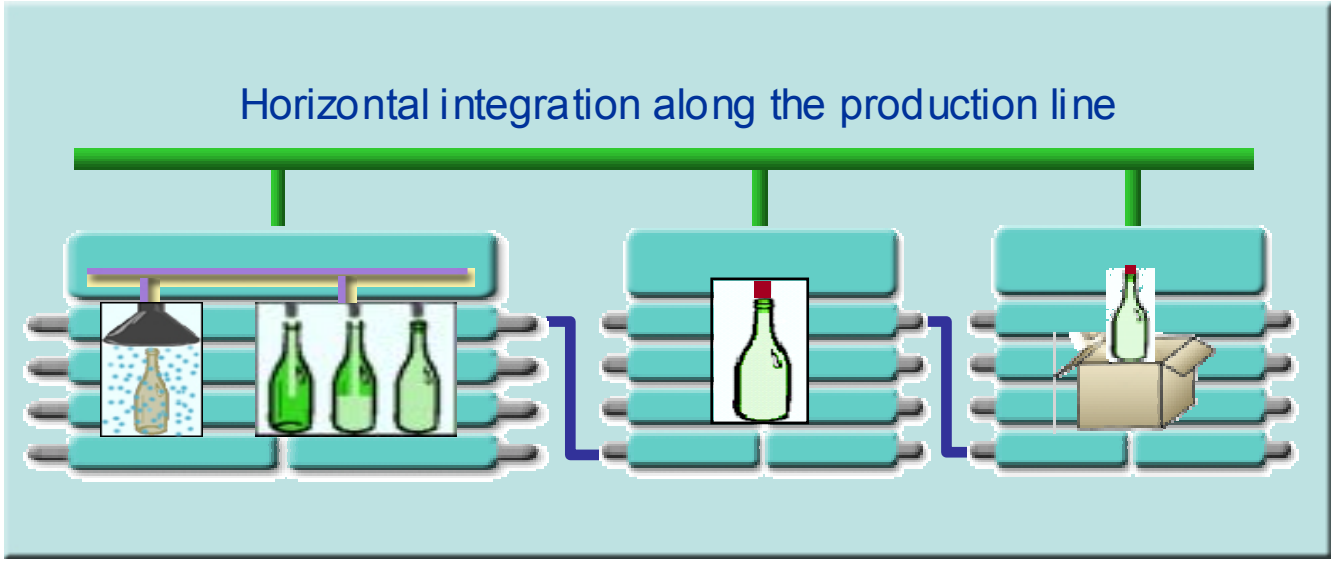
Device Designation and their Roles



Distributed Automation – Plant View

Plant is structured in logical parts (components)

- **standardized component description**
- **open communication between components**



PROFINET CBA – The solution for distributed automation

Distributed Automation – Engineering

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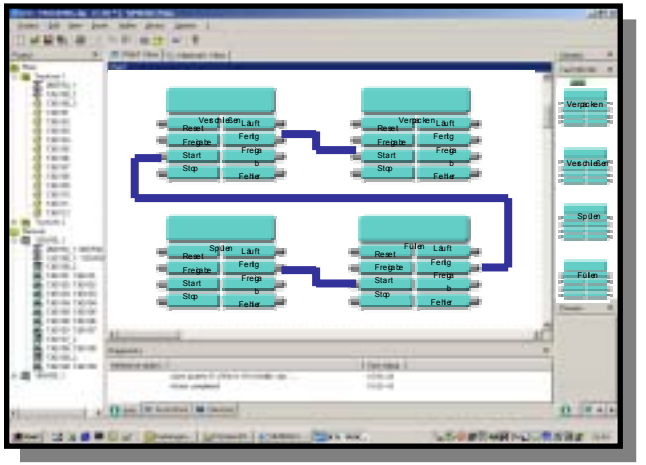
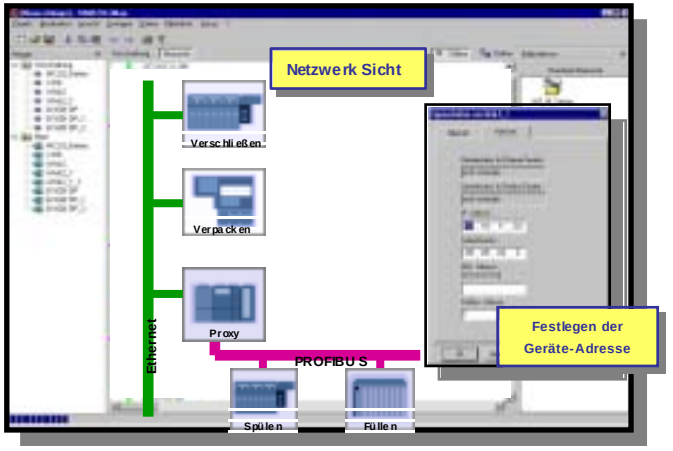
Configuring the communication. No programming.

