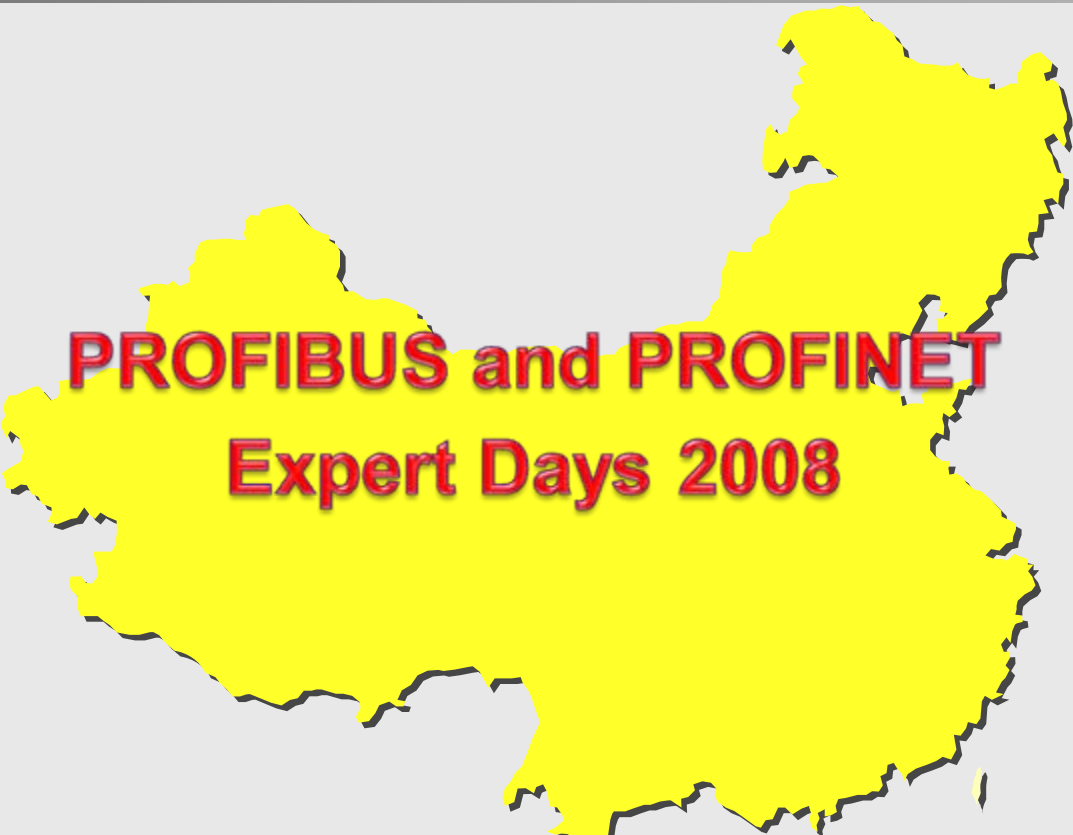




PROFIBUS and PROFINET Expert Days 2008

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Siemens AG
bjoern-moeller@siemens.com

About the presenter

演讲者简介



Motivation

Initial Situation

Redundancy
Concept

Economic
Aspects

Outlook

Conclusion

Name: Bjoern Moeller
Company: Siemens AG - Germany

PI working group leader; “DCS Requirements”

Bjoern Moeller is product manager for the process control system
SIMATIC PCS 7

He has more than 7-years experience in development and appliance of
process automation products. He is responsible for product definition and
innovation of field bus technology.



