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Workshop – PROFINET in Process Automation

Workshop: *PROFINET in Process Automation*
Agenda

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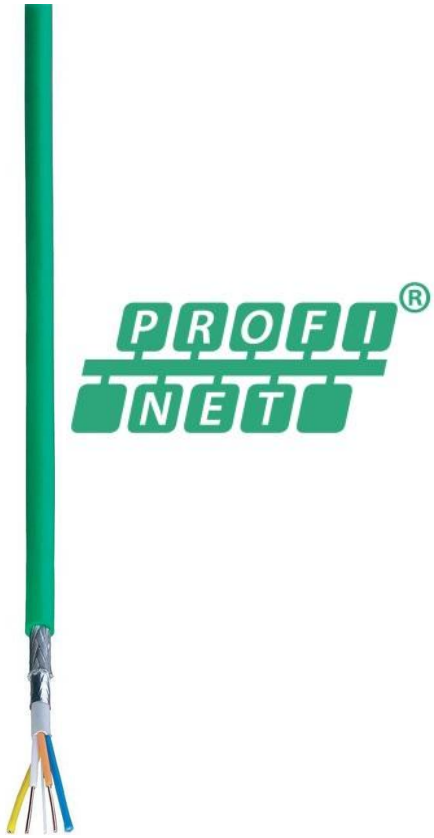

- PROFINET in Process Automation
  - Requirements of the Process Industrie
  - PROFINET - One solution for all applications
  - Highest availability and scalability with PROFINET
  - Investment protection over the whole life cycle of the plant
  - Benefits of PROFINET in Process Automation
- Migration of PROFIBUS-DP to PROFINET
  - Live Demo
- PROFINET System Redundancy
  - Live Demo
- PROFINET Roadmap

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Requirements of PROFINET in Process Automation

Requirements of the Process Industrie

The requirements of the Process Automation are significantly different to the requirements of Factory Automation.

- *Higher availability and scalability required*
  - Operating time 24 hours per day and 365 days per year
  - Changes in Run
- *Life cycle of the plant 20 years and more*
  - Investment protection
- *Higher quantity*
  - Plants up to 100.000 I/O-Signals
- *Connection of Field devices*
  - 2-wire
  - Bus powered
  - Intrinsic safe (hazardous area)

PROFINET - One solution for all applications

Factory Automation

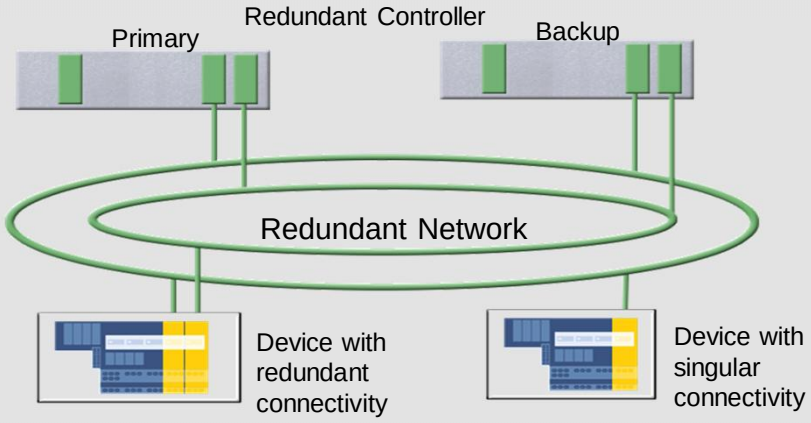
Motion Control

Process Automation

One technology for all applications!

Highest availability and scalability with PROFINET

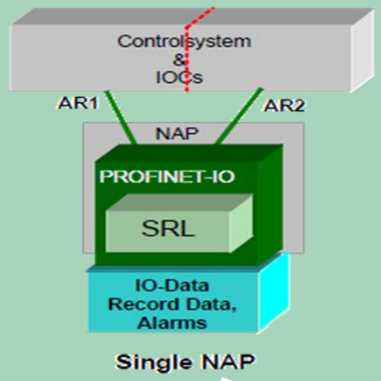
System Redundancy



Functionality:

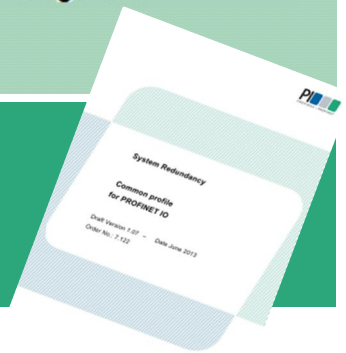
The PROFINET device builds up more then one Application Relationship (AR) to the redundant controller.

The support of System Redundancy is defined for PROFINET devices, which are used in PA, as mandatory in the CC-B (PA)

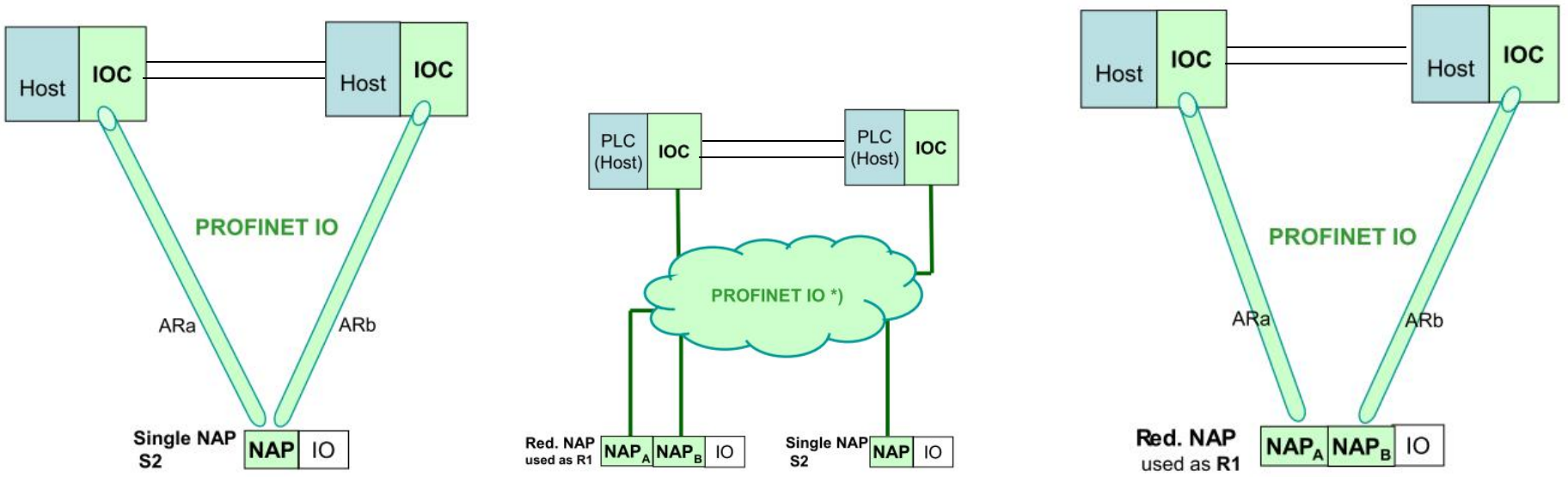


Advantages by using PROFINET System Redundancy

- Higher availability
- Higher scalability



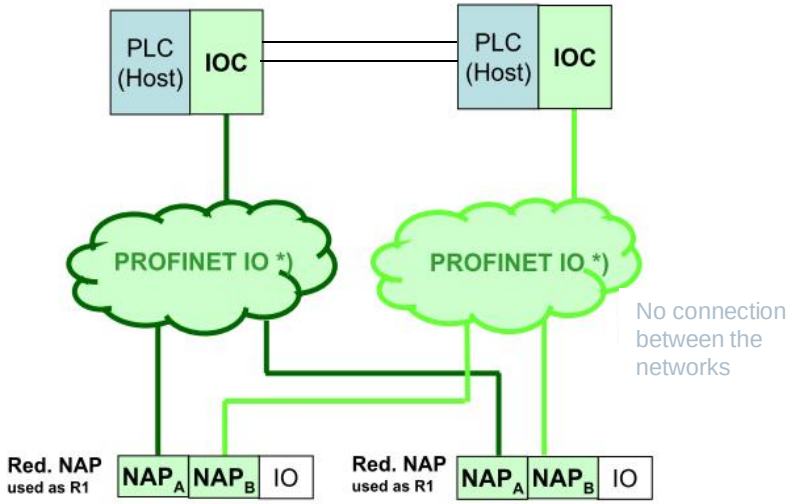
Highest availability and scalability with PROFINET