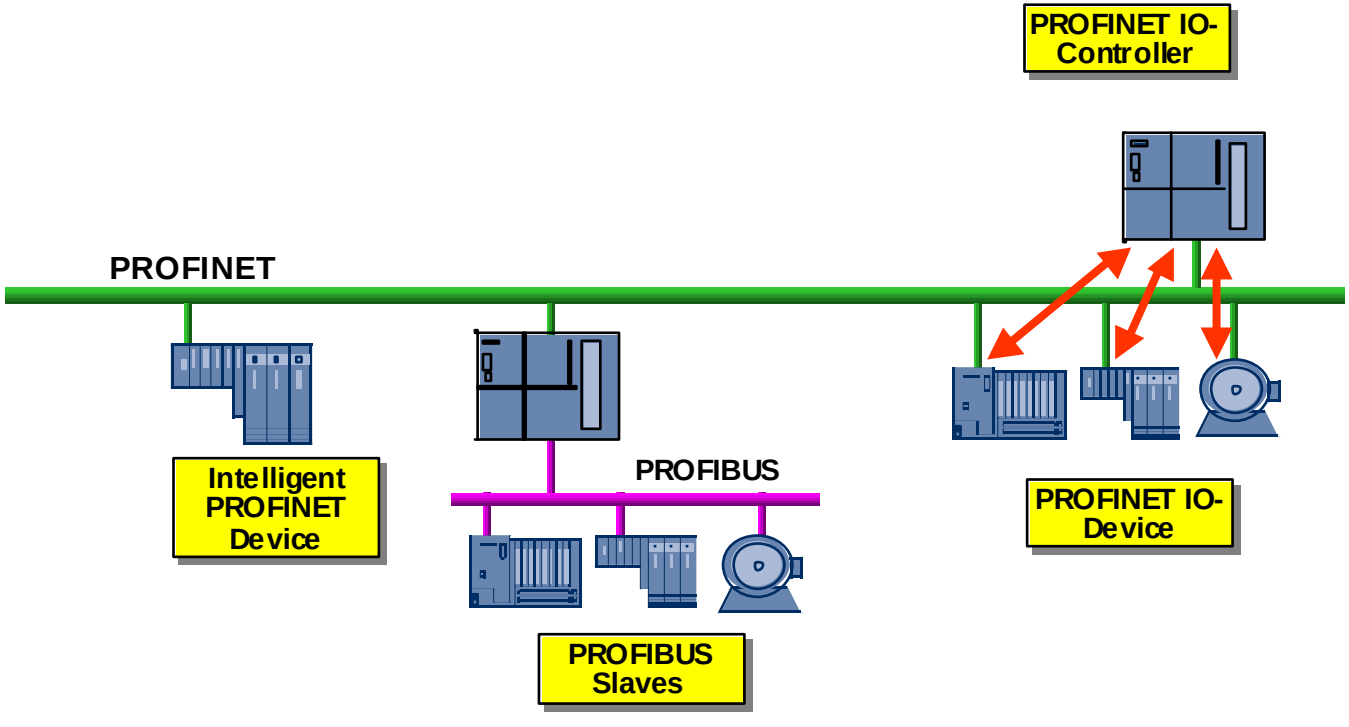
- **Drag & Drop**
- **Use of technological interfaces**





here: Example with Siemens SIMATIC iMap

Combination of Applications – PROFINET IO –



PN IO: PROFINET IO Communication: Data exchange between IO-Device and IO-Controller over Ethernet

Combination of Applications – PROFINET CBA –

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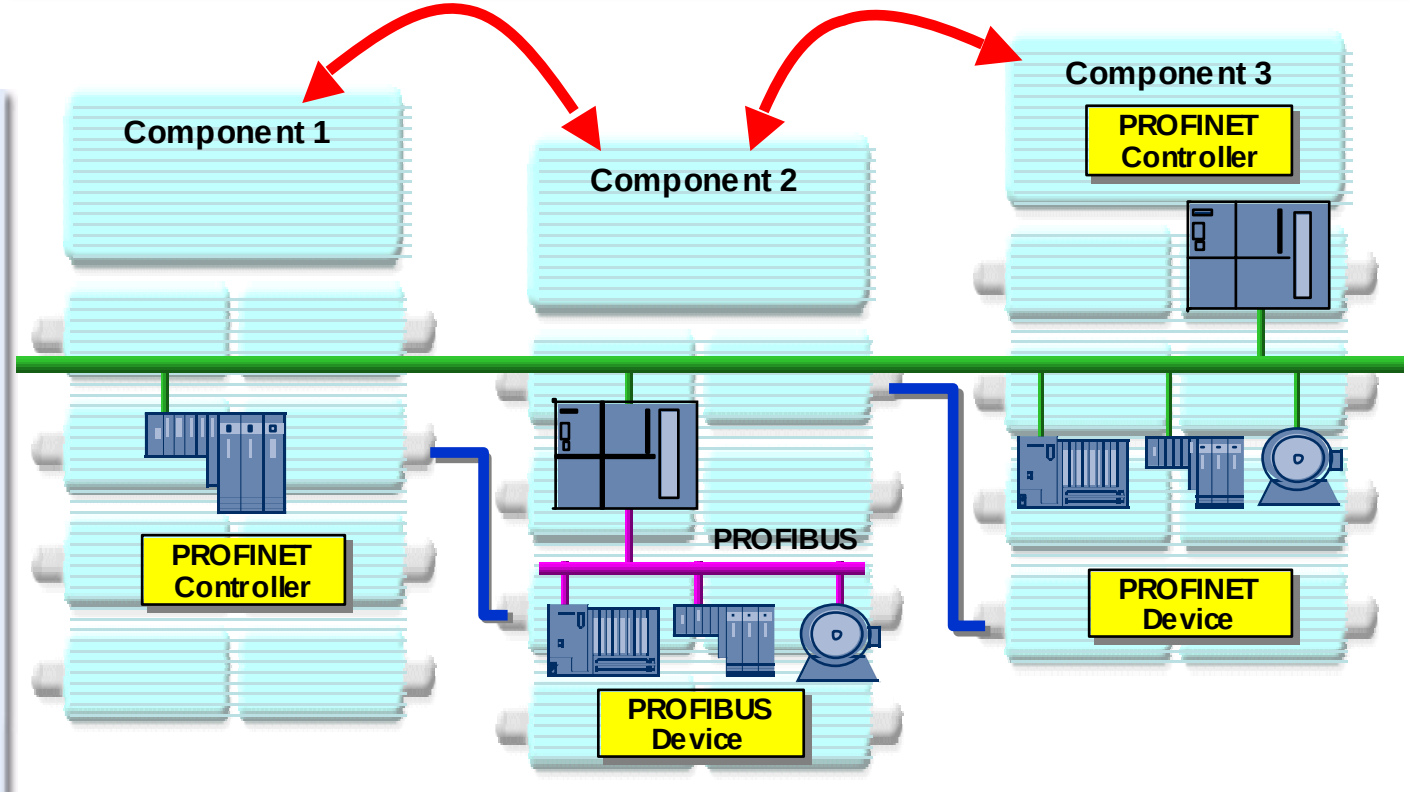