Expertise:

- PROFIBUS DP and PA
- RS 485 and MBP technology
- PROFINET
- Distributed control systems (DCS)
- ANSI / ISA S88 (Batch Control)

Achievements:

- Release of first version of PI requirement specification for PROFINET in process automation
- Project management of DCS software components
- Companionship of complete product lifecycle for SIMATIC field bus components



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- **Motivation / objectives** 动机 / 目标
- **Initial situation** 初始状态
- **Redundancy concept and benefits** 冗余概念和优点
- **Economic aspects** 经济效益
- **Outlook** 展望
- **Conclusion** 总结

Motivation

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Redundancy
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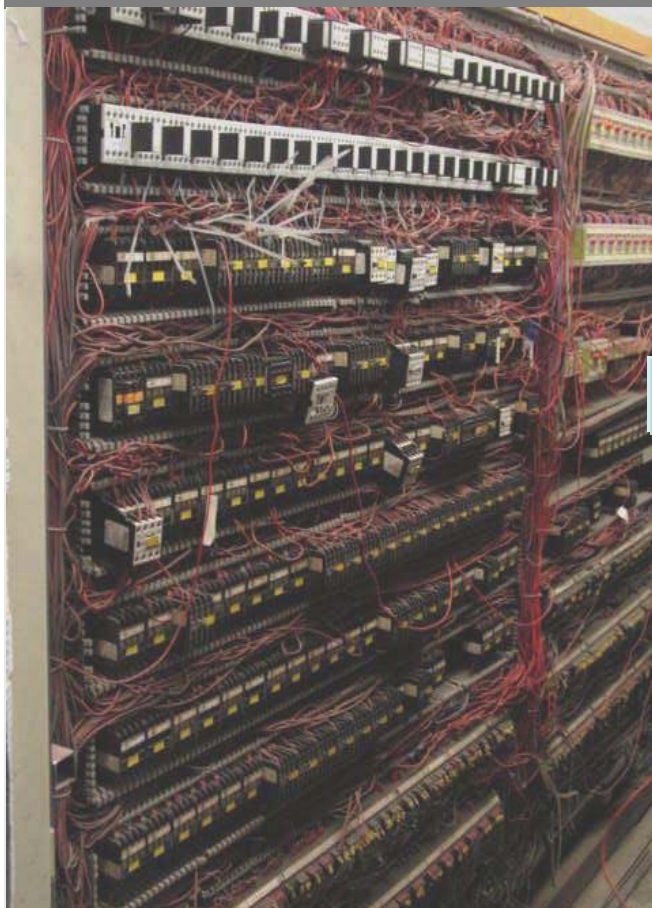
Economic
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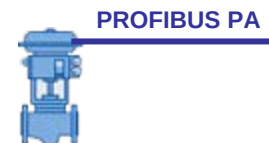
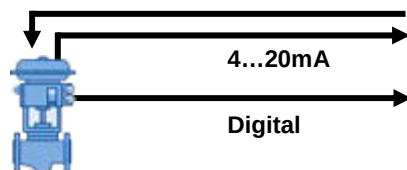
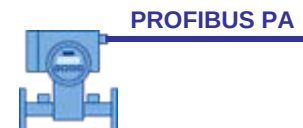
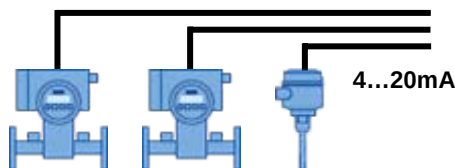
Conclusion

Save space and costs !!!

节约空间和成本!!!



- **Cost and space savings** 成本和空间的节省
 - **Less instruments using multivariable devices**
 - **Less wiring**
 - **Less I/O cards**
 - **Less controller logic**



PROFIBUS PA already features ...

现有特性 ...



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- **Free choice of devices due to open standard** 平台的开放增加设备的选择性

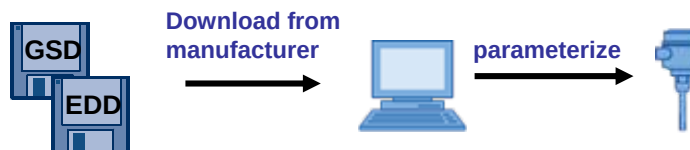
- **Interchangeability** 可替代性

Devices can be operated in device manufacturer independent mode according „PA Profiles“ e.g.

- counting
- pressure
- flow
- level ...

- **Interoperability** 互操作性

Universal device description independent from DCS or device manufacturer



PROFIBUS PA already features ...

现有特性 ...



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Economic
Aspects