System Redundancy in a non redundant PROFINET network

- Redundant PROFINET Controller with single PROFINET interface
- PROFINET Device with single PROFINET interface (**S2** System Redundancy)
- PROFINET Device with redundant PROFINET interface (**R1** System Redundancy)

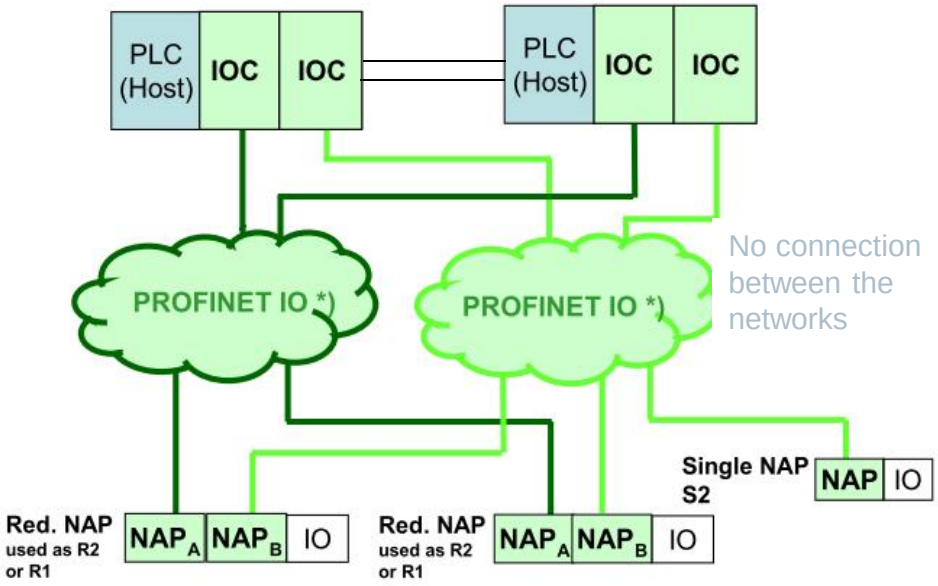
Highest availability and scalability with PROFINET

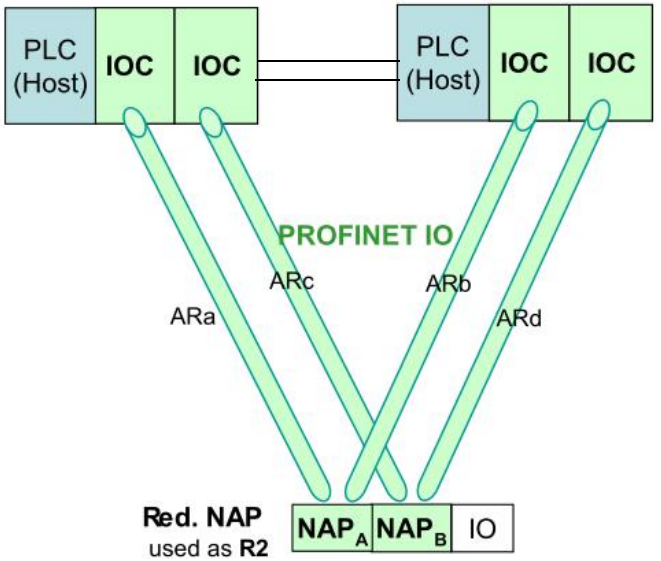


System Redundancy in a redundant PROFINET network

- Redundant PROFINET Controller with single PROFINET interface
- PROFINET Device with redundant PROFINET interface (R1 System Redundancy)

Highest availability and scalability with PROFINET



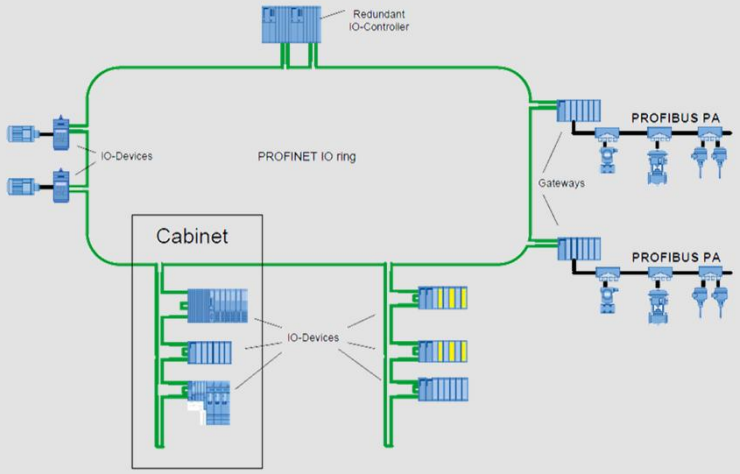


System Redundancy in a redundant PROFINET network

- Redundant PROFINET Controller with redundant PROFINET interface
- PROFINET Device with single PROFINET interface (S2 System Redundancy)
- PROFINET Device with redundant PROFINET interface (R1 System Redundancy)
- PROFINET Device with redundant PROFINET interface (R2 System Redundancy)

Highest availability and scalability with PROFINET

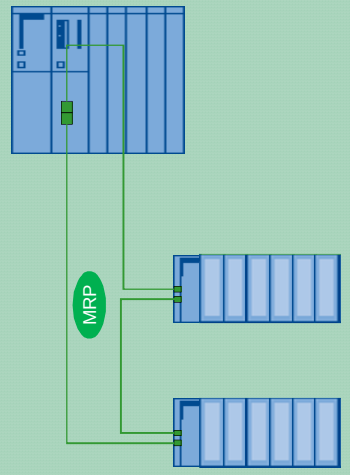
Media Redundancy



Functionality:

The PROFINET device has more than one physical connection to the controller.

It is not necessary for the PROFINET device to build up more than one Application Relationship (AR) to the PN controller.

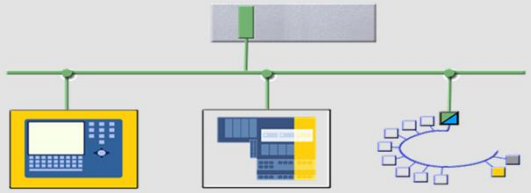


Advantages by using PROFINET Media Redundancy

- Electrical Ring installation
- No additional HW necessary
- Combination with System Redundancy possible

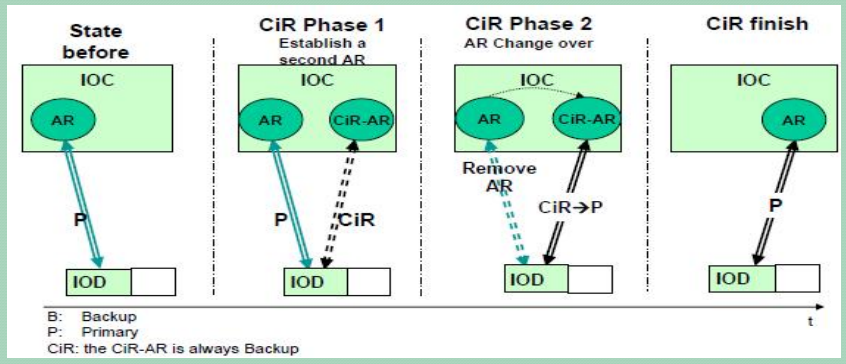
Highest availability and scalability with PROFINET