PN CBA: 1. Component Generation
2. Component Interconnetion

Combination of Applications

PROFINET IO

- **Same I/O view like PROFIBUS DP**
- **I/O signal assignment to the controller in the process image**
- **Configuration in the vendor specific tool with hardware configuration and programming languages**
- **Reusability on module level**

➔ **I/O Connection**

PROFINET CBA

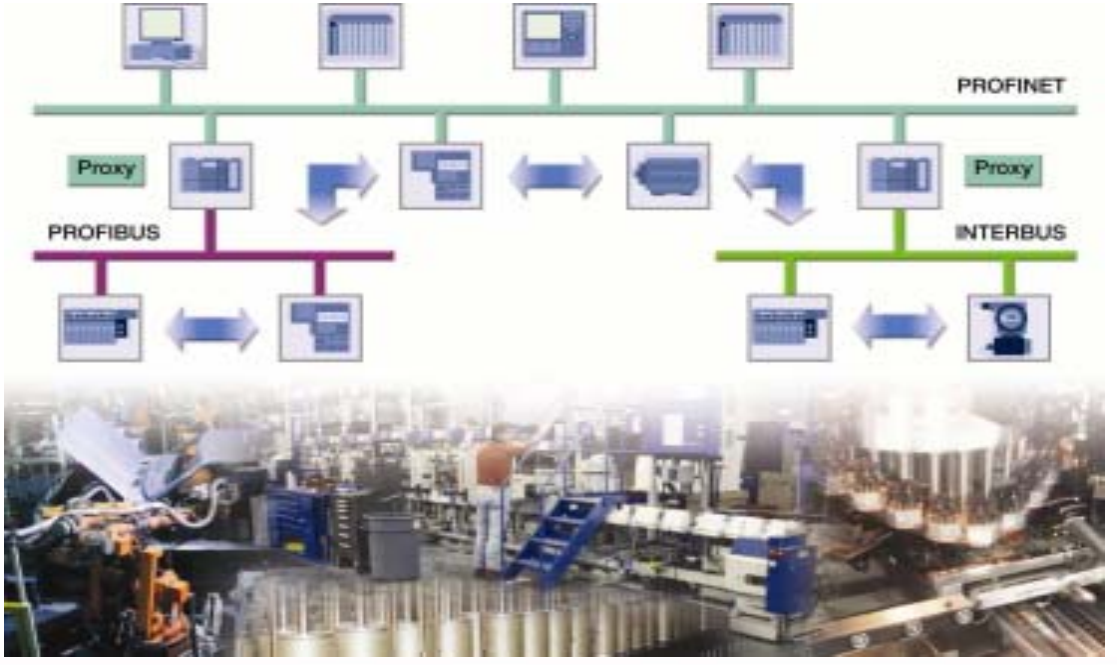
- **Superior plant view**
- **Definition of communication interfaces**
- **Configuration with a vendor independent tool on plant level**
- **Reusability on machine level**

➔ **Machine/machine communication**

Integration of Fieldbus Systems

Integration of Fieldbus Systems into PROFINET

- **Seamless Integration of fieldbuses like Interbus and PROFIBUS**
- **Investment protection for device manufacturers and end users**



