

PROFINET
The leading
Industrial
Ethernet
Standard



The Benefits of
PROFINET

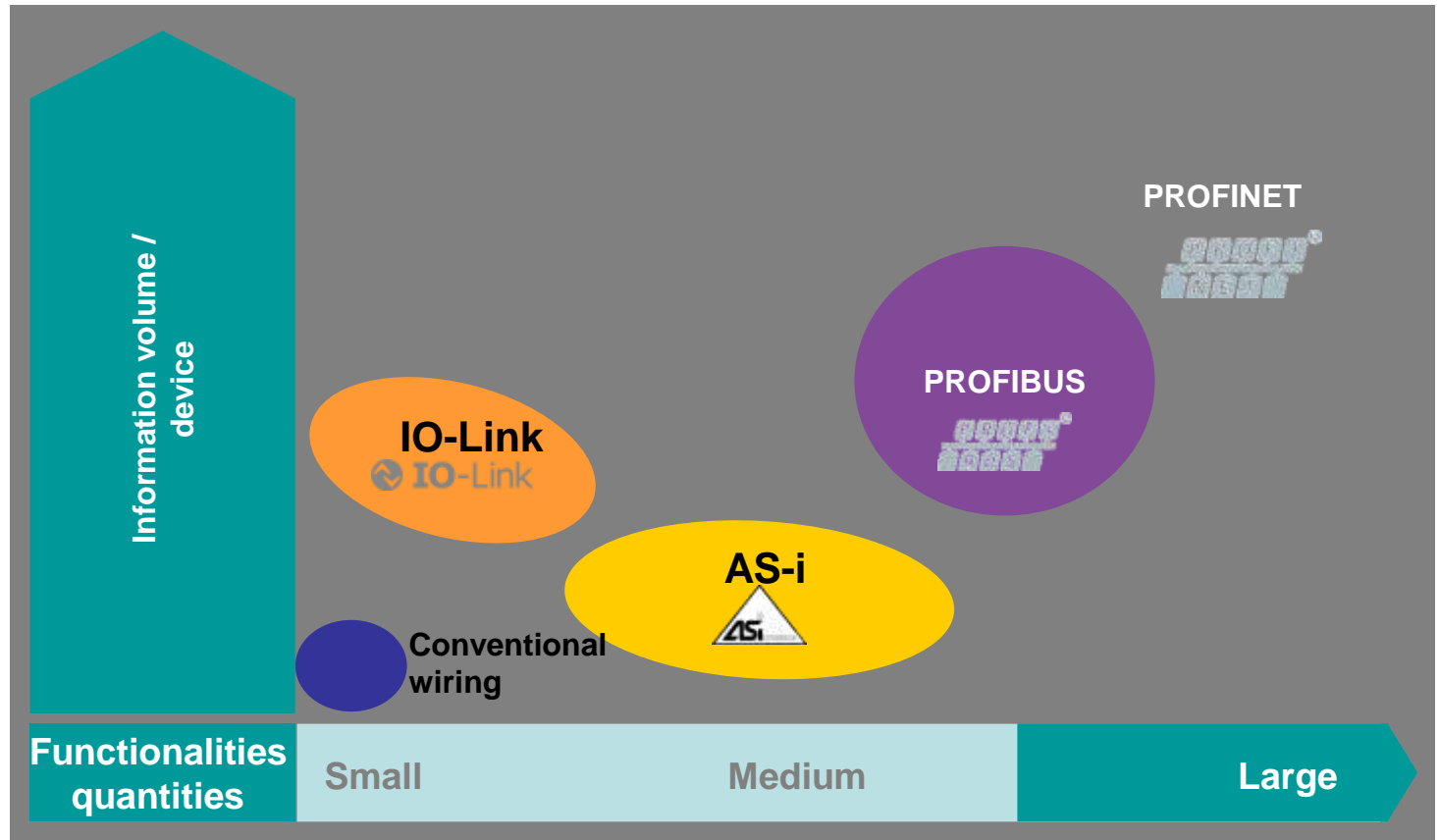
Network standard Ethernet

- ▶ High transmission rate
- ▶ Wireless
- ▶ Flexible topologies

Fieldbus standard PROFIBUS

- ▶ High-speed IO communication
- ▶ Safety
- ▶ Diagnostics

PROFINET



Protects your investment

- Seamless integration of existing fieldbuses
- Easy conversion of existing devices
- No additional tools or training needed

Saves costs

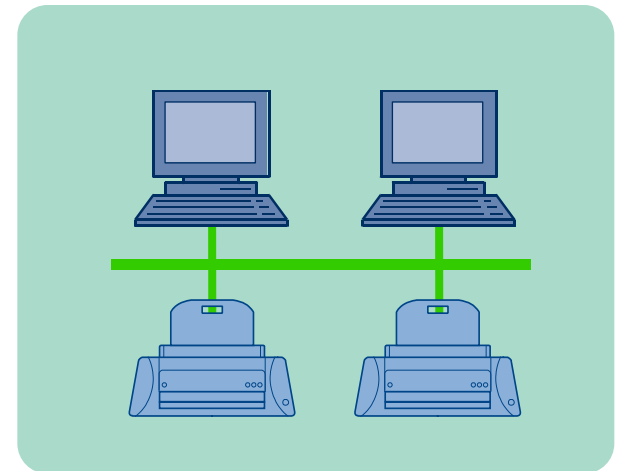
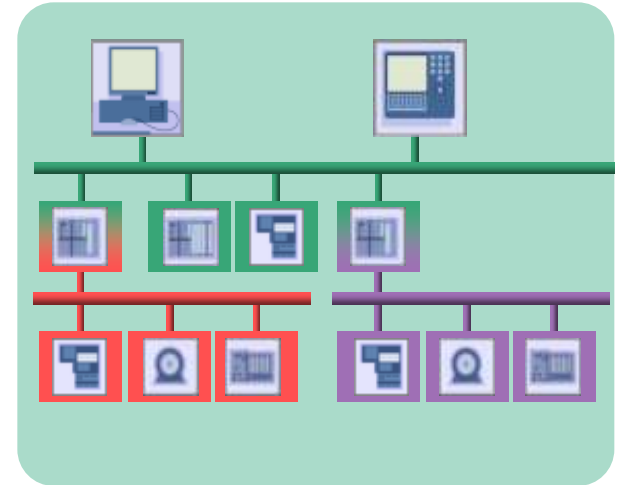
- Uses existing Ethernet networks