Configuration in Run



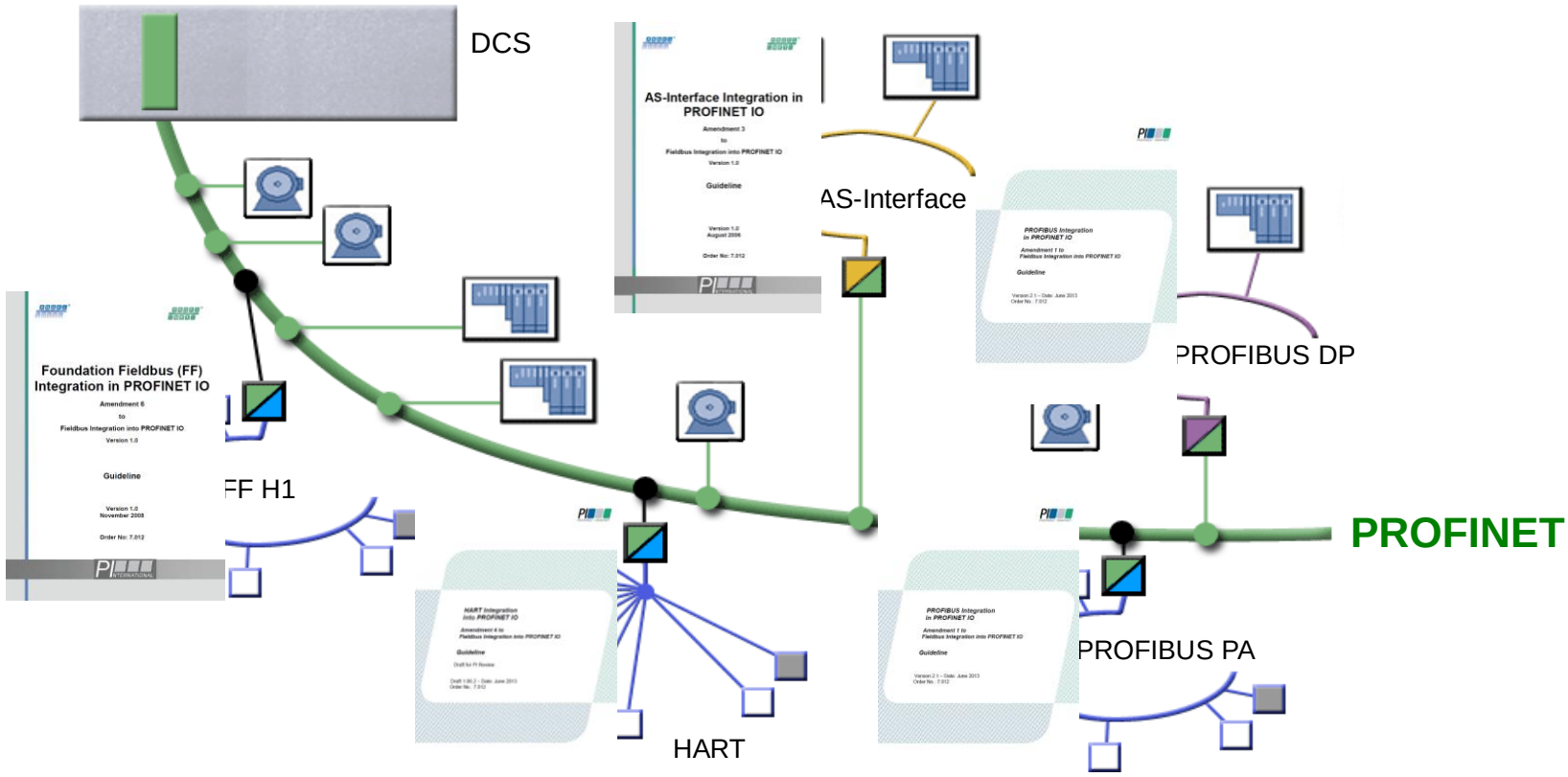
- Add, Remove and Replace of Devices
- Add, Remove and Replace of Modules
- Change of parameters

Functionality



The production process is not influenced by the Changes in Run!

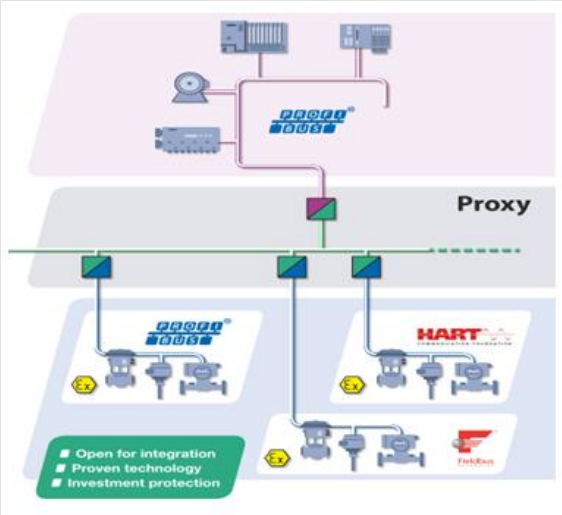
Investment protection over the whole life cycle of the plant



… by integration of existing fieldbus technologies via proxys!

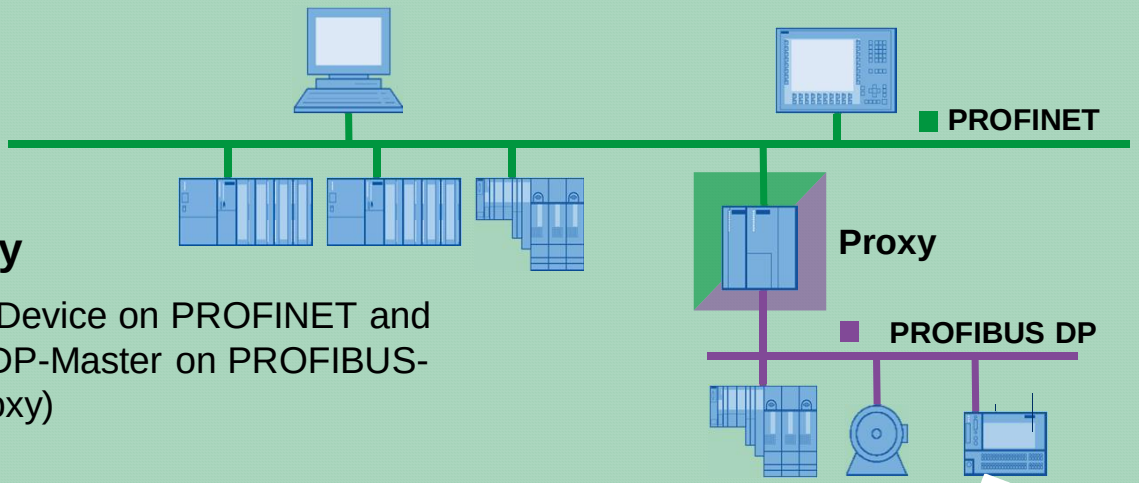
Investment protection over the whole life cycle of the plant

Proxy-Technology



Functionality

The proxy is a Device on PROFINET and for example a DP-Master on PROFIBUS-DP (PN/DP-Proxy)

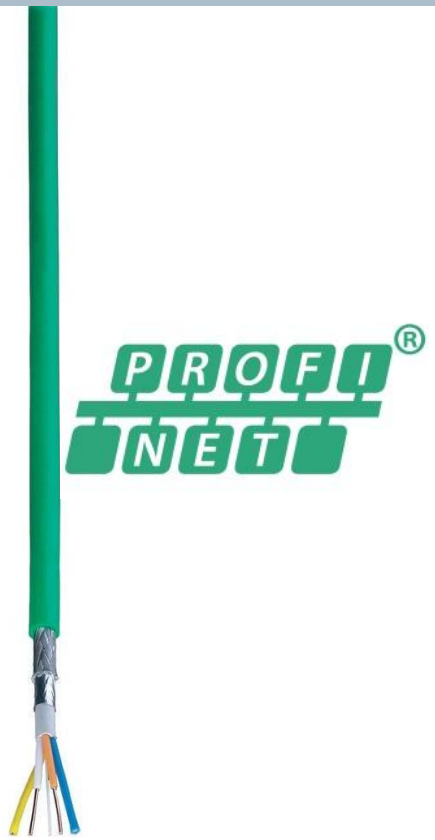


Advantages by using Proxy-Technology

- Openness by integration of existing fieldbuses and installed bases
- 100% investment protection for device manufacturer and end user.
- More than 244 Byte possible, because of that higher device count possible
- Allows step-by-step change from PROFIBUS to PROFINET