Commitments to PROFINET

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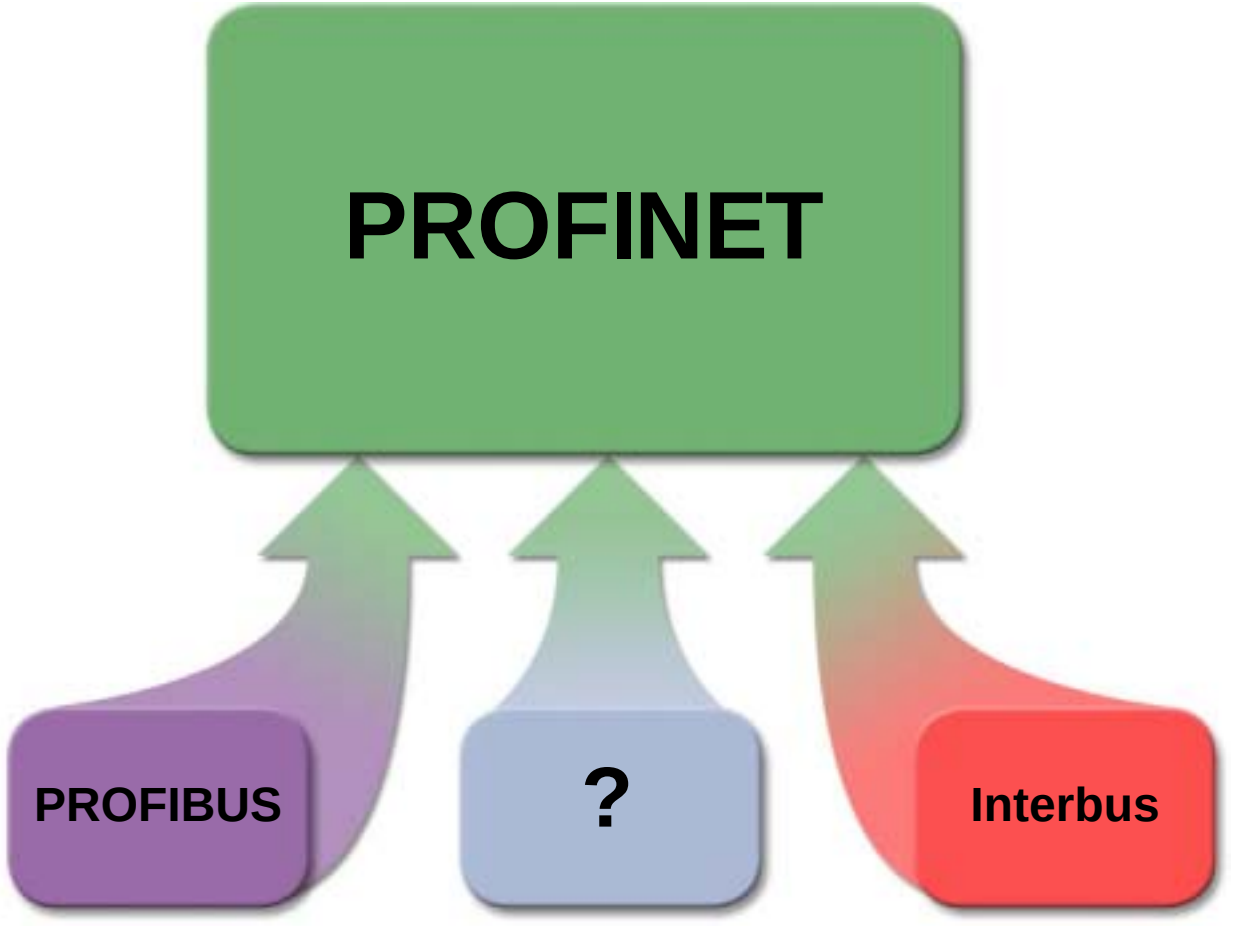
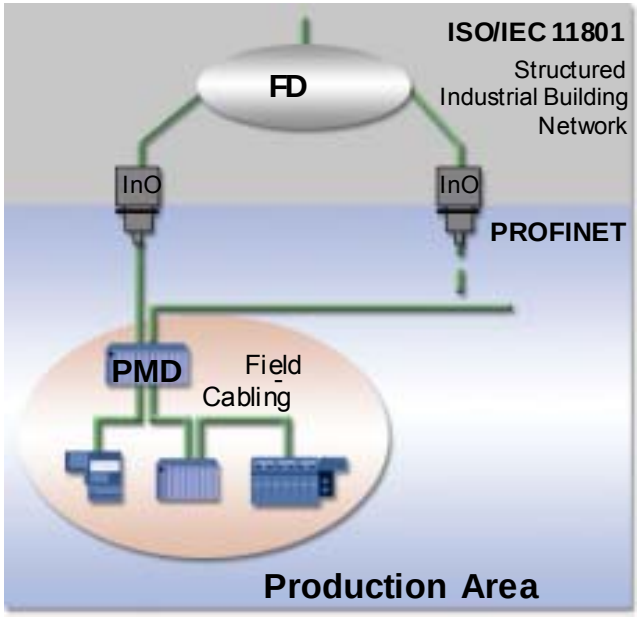


Network Installation

The PROFINET Installation Guide supplements the office oriented cabling standards by considering the specific conditions of industrial environment

- **Machine builder and plant operator:**
  - The user get rules for the installation of Ethernet networks.
- **Device manufacturer:**
  - The PROFINET device manufacturer gets clear instructions for the device development.