Uniformity

- Uniform physical network concept

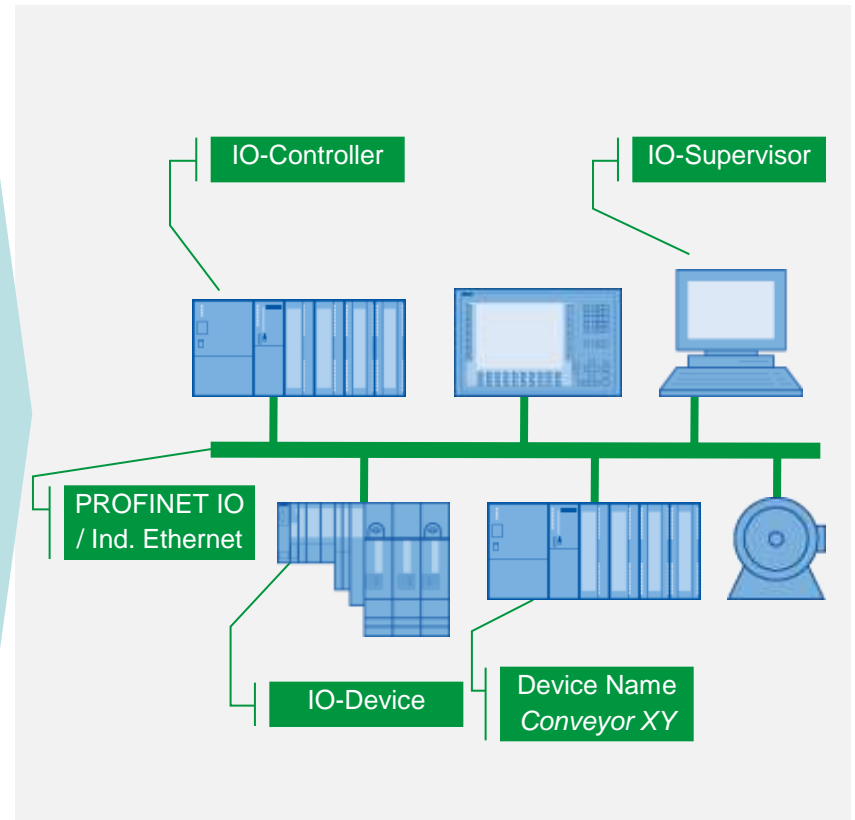
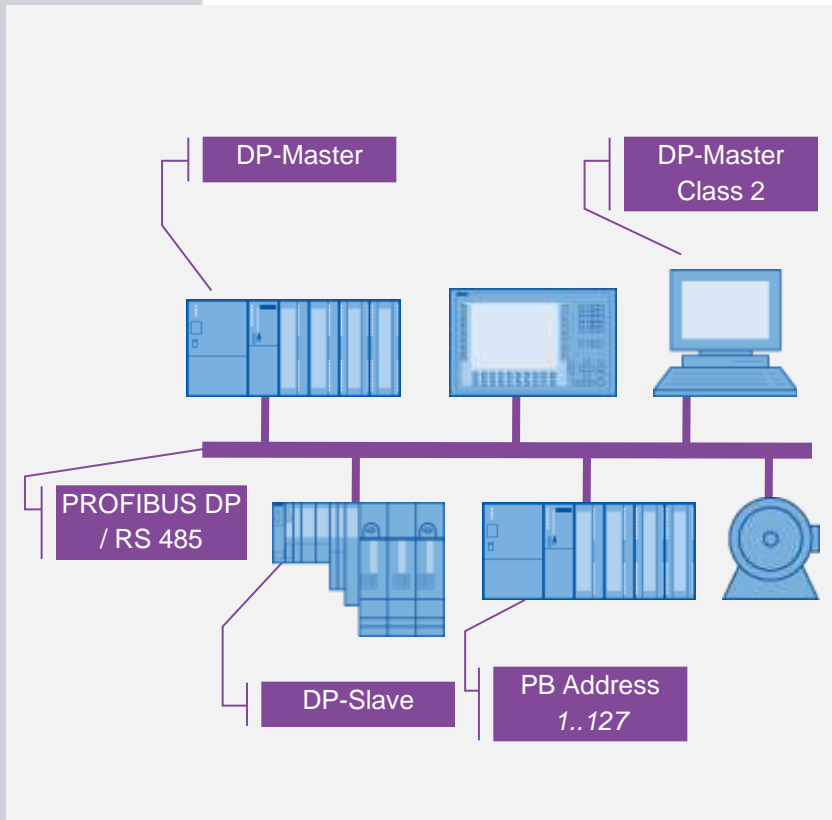
Saves time

- Reduces engineering and testing time
- Cuts time needed for migration



Summary

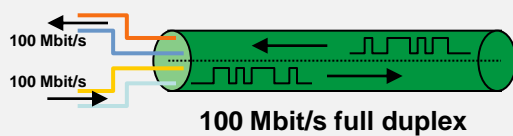
Minimizes the time and expense of setting up your system with or migrating to PROFINET.



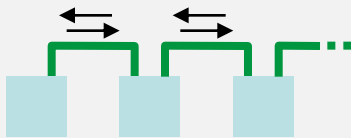
Low cost of adoption, investment protection by the transition to PROFINET!

PROFINET is Ethernet

- Ethernet is the established standard in the IT world for fast exchange of data (IEEE 802.3)
- PROFINET is always full duplex → simultaneous communication in two directions

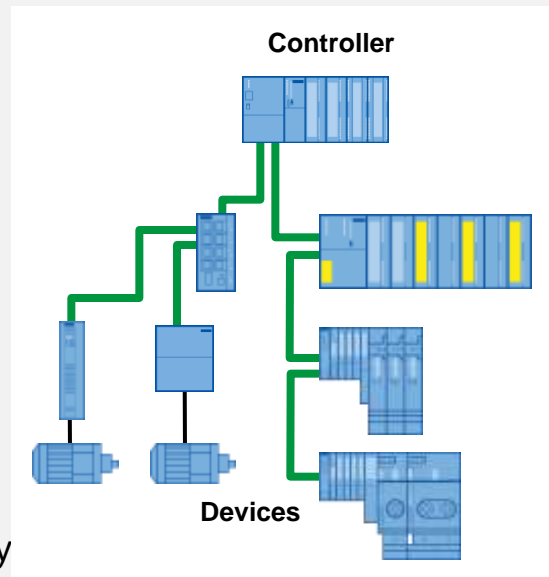


- PROFINET is always "switched Ethernet"



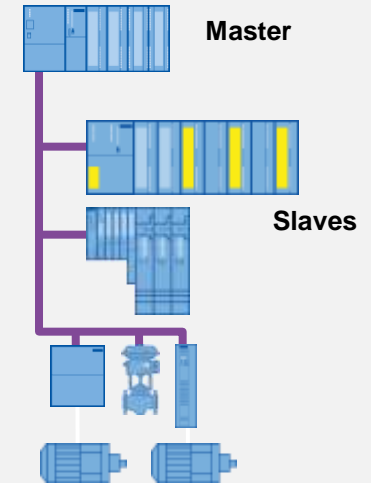
Switches connected into a line

- Distribution of network load can be influenced using topology



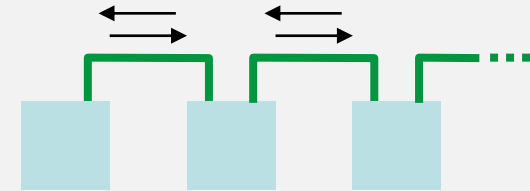
As comparison: PROFIBUS

- One line to which all nodes are connected
- Performance directly dependent on number of nodes



PROFINET completely uses all possibilities offered by Ethernet

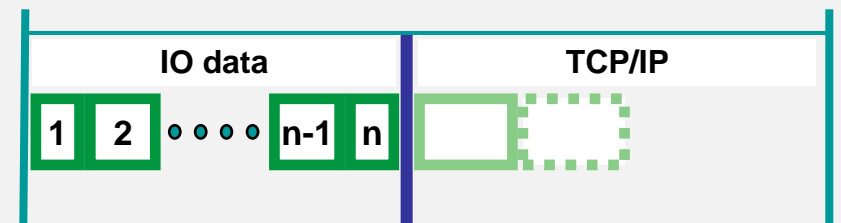
PROFINET
is 100% switched Ethernet



PROFINET
uses IT standards such as TCP/IP

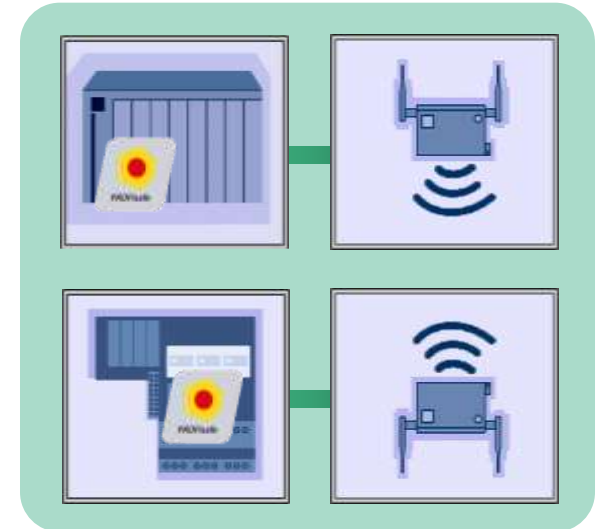


PROFINET
is real-time and deterministic



PROFINET based on standard Ethernet

- Wireless communications in compliance with IEEE standard possible
- Industrial WLAN (IEEE 802.11)
 - cyclic and acyclic data transmission
 - Supervision of wireless connection
 - Redundant wireless operation over 2 separate wave bands for raised availability
 - PROFI-safe over WLAN
- Bluetooth (IEEE 802.15.2)
 - Coexistence with WLAN
- Fast commissioning
- Easy diagnostics