Benefits of PROFINET in Process Automation

- PROFINET is a worldwide established standard in the industry – based on standard Ethernet
- PROFINET is well proven since many of years in factory automation and motion control
- Seamless Integration from ERP/MES level to field level (horizontal integration)
- Detailed diagnostic and easier commissioning due to Ethernet mechanisms (Plug & Play)
- Complete Commissioning by automatic naming and addressing –
  Easier and faster device exchange



- 100% investment protection for the future due to integration of existing fieldbus technologies (Proxies)
- Higher scalability of the system redundancy
- Higher performance with higher data rate (100Mbit)
- Higher robustness
- More flexible topologies (Line, Star, Tree and Ring)

PROFINET is the future system backbone for PCS 7

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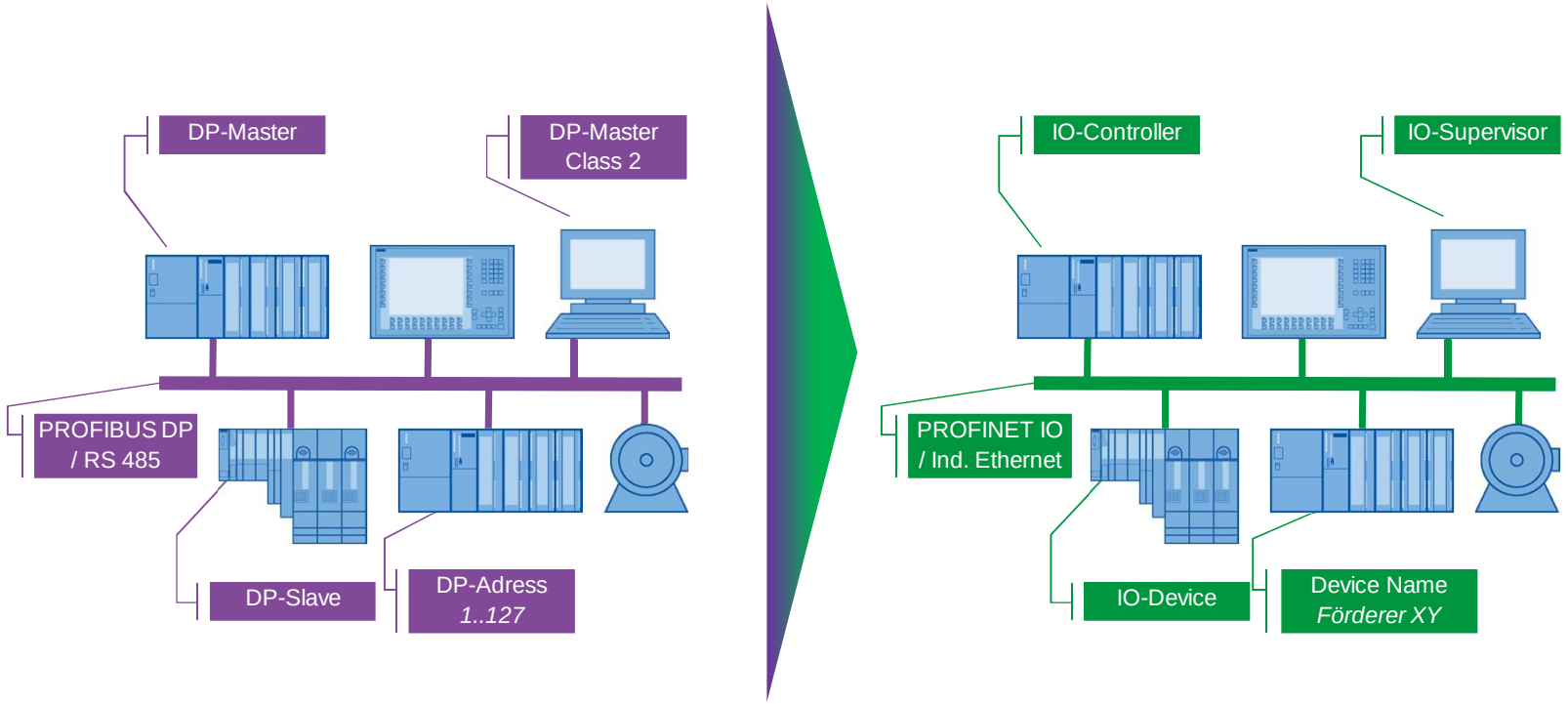
Migration of PROFIBUS-DP to PROFINET

Same concept, new names



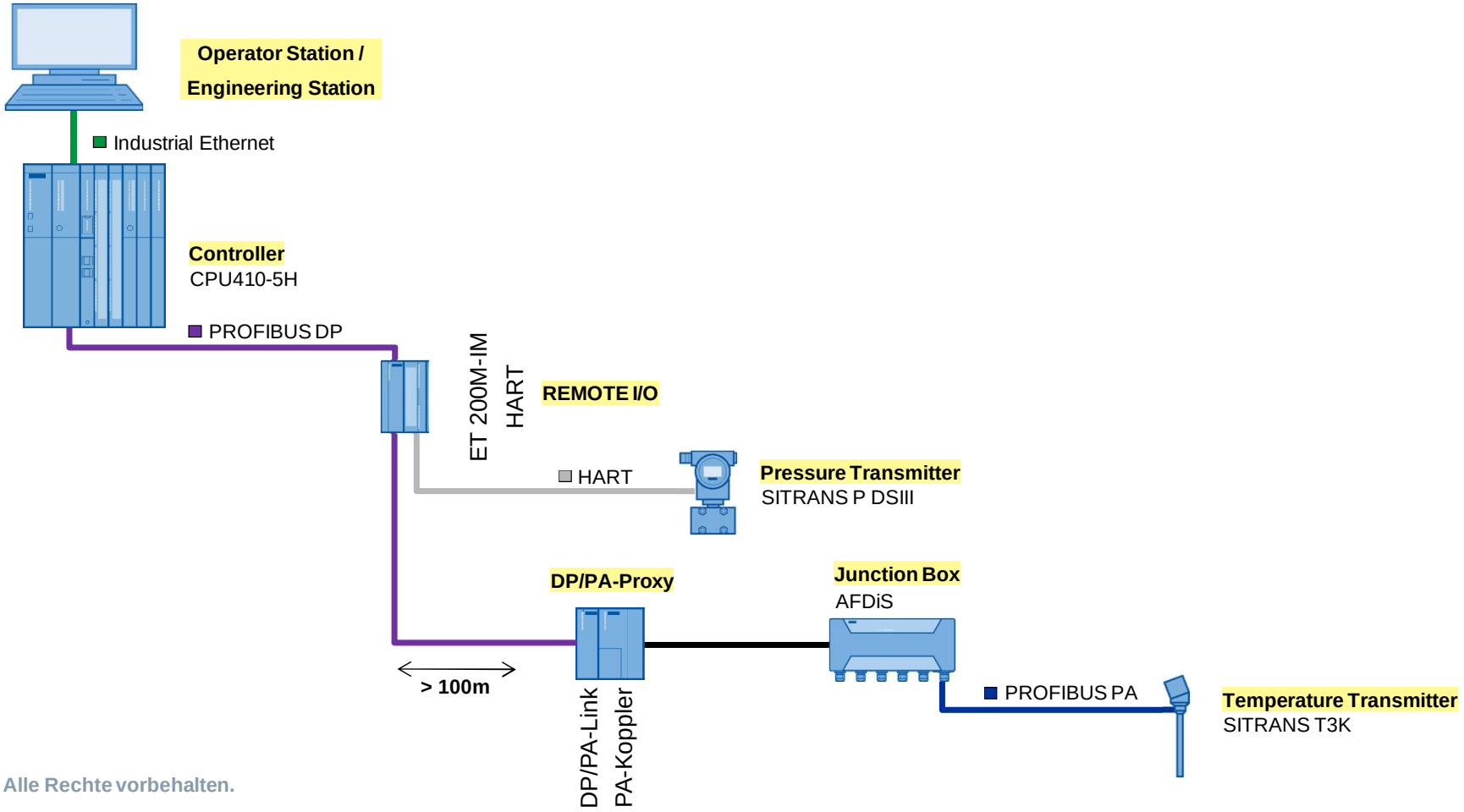
Low cost of adoption and investment protection!