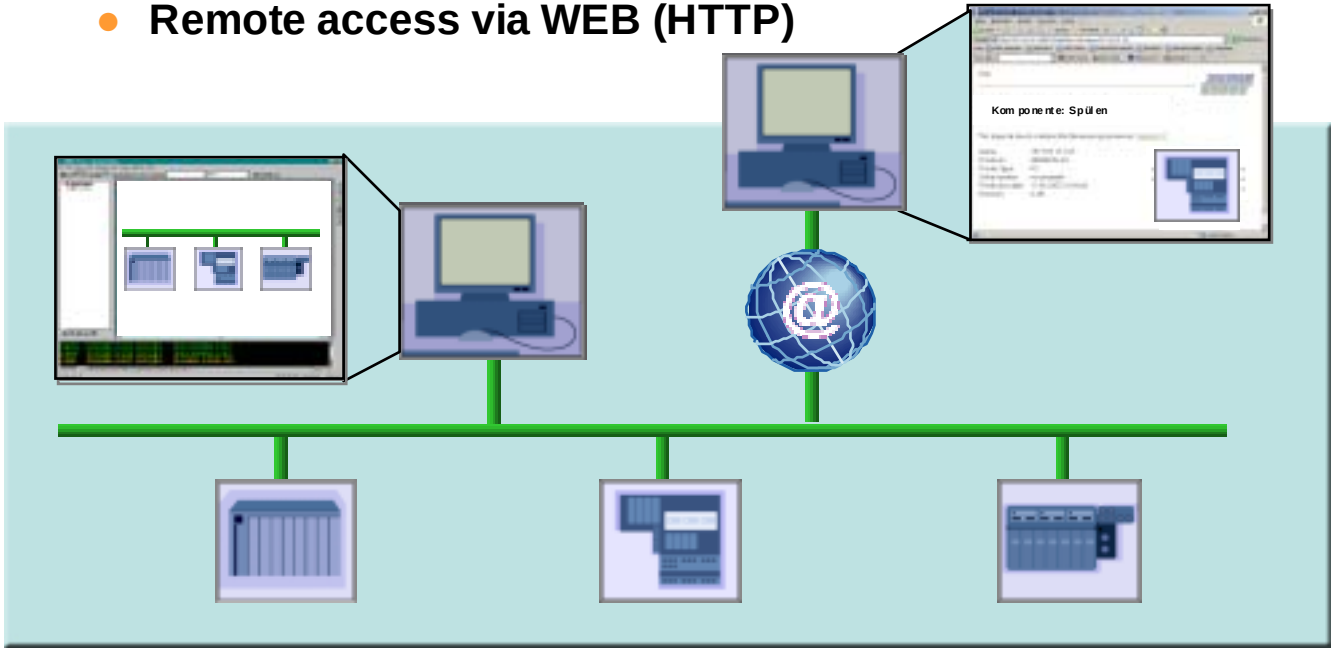


InO = Industrial Outlet
FD = Floor Distributor
PMD = PROFINET Machine Distributor

IT Standards

Use of established IT Standards

- Network management (DHCP)
- Network diagnosis (SNMP)
- Remote access via WEB (HTTP)



PROFINET Security Concept

Objectives of PROFINET Security

- Fault-free operation and protection of industrial systems and production process
- Protection of industrial communication (incl. remote access) against data espionage and manipulation
- Protection of industrial automation systems against unauthorized access (e.g.: PLC, HMI, IE/PROFIBUS links)
- Extended use of existing, open and field-tested IT security standards

Protection for "automation cells"

- A ”cell” consists of 1 up to n network nodes and corresponds to a protected network segment
- Access control at the ”cell entrance” using security network components
- Protection of devices without their own security functionality within a cell
- Simultaneous protection of several devices
- Real-time communication unaffected within the cell
- Secure channel, therefore secure communication between cells
- Industrial Ethernet / PROFIBUS links are equivalent to network nodes, so that lower-level PROFIBUS networks are also protected.