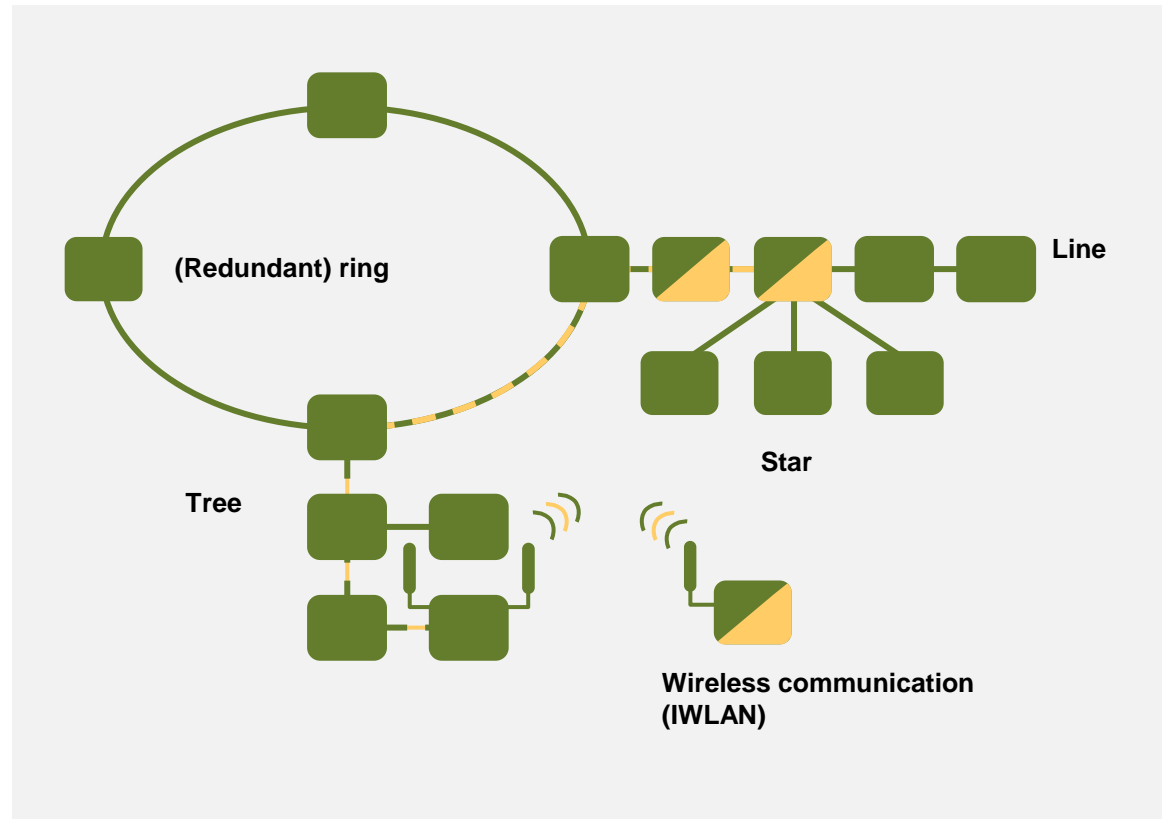


Using established standards for innovative applications

Flexibility

Tailor-made plant concepts

- ▶ Industrial Wireless LAN
- ▶ Safety
- ▶ Flexible topologies
- ▶ Open standard
- ▶ Web tools
- ▶ Expandability

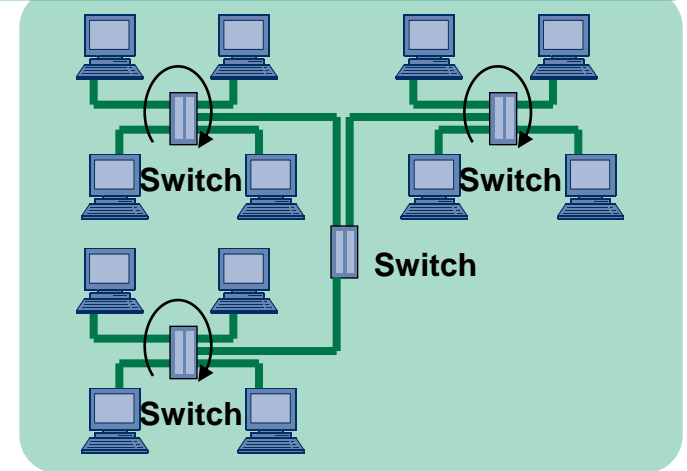


Maximum flexibility enables tailor-made machine and plant concepts

Switching technology

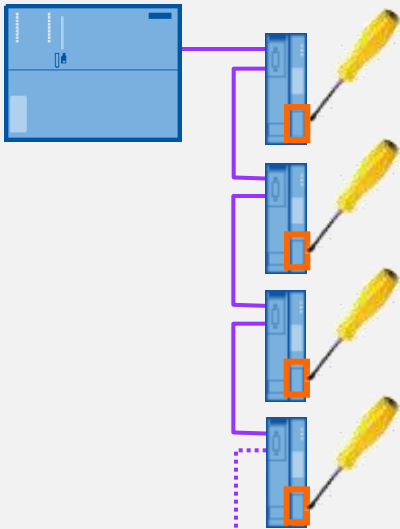
- Simultaneous sending/receiving
- Parallel communications paths
- Unlimited number of devices
- Ultra short response times
- 1,440 bytes per frame