What PROFIBUS DP can, PROFINET can do too…

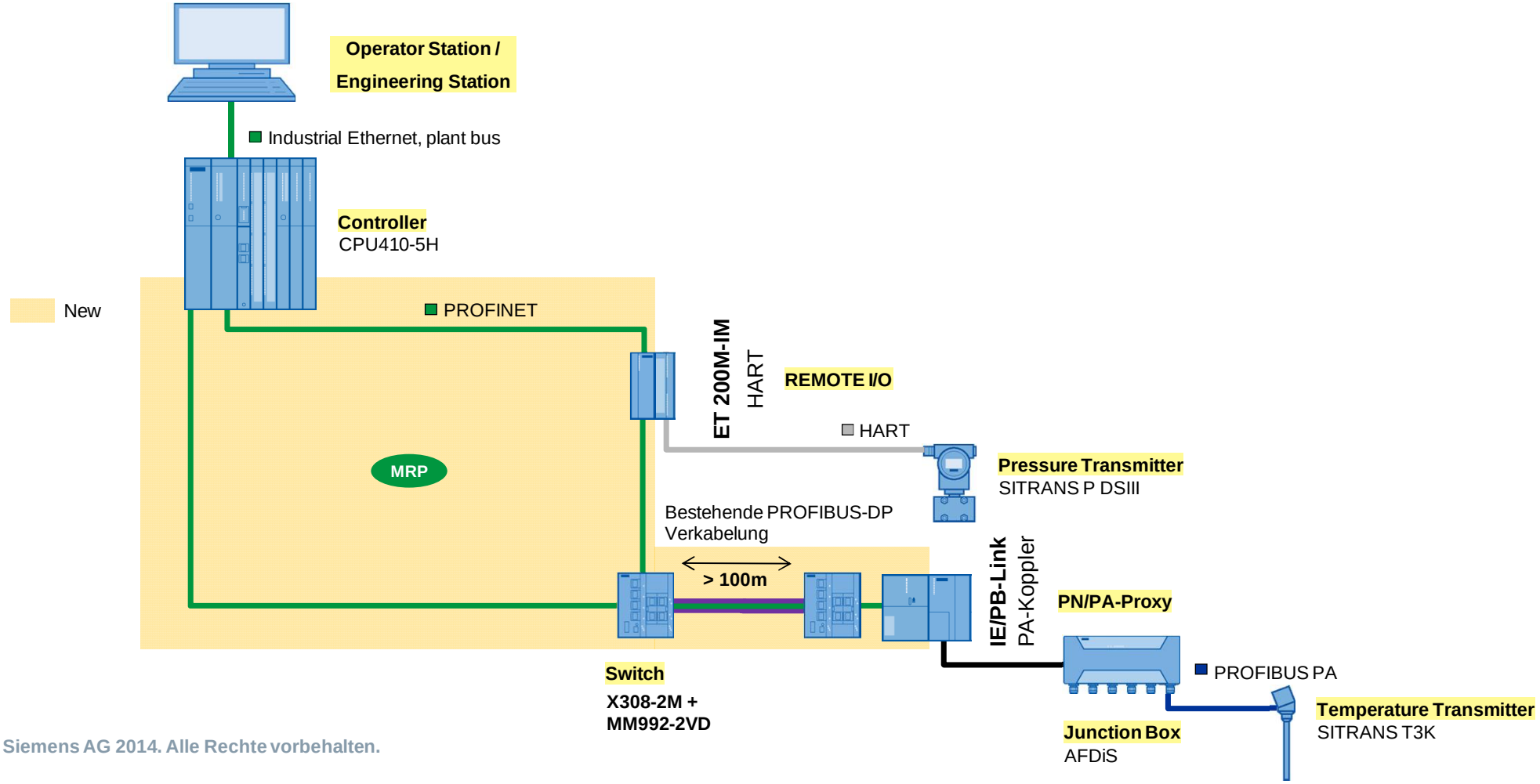
PROFIBUS DP	Functionality	PROFINET
Only one defined channel between master and slave	Data channel	Several communication channels between Controller/ Supervisor and Device possible
Same priority of communication	Data prioritization	Flexible parameterization of the data rate
Min. 300µs	Cycle time	Min. 31,25µs
244 Byte I/O	Consistent Data per Device	1440 Byte I/O
Not possible	IT-Service	Integration without limitation possible
Only one priority possible	Alarms and diagnostic	Different priorities possible
Manually DIP-Switches or via telegram	Addressing	Automatic by controller or manual by engineering system (device exchange without engineering station)
Max. **12 Mbit/s** (Token)	Data rate	***100 Mbit/s*** (full-duplex)
Normally: Line Limited: Tree and Ring Termination necessary	Topology	Line, Star, Tree, Ring and combination possible

… and much more!

Live Demo: PROFIBUS-DP Installation



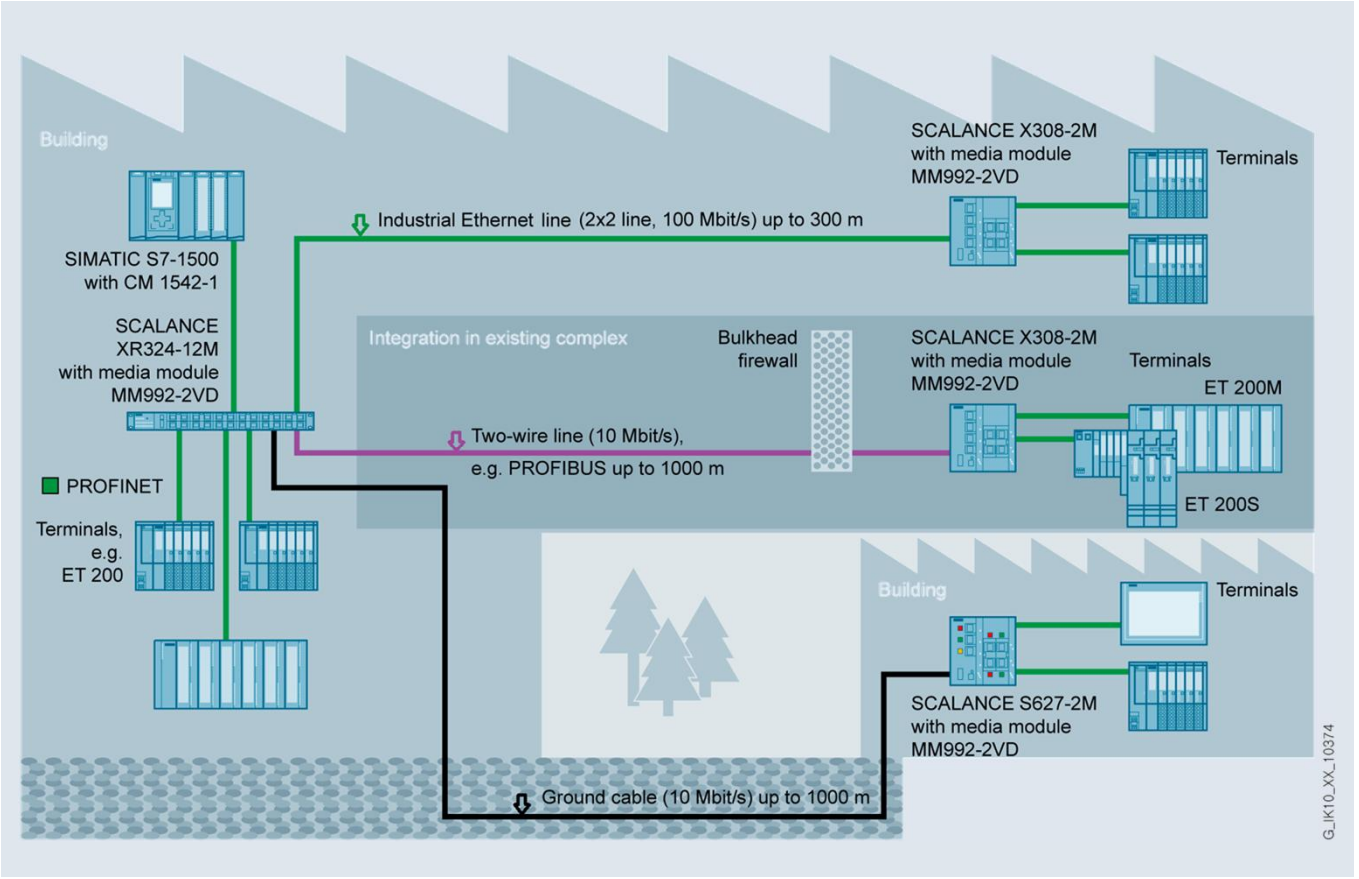
Live Demo: Migration from PROFIBUS-DP to PROFINET