The Cell Concept of PROFINET Security

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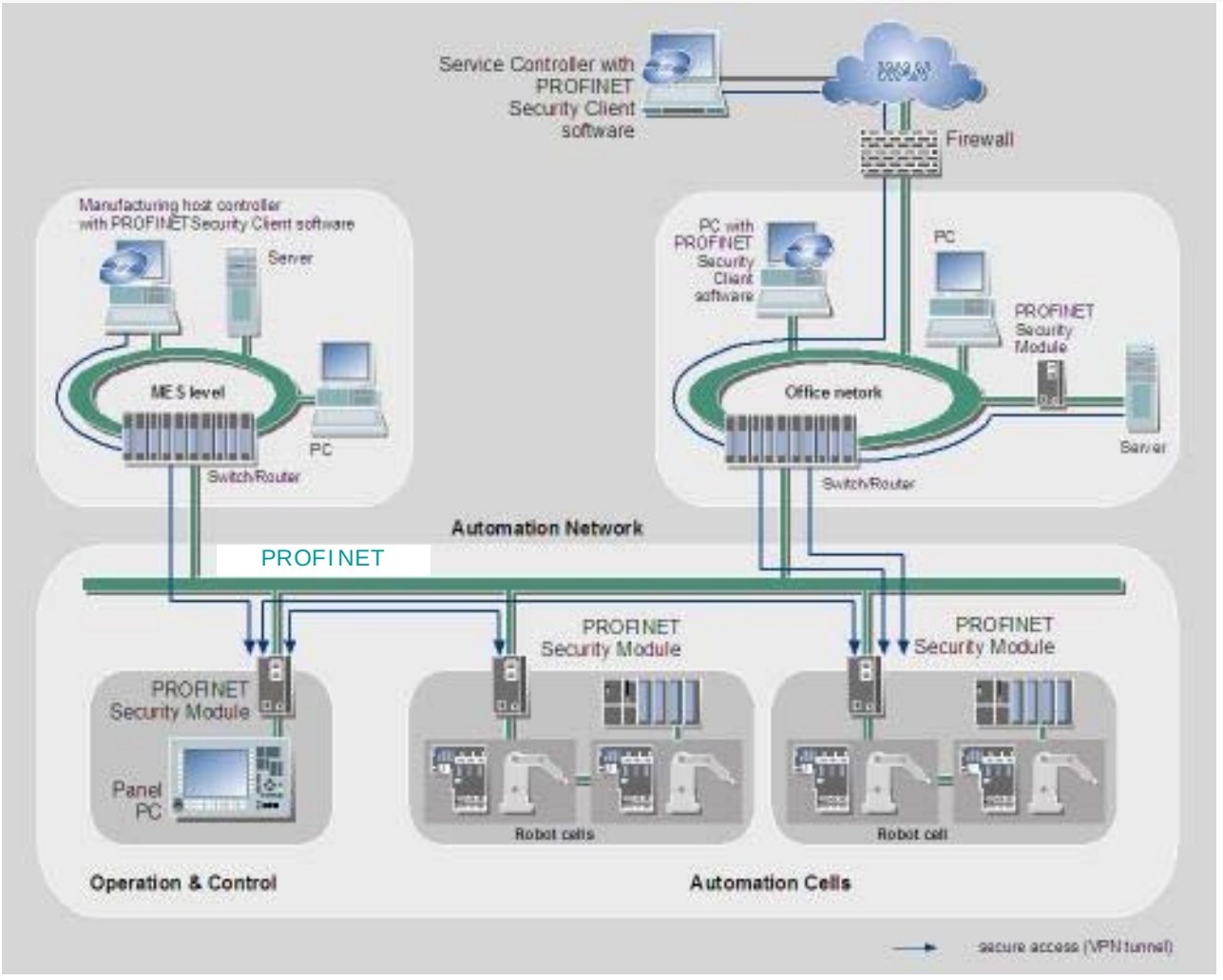
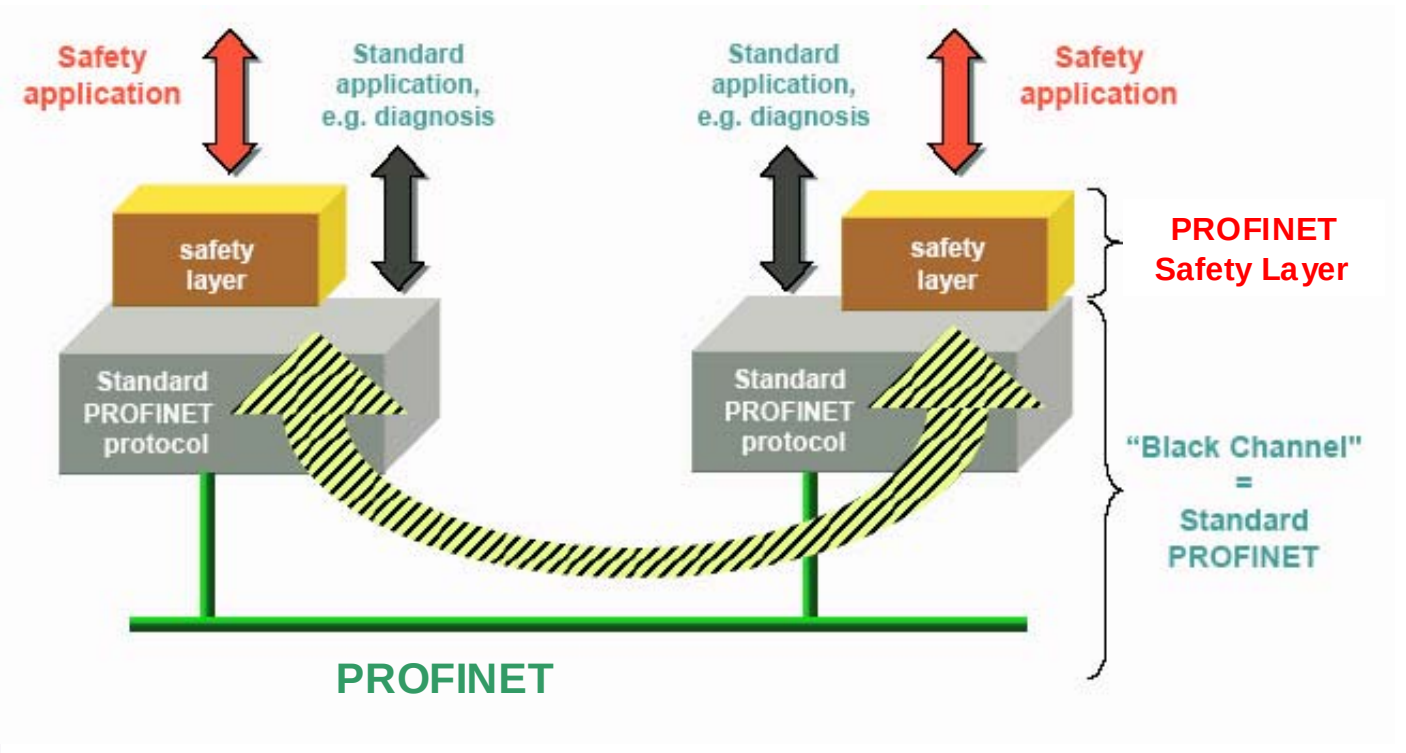
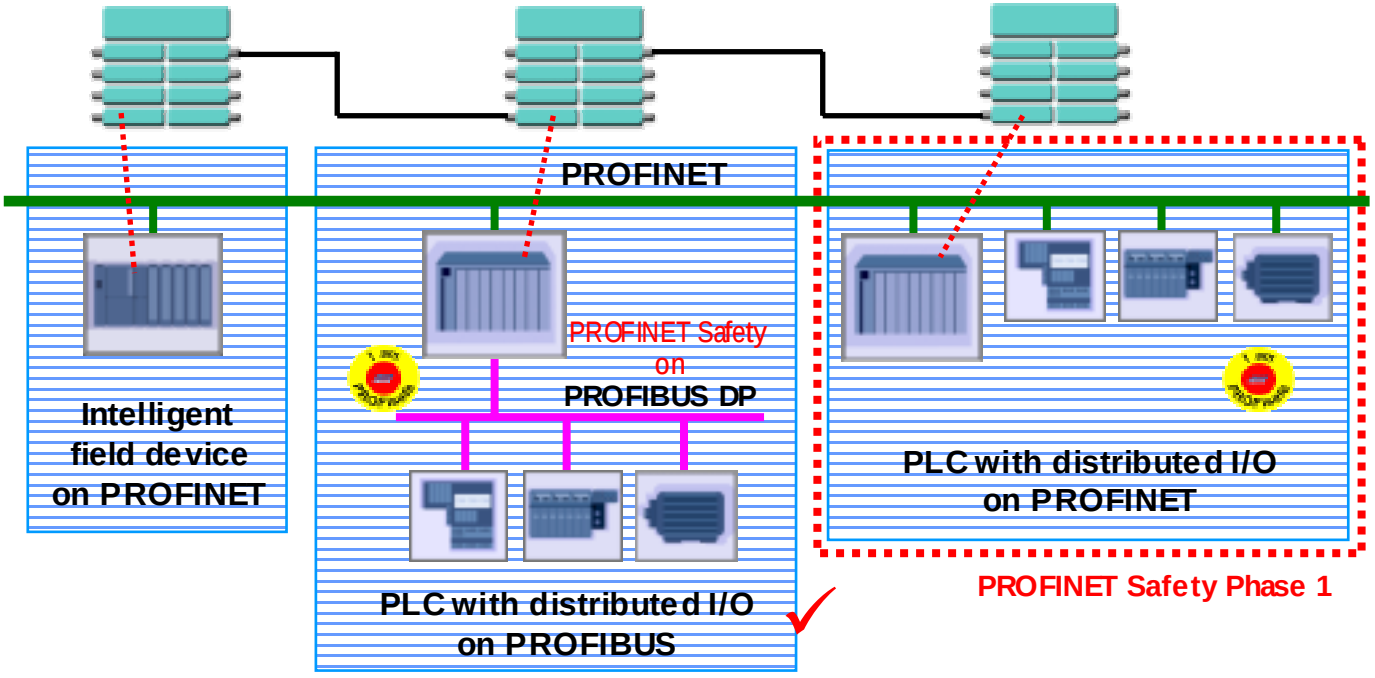