Parallel communications

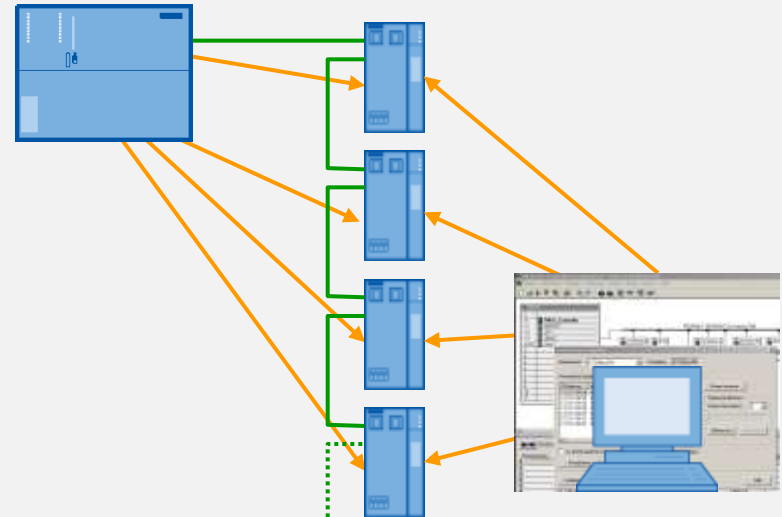


PROFINET – innovative and future-proof

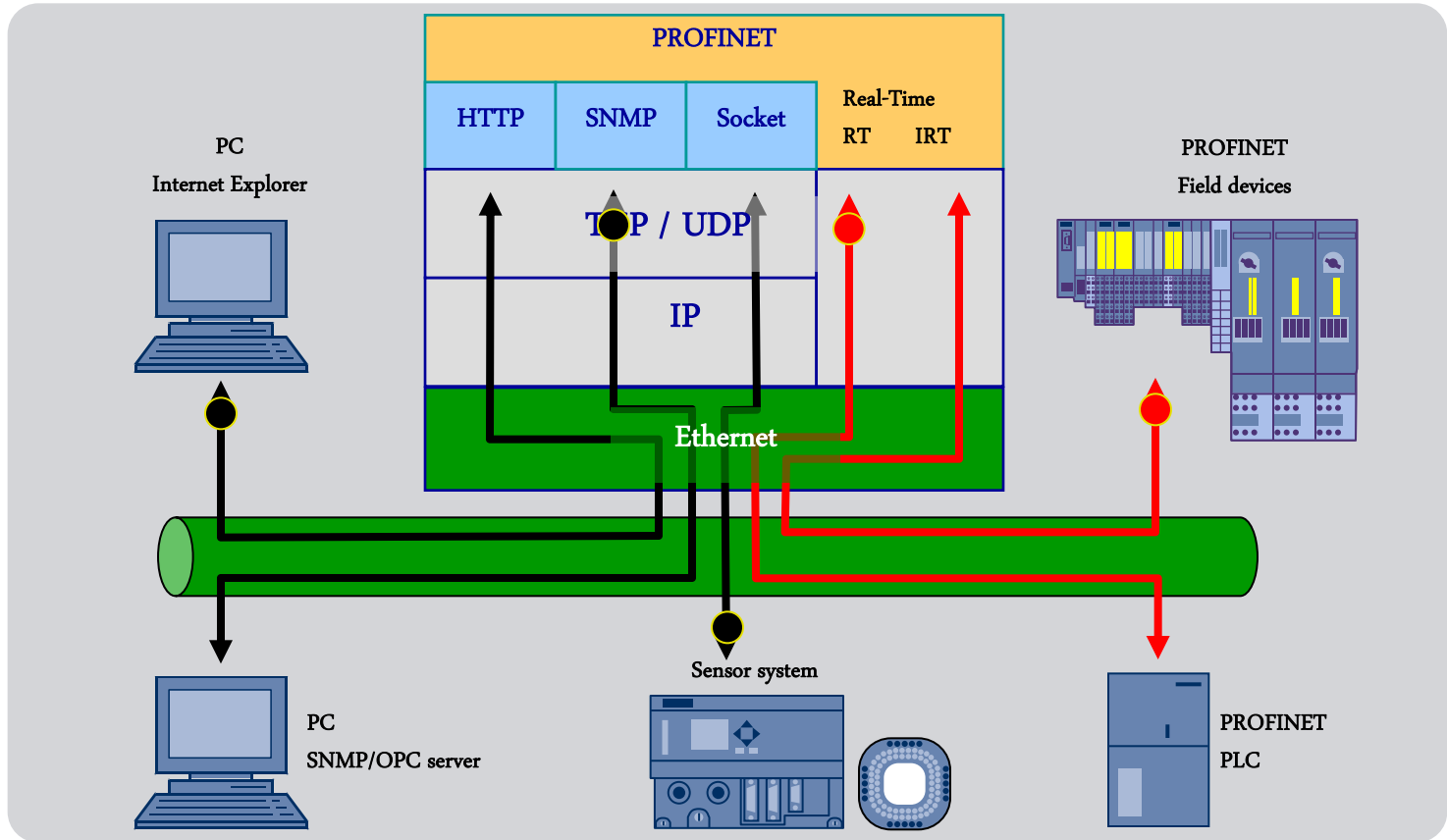
Individual addressing in each station



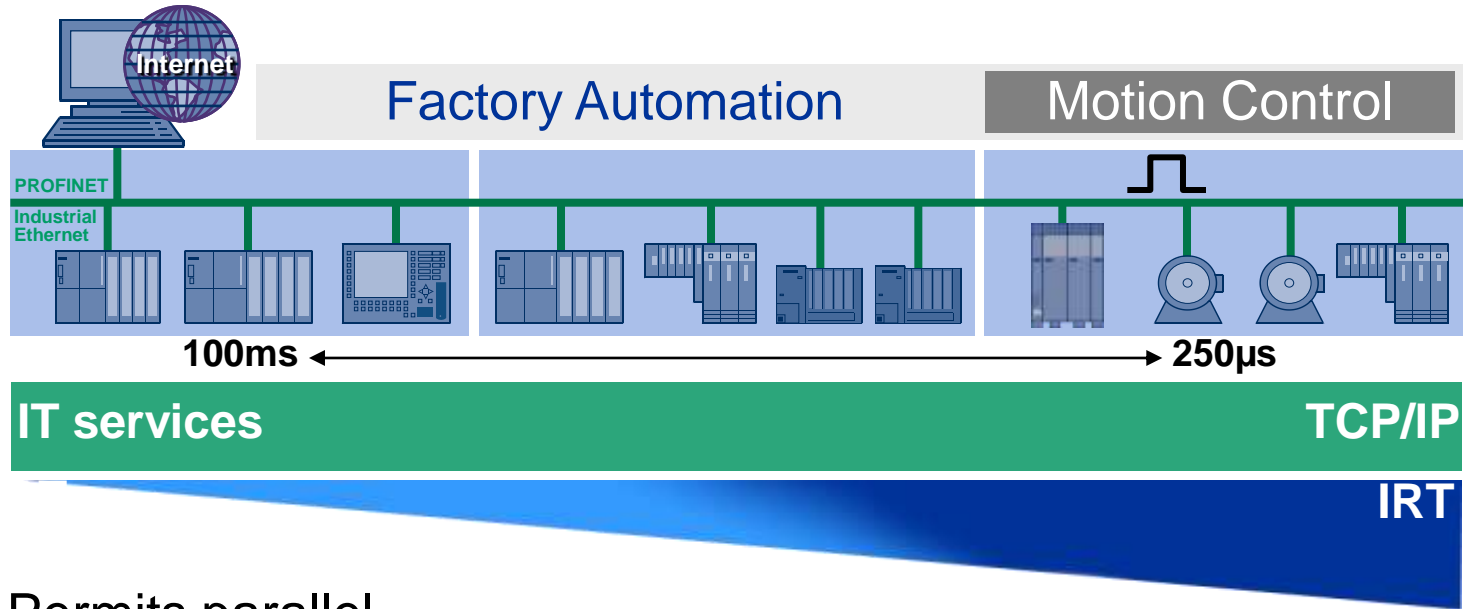
Simple name designation through Controller with support of Engineering System



**Complete commissioning through automatic name designation
Simpler and faster device replacement**



PROFINET features standard TCP/IP communications in compliance with IEEE 802.3 and real-time communications

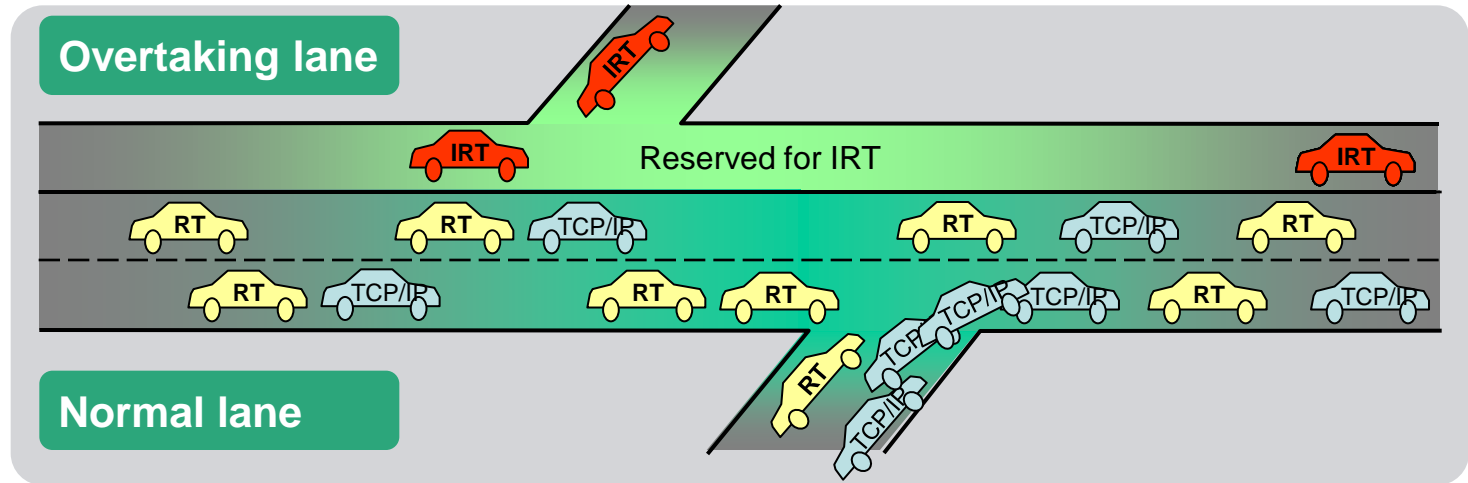


Permits parallel...

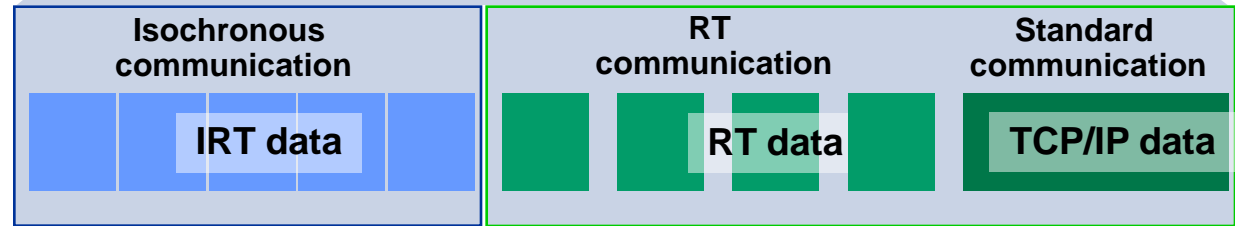
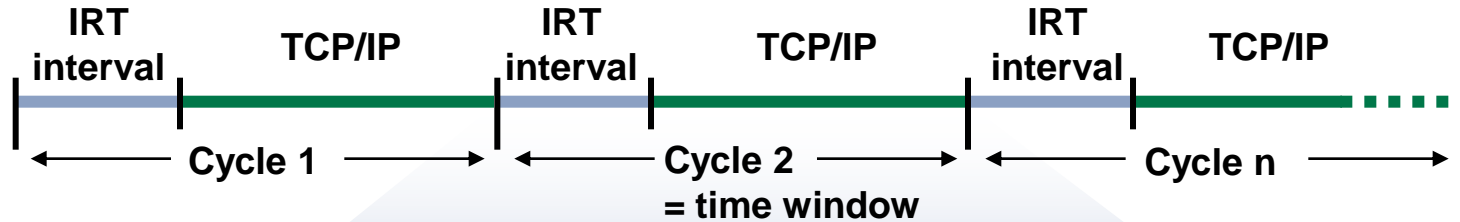
- ... direct online access to field devices
- ... location-independent maintenance and service (including remote)
- ... savings in the recording of production/quality data