MM992-2VD
Example of an application

Possible uses of the VD module:

1. Use of Ethernet cables distances >100m
2. Retrofit
3. Use of existing two-wire cables in VD mode
4. Use of Ethernet cables in standard mode



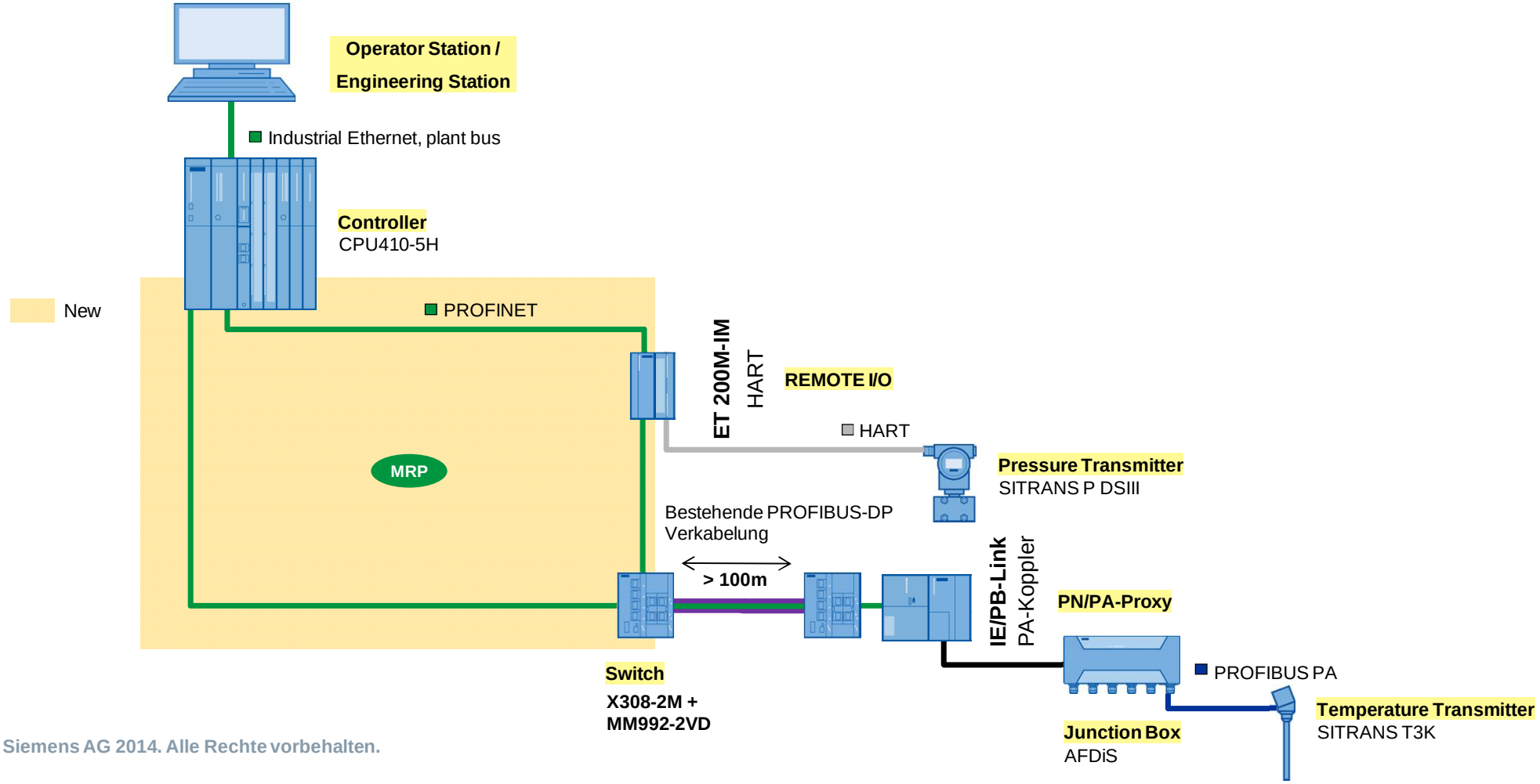
MM992-2VD
Benefit

- Connection of remote stations, where a connection via fiber optic cable is too expensive, or where the use of an Ethernet copper cable is not possible due to its maximum range of 100 m
  - PROFINET connection at 100 Mbps up to 300 m using standard Industrial Ethernet FC installation cable (IE FC Cable 2x2 / Cat5 AWG22)

- Use of already laid communications cables, e.g. PROFIBUS or two-wire cables
  - use case Migration from PROFIBUS to PROFINET to connect Remote IOs (e.g. ET200, SIMOCODE) special in Application PROFINET in PA
  - Reduction of the installation costs by using already installed cables

- Non-reactive connection of stations to an Ethernet network
- Easy integration into existing systems thanks to SCALANCE X-300 media module design
- Universal module utilization, as it automatically checks whether a two-wire cable or a standard Ethernet cable is connected