Concept for PROFINET Safety



PROFINET Safety:
One Cable for Standard Applications and Safety Applications

Availability of PROFINET Safety



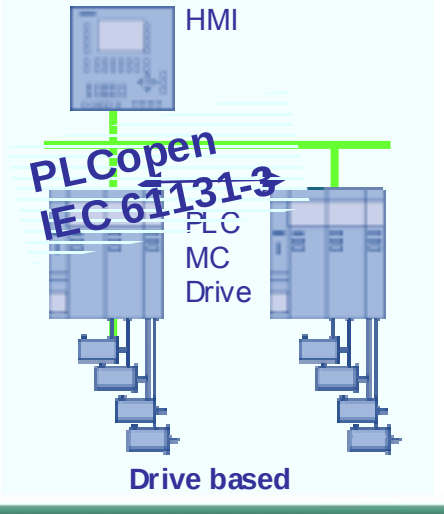
Milestones for PROFINET Safety:

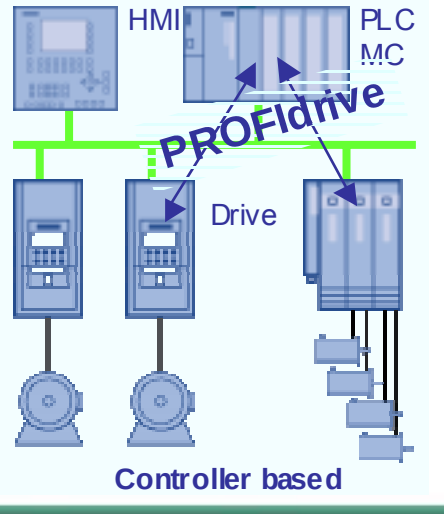
- **Adjustment with TÜV, BIA**
- **Draft Specification: Hanover Fair 2005**
- **Final Specification: 3.Q 2005**
- **First Pilot Applications are Planned for End of 2005**

Motion Control with PROFINET

Advantages at a glance

- **Highest Performance – concerning number of axes, amount of data and cycle times**
- **Contemporaneous open TCP/IP Communication for e.g.: innovative diagnosis and maintenance functions**
- **Suitable for all automation concepts**
- **Openness, interoperability und vendor independent**
- **Security, safety and Availability applicable**





MES and PROFINET

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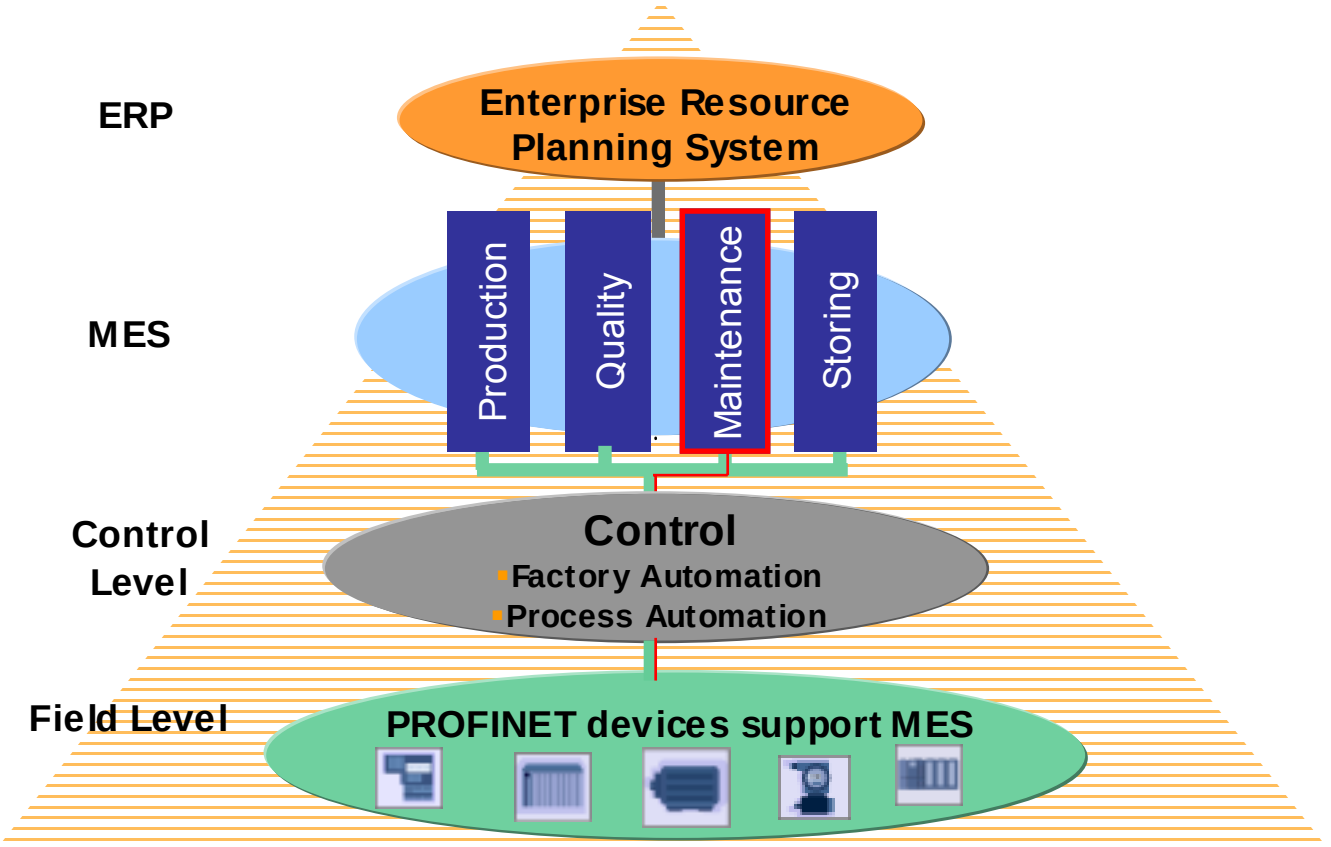

First Phase at PROFINET:

Definition of Interfaces for MES-relevant Maintenance Information

PROFINET Certification

PROFINET Certified

Certification is **mandatory** for PROFINET

- **Certification follows the scheme approved with PROFIBUS through accredited Test Labs**
- **Certification is mandatory for rollout of PROFINET Products**
- **Uniform test scope and test process**

  Conformity with the specifications, correctness of the device model implementation, interoperability with other PROFINET stations