**Scalable Real-time with
simultaneous, unrestricted IT communication**

- Fast Ethernet with switching technology → Fast simultaneous exchange of setpoint and actual values (100 Mbit/s)
- Time synchronization of the switches → Requirement for Isochronous mode
- Deterministic communication cycle → Essential for motion control
- Reservation of time areas → Guaranteed performance for motion & IT



PROFINET with IRT (Isochronous Real-time)

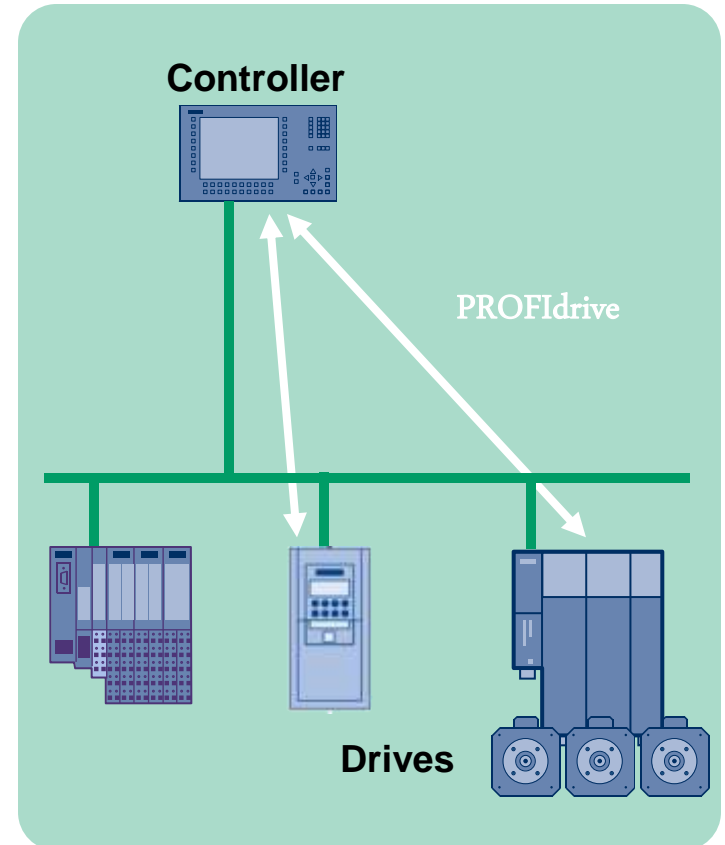


- Bandwidth reservation for isochronous communication
- IRT permits high-precision synchronization

Hardest Real-time by means of Isochronous Real-time (IRT)

PROFIdrive

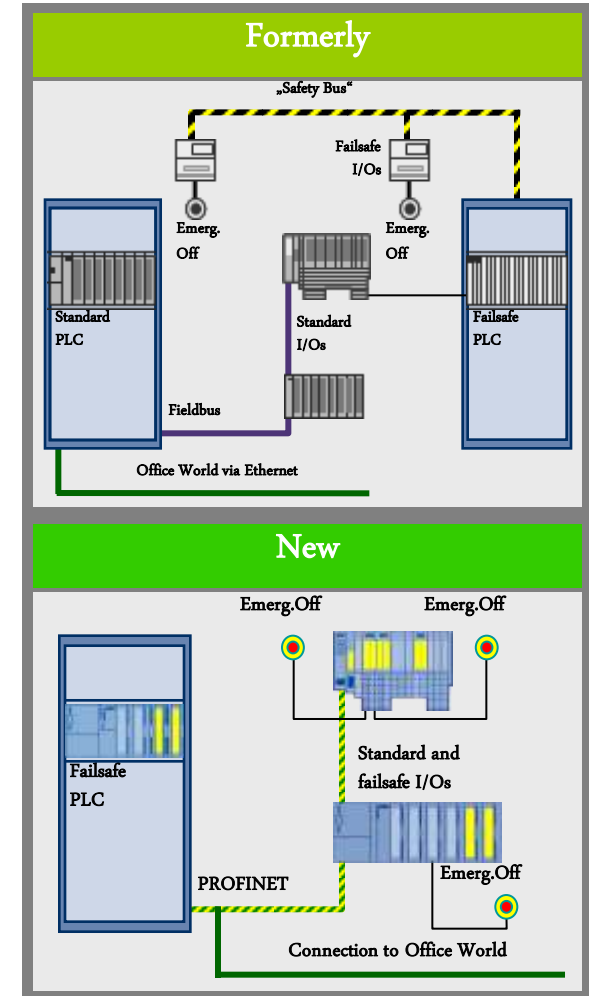
- Is the application profile for drives on PROFIBUS and PROFINET
- Is cross-vendor and ensures interoperability between drives and controllers
- Offers the same application view as with PROFIBUS and PROFINET
- Is standardized through PROFIBUS & PROFINET International (PI)



Worldwide standard communications for drives

One bus for standard and failsafe automation

- Meets the highest safety categories
- Safety Integrity Level 3 / PL e / Cat. 4
- Uniform diagnostics and uniform user interface
- Reduce the number of types, parts and interfaces





Save time, space and money with Safety Integrated!



- Using PROFIsafe and PROFINET can satisfy all requirements when it comes to ensuring complete safety for humans, equipment, and the environment.
- First communications standard developed in accordance with safety standard IEC 61508
- Developed to IEC 61784-3-3, PROFIsafe is the international standard
- PROFIsafe handles potential faults (e.g. invalid addresses, delays, data loss) by means of
 - Serial numbering
 - Time monitoring
 - Authenticity monitoring
 - Additional CRC backup



- Evaluated by  and 
- Drive technology also fits in seamlessly here with the integrated safety functions according to IEC 61800-5-2.

Request	Response	Response
...
...
...

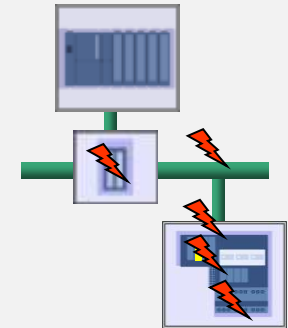
Lifecycle



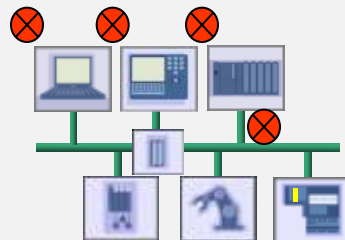
- Appropriate information in all phases of the lifecycle
- Extra details as required

Type/location of fault

- Detection of all faults
 - Cabling
 - Station
 - Module
 - Channel,...
- Display of fault location



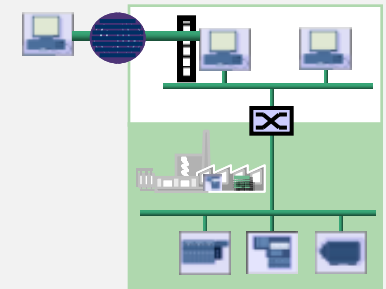
Local access



- Diagnostics information where it is required

IT integration

- Remote access
- Network management



Simple and fast diagnostics

- Support of all requirements
- by means of suitable standardized mechanisms

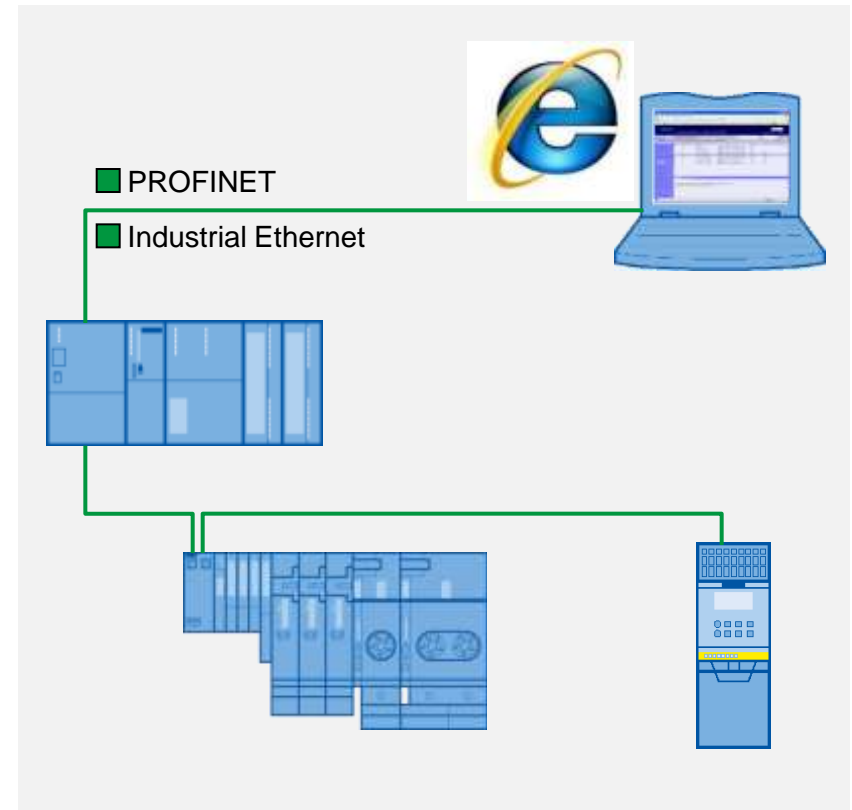
Easy and fast diagnostics access

- Direct access to diagnostic information using standard Web browser (without Step7)
- Quicker access to diagnostic information results in shorter downtimes
- Individually adaptable maintenance concepts thanks to user-defined Web pages
- Remote machines are simple to maintain per remote access