Live Demo: Migration from PROFIBUS-DP to PROFINET



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PROFINET System Redundancy

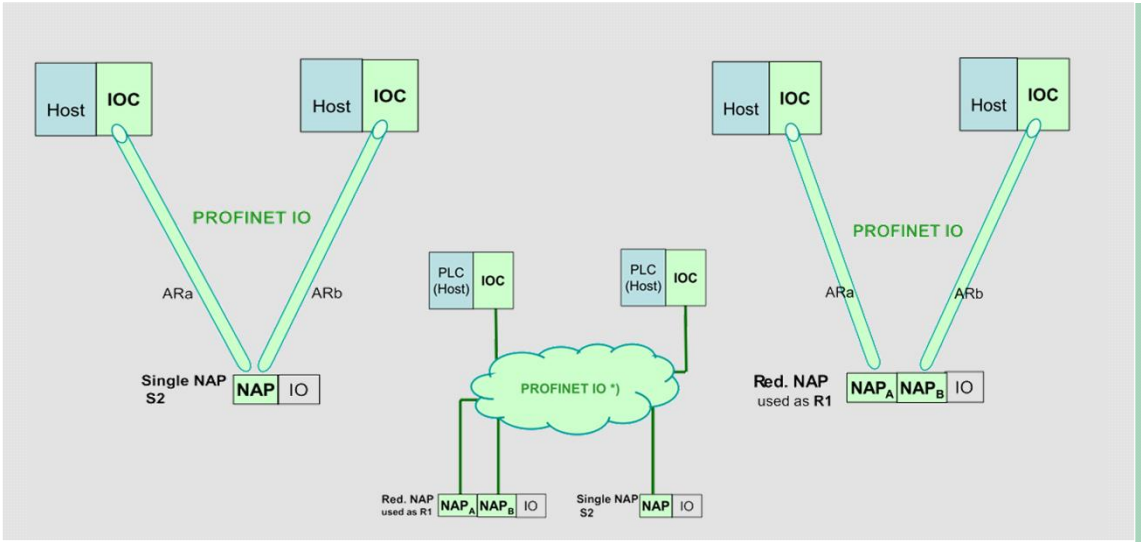
PROFINET System Redundancy

Today

System Redundancy S2

Tomorrow

System Redundancy R1



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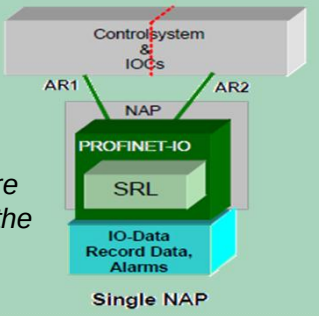
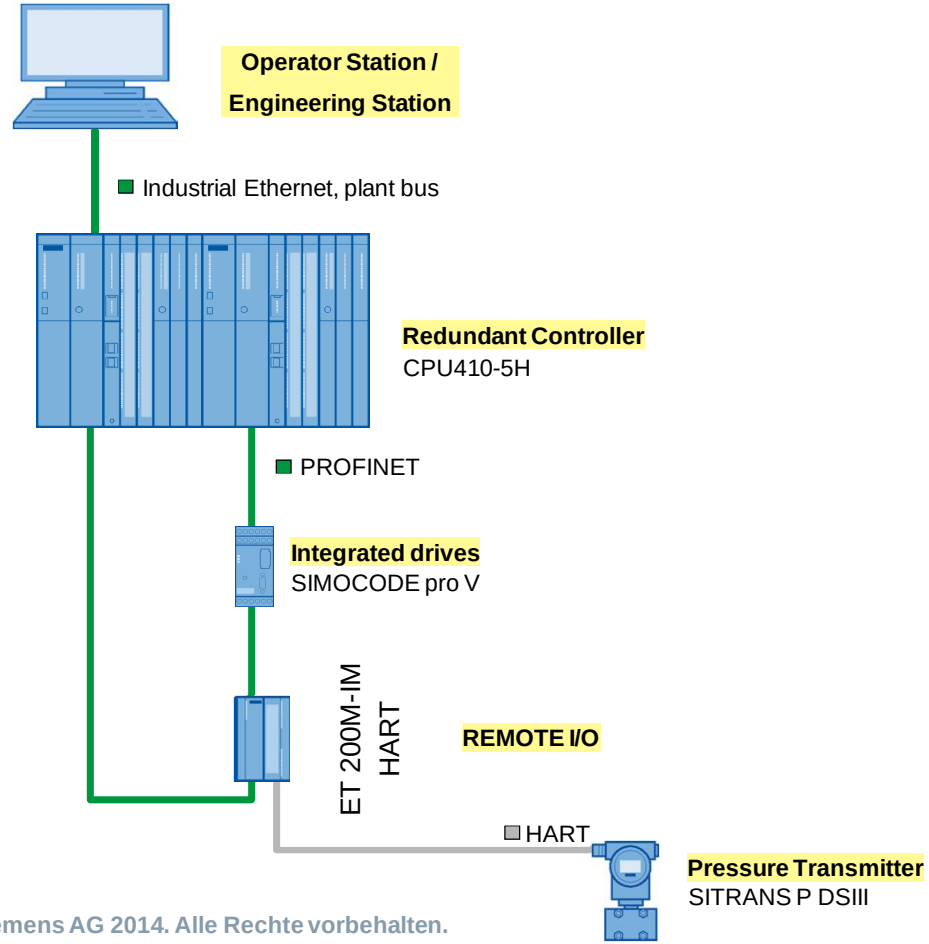


Advantages by using PROFINET System Redundancy

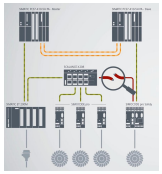
- Higher availability
- Higher scalability

Live Demo: PROFINET System Redundancy S2

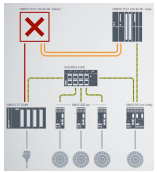


SIMOCODE pro V with PROFINET System Redundancy

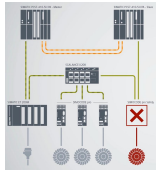
- **Significant increased plant availability thanks to uninterrupted communication with an H-CPU in case of**
  - Cable break

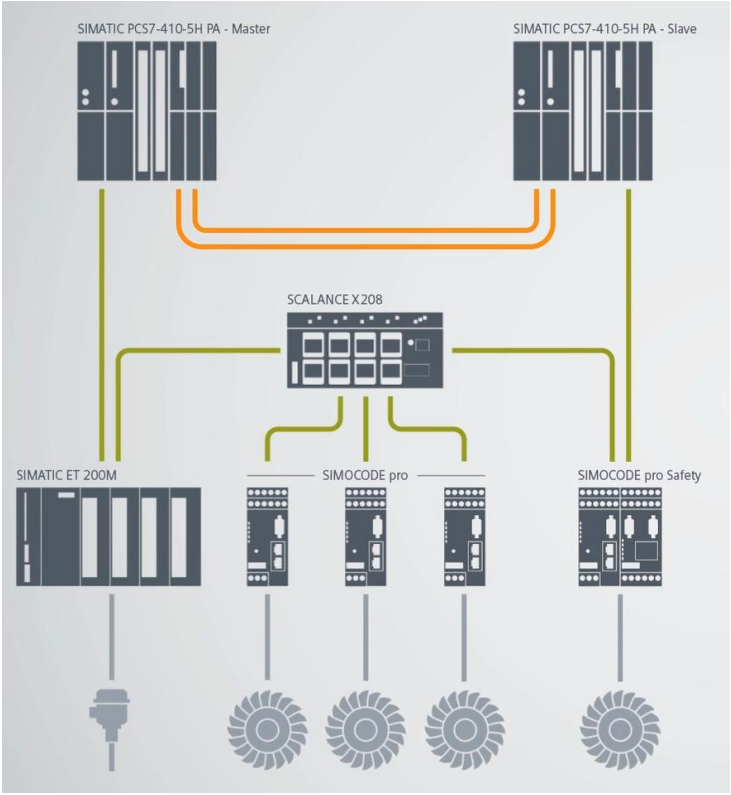


  - Controller failure



  - Field device failure





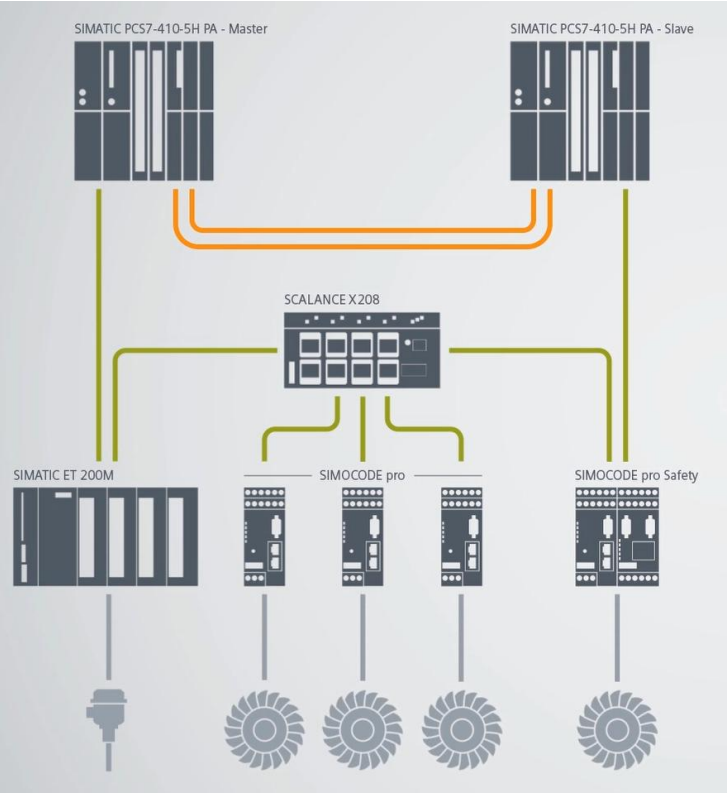
SIMOCODE pro V PN System Redundancy

SIMOCODE pro V with PROFINET System Redundancy

- **Sales release**
  January 2015

- **Delivery release**
  February 2015

- **SIMOCODE pro V PN** with **System Redundancy** will be delivered with **new** Firmware-Version V1.2