Use of tools from the IT world

- Integration of Web servers in Siemens PROFINET controller
- Access to Web server using standard browser (e.g. Internet Explorer)
- Security modules of the SCALANCE S range securely separate subnets using proven IT technology

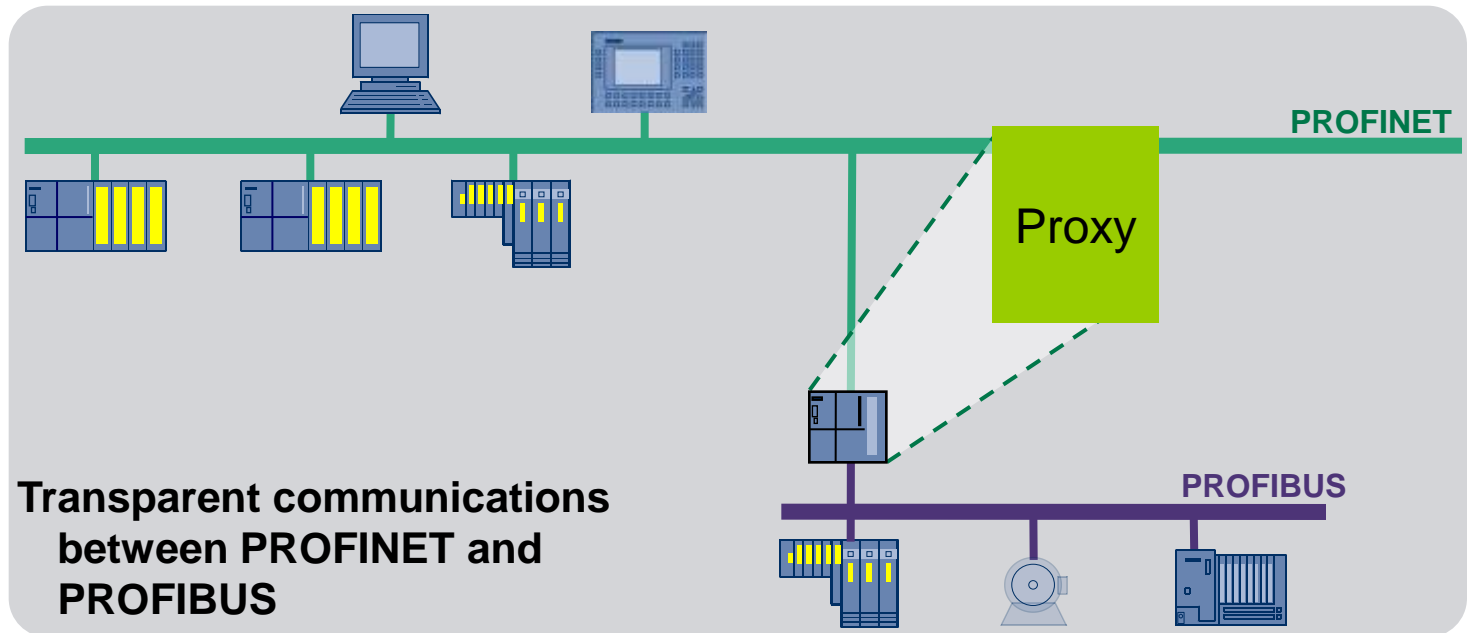
Product	Model	Features
SCALANCE S	SCALANCE S	...
SCALANCE S	SCALANCE S	...
SCALANCE S	SCALANCE S	...



Standard Web tools can be used with PROFINET to directly access device information

Benefits and added value for our customers

- Including gateways for PROFIBUS, Interbus, AS-Interface and other fieldbuses
- Including controllers with PROFINET and PROFIBUS interface



Protects your investment

Transparent integration without programming

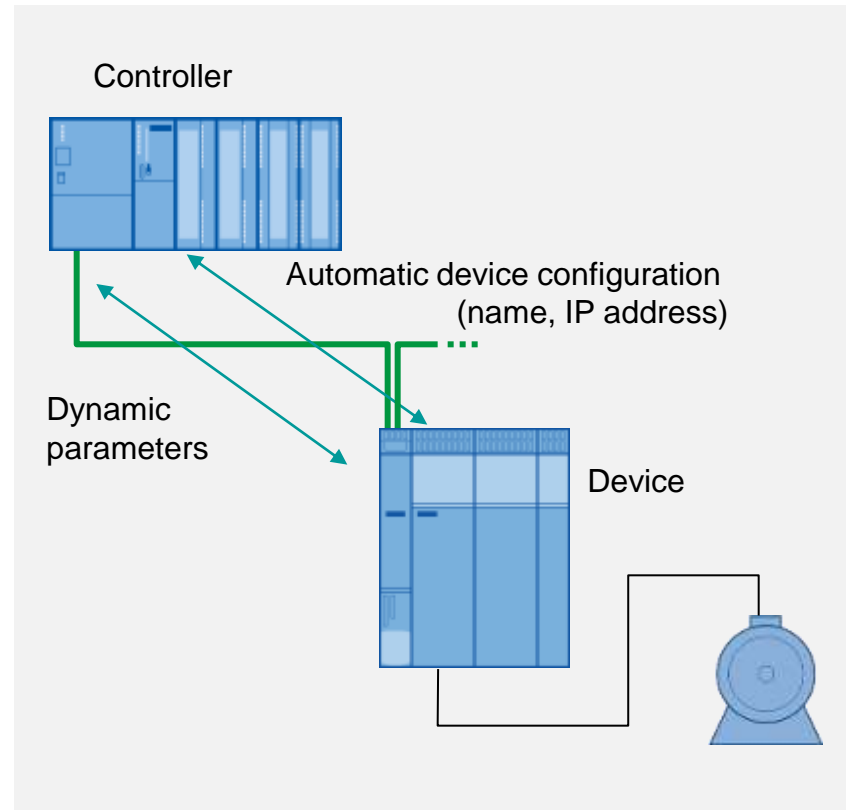
Easy and fast device replacement

- During servicing and maintenance, no programming tools or engineering personnel are needed for replacing devices
- Reduction in downtime because only a new device from the warehouse must be used to put a machine or plant back into operation
- No more settings necessary on the device

Device replacement without PG

- Optional swap media (e.g. MMC, C-Plug) permit fast and easy replacement of devices without programming device
- Device exchange with PROFINET on basis of known topology can also be carried out without swap media
- iPar server in order to transfer dynamic device parameters automatically to the new device

Parameter	Value	Unit
Device name	Device1	
IP address	192.168.1.1	
Subnet mask	255.255.255.0	
Gateway	192.168.1.1	
Dynamic parameters	...	



Automatic reconfiguration following device replacement without engineering and without memory card

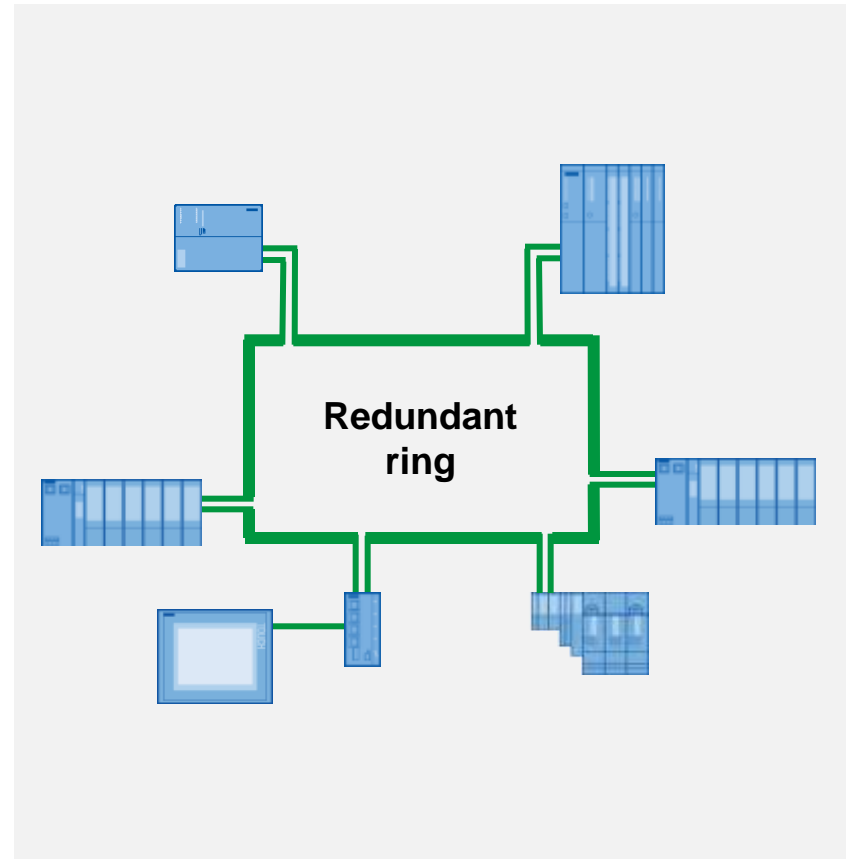
High performance with media redundancy

- Increase in plant and machine availability
- Media redundancy is integrated in PROFINET and can easily be utilized without added costs
- Diagnostics for fast troubleshooting also possible with network fault

Media redundancy integrated in PROFINET

- The media redundancy can be implemented both with the help of external switches and direct via integral PROFINET interfaces
- Device failures in the ring topology have no effect on the plant availability
- Troubleshooting is accelerated even with a network fault

Feature	PROFINET	PROFIBUS
Media Redundancy	Yes	No
High Performance	Yes	No
Easy Integration	Yes	No
Low Cost	Yes	No
Fast Troubleshooting	Yes	No



High plant availability due to media redundancy

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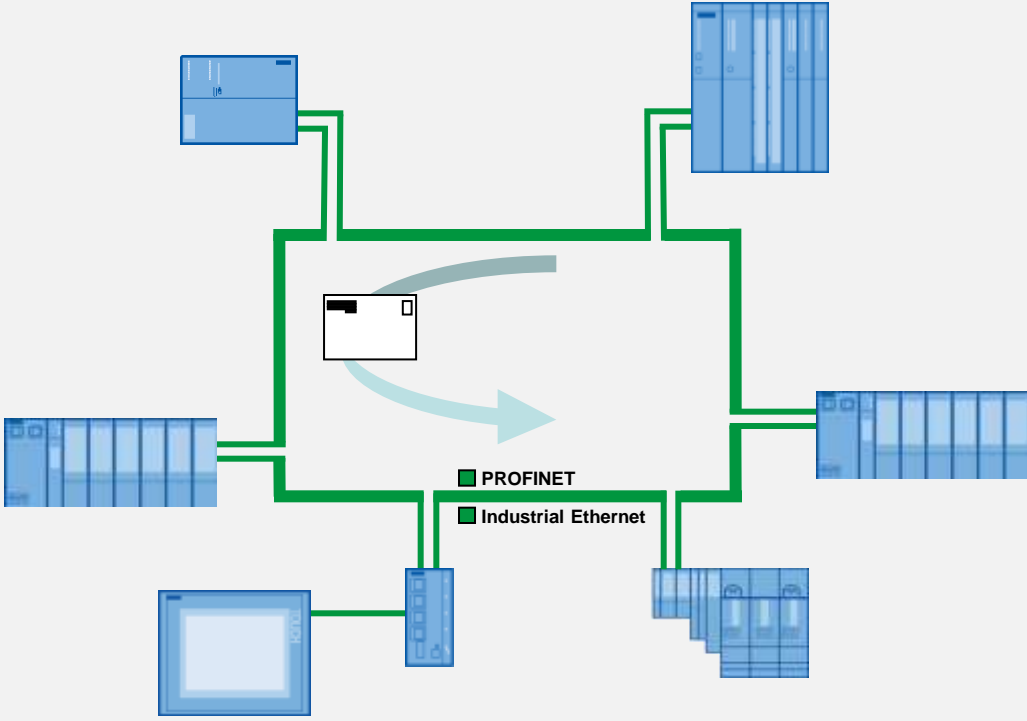
Innovation for simplification of system architecture

PROFINET devices possess MRP

No closing of IE switches or ring management necessary

One of the devices automatically takes on the role of the ring manager

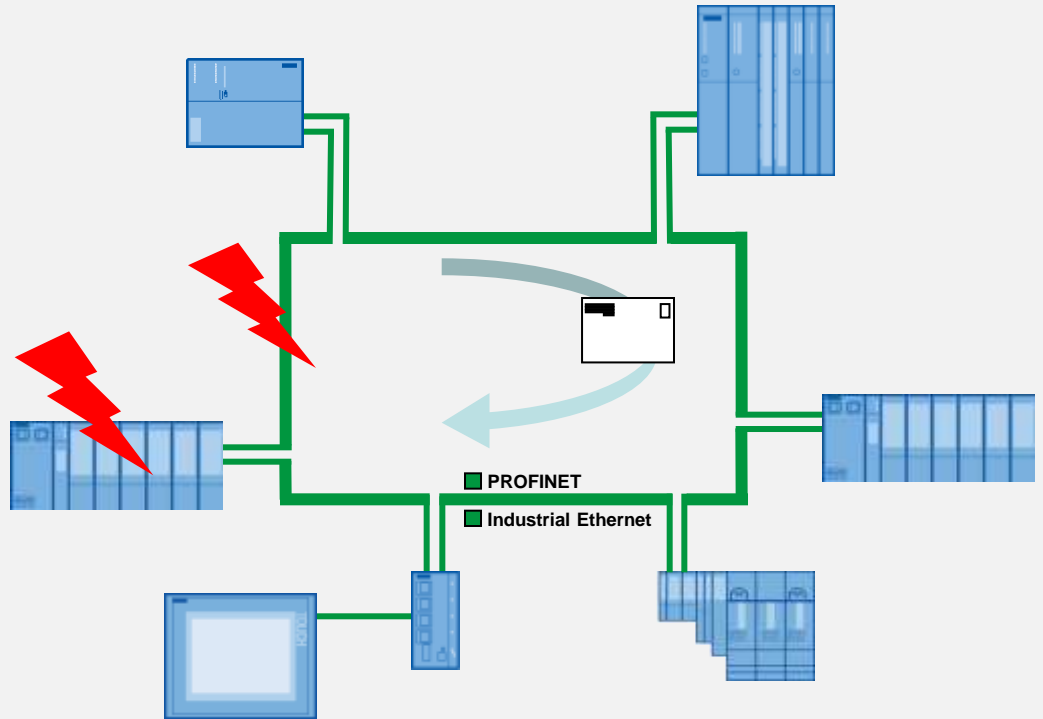
MRP via integral PROFINET ports



- Improved plant availability
- More flexibility
- Lower costs since less equipment required

Protocol	Standard	Application
PROFIBUS	IEC 61158	Industrial Automation
PROFINET	IEC 61158-3	Industrial Ethernet
Industrial Ethernet	IEEE 802.3	Industrial Ethernet

- In the event of a fault in the segment or ring node, communication is restored again
- A second communication path through the network is opened by the ring manager
- Communication is routed over this alternate path
- The failure is limited to the damaged segment or node

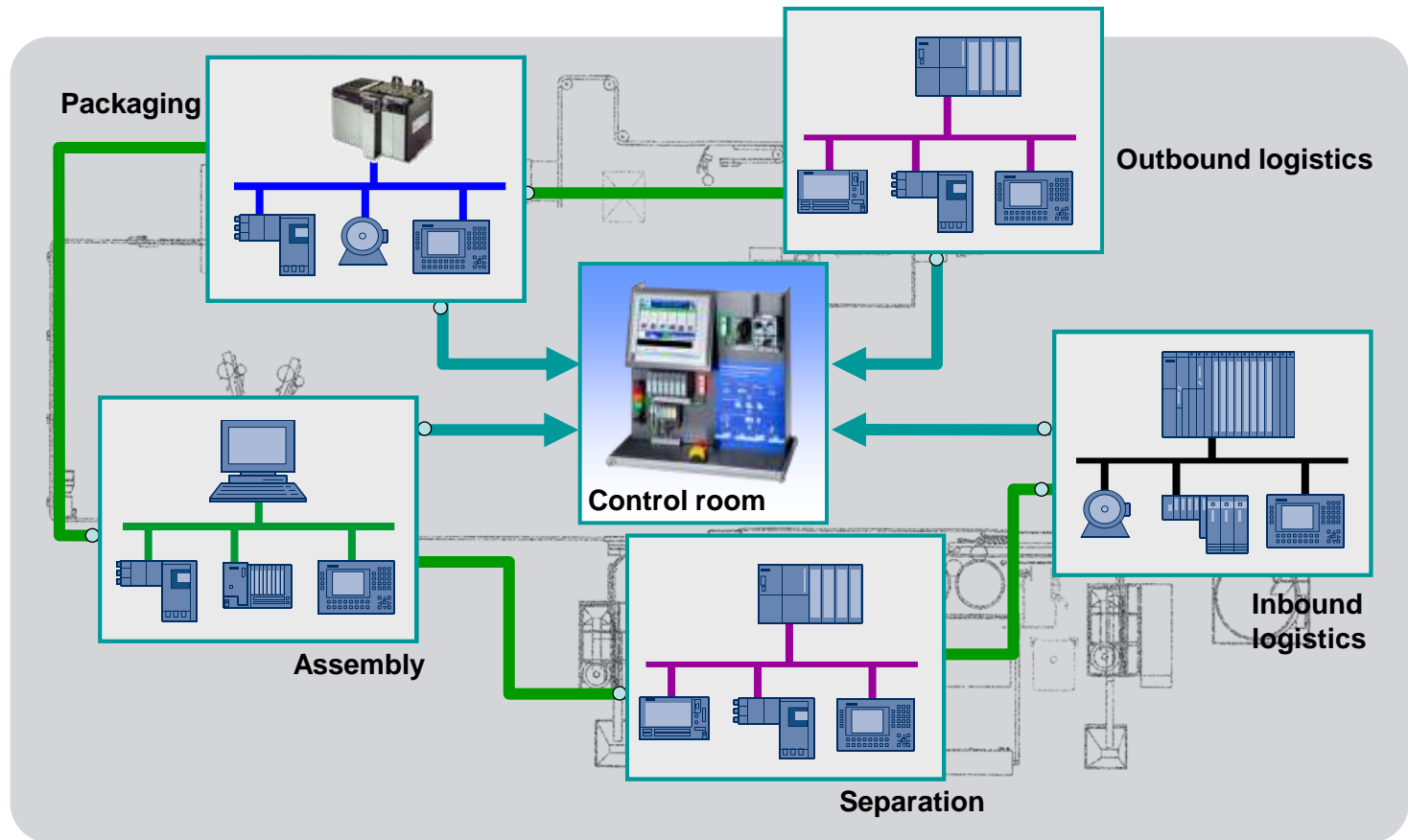


- **IEC 61158-5-10
Issue 1.0 2007-12**
- **Based on ring topology**
- **Max. 50 nodes in the ring**
 - PROFINET IO-Controller
 - PROFINET IO-Devices
 - Components of the network infrastructure (IE switches)
- **Configuration and diagnostics in STEP7**
- **200 ms reconfiguration time**



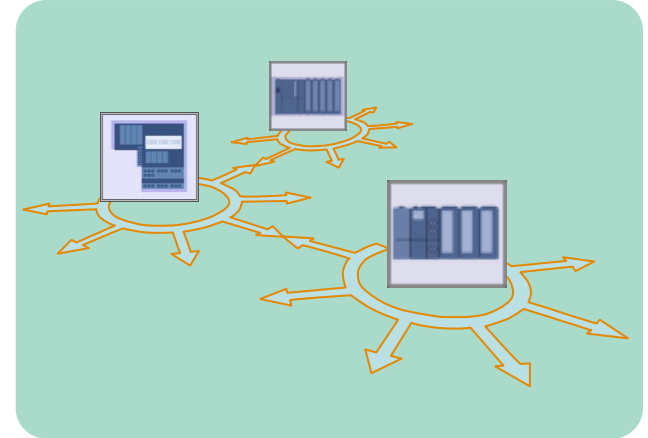
INTERNATIONAL
standard





- Machines from different OEMs
- OEMs implement different automation architectures
- Machines controlled by different PLCs

- Configuration of communications instead of programming and troubleshooting
- Flexibility in configuring and reconfiguring production flow
- Modification or exchange of machines without any adverse affects on communications or integration of the other systems
- Integrated plant-wide system diagnostics
- Standardized machine data interfaces for plant operators



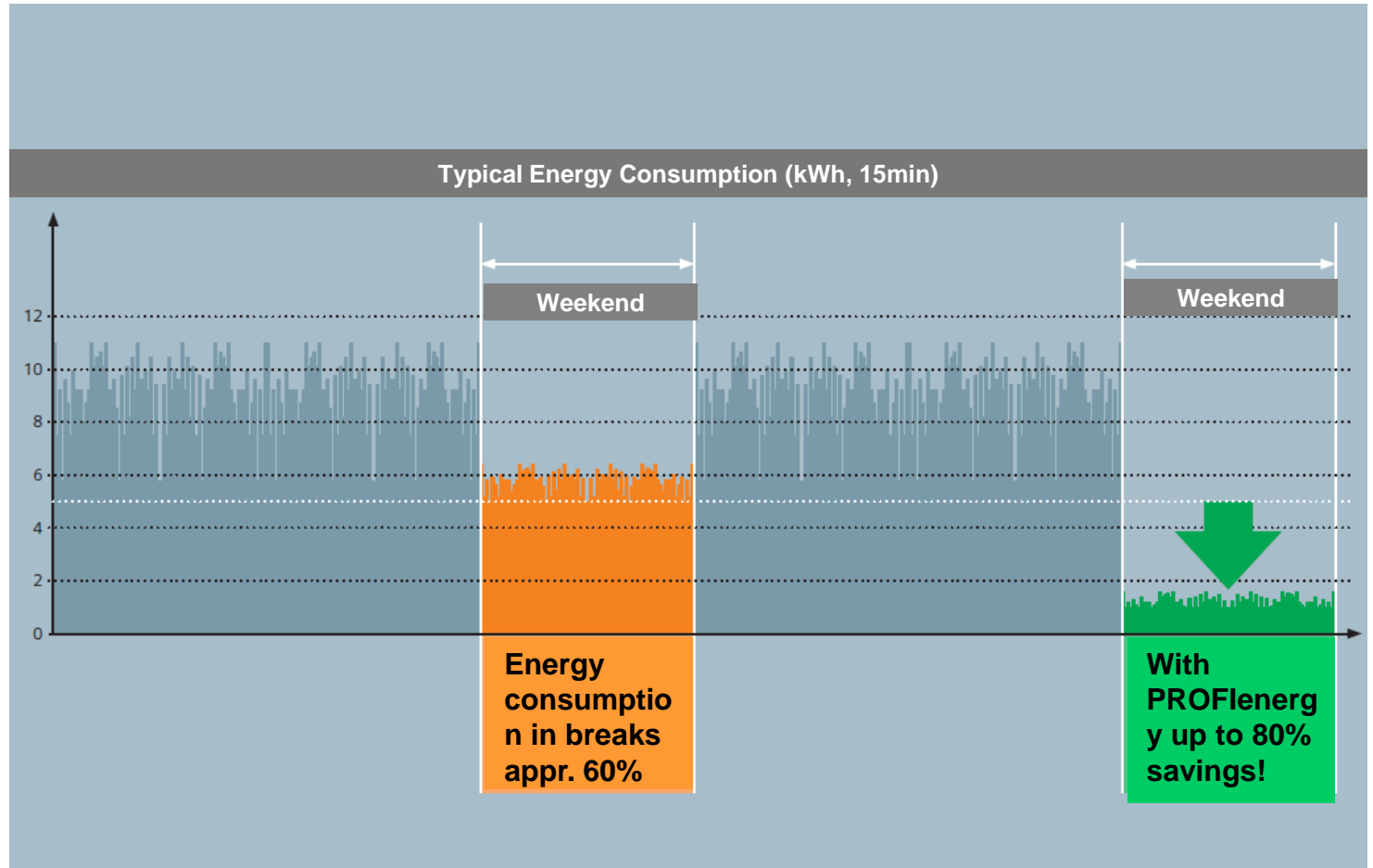
Summary

For increased productivity and plant availability

- PROFINET is the first field bus worldwide with a standardized profile for efficient energy management.
- PROFINET is a synonym for innovation. Requirements from customer side are taken seriously and implemented very fast.
- PROFlenergy generates additional value to your products and safes your business in the long term.



Use PROFlenergy, to save energy and costs!



Energy consumption during breaks appr. 60%!

PROFINET offers ...

... more continuity and uniform structures

... more nodes and better performance

... seamless integration of existing systems

... new, innovative applications

... continuous enhancements