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Roadmap

Roadmap - PROFINET in Process Automation
Ready to ship 2014

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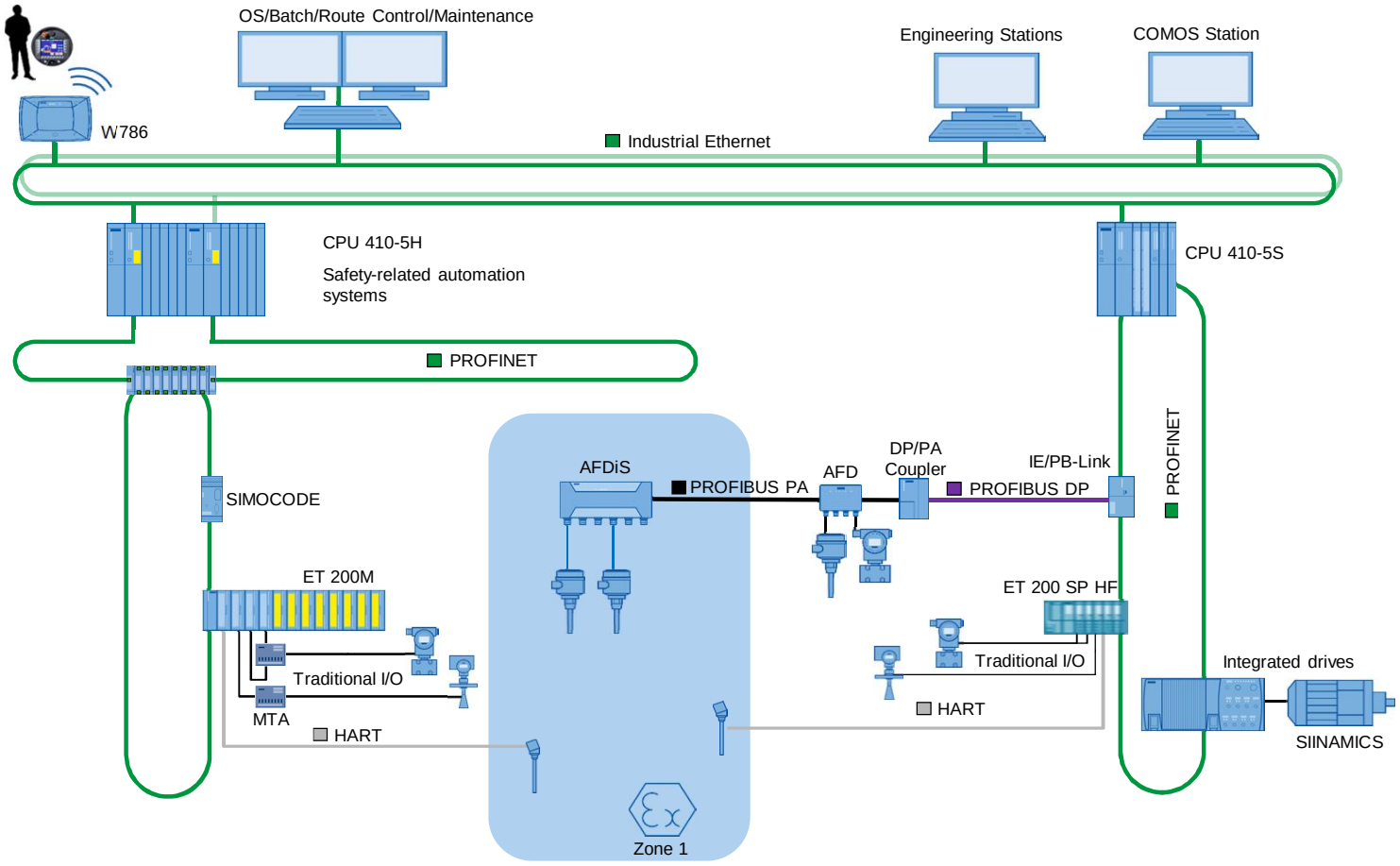
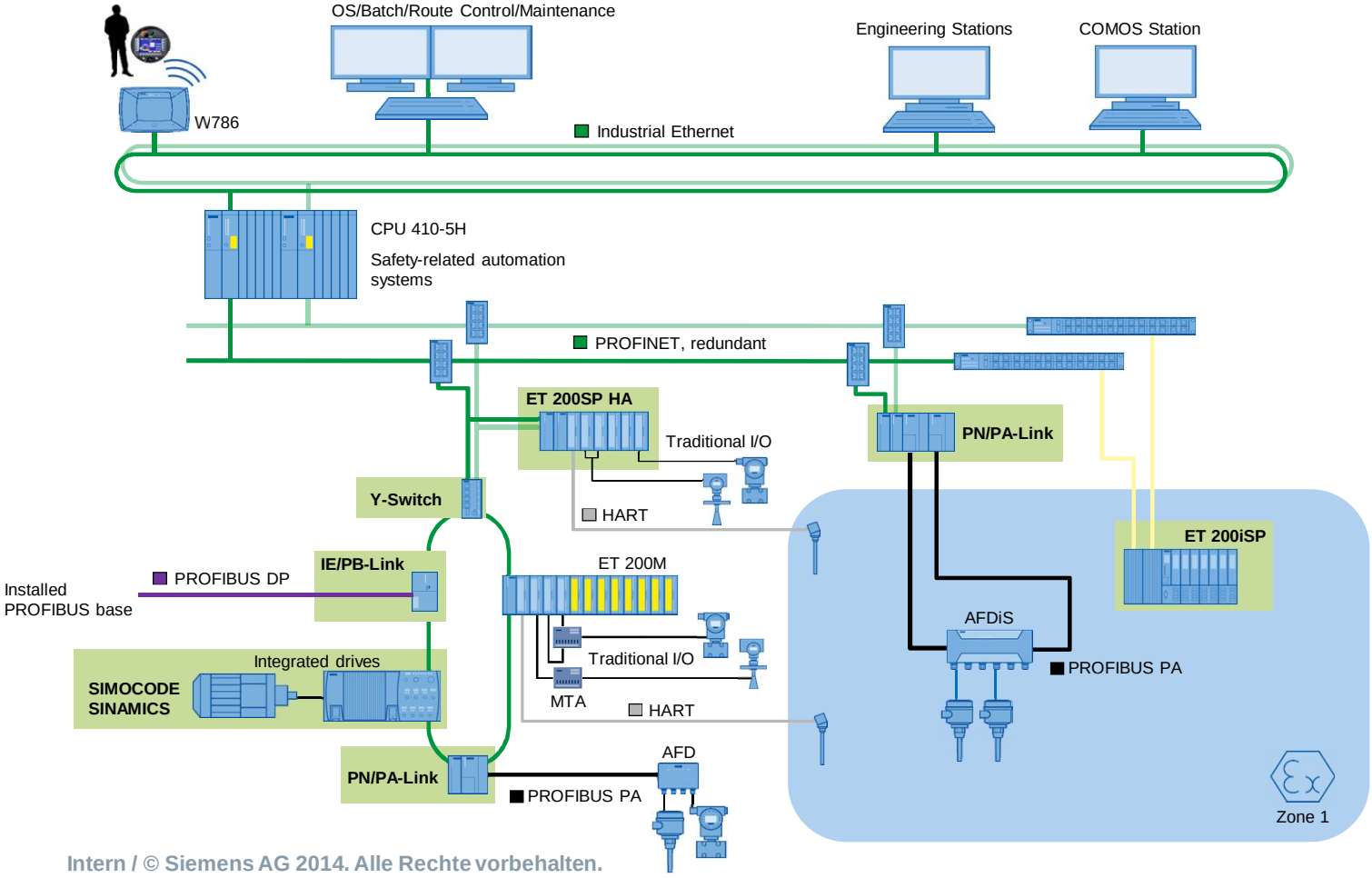


- Cost effective architecture for system redundancy (Red. Controller, Single IM)
- 100% investment protection and backward compatibility for fieldbus installations (reuse of I/O modules)
- PROFIBUS & PROFINET in one System
- Second PROFINET IO Controller on CPU410-5H
  (without CP443-1 -> optimized costs)
- Complete integration of ET 200SP HF (Replacing of ET 200S)
- Complete integration of SIMOCODE with PROFINET System Redundancy S2

Roadmap - PROFINET in Process Automation
Goal for next major Step (Sneak Preview to V9.x)



- Configuration Changes in Run with PROFINET
- Scalable system redundancy (from Low cost to High end)
- Growing product portfolio for PROFINET
  - **Replacement of PROFIBUS DP**
- ET 200iSP: Zone 1 Remote I/O with PROFINET (fiber optical redundant IM)
- ET 200SP HA: Zone 2 Remote I/O with PROFINET state-of-the-art incl. IO-Red.
- PN/PA-Link: Seamless Integration of PROFIBUS PA in PROFINET

Thank you for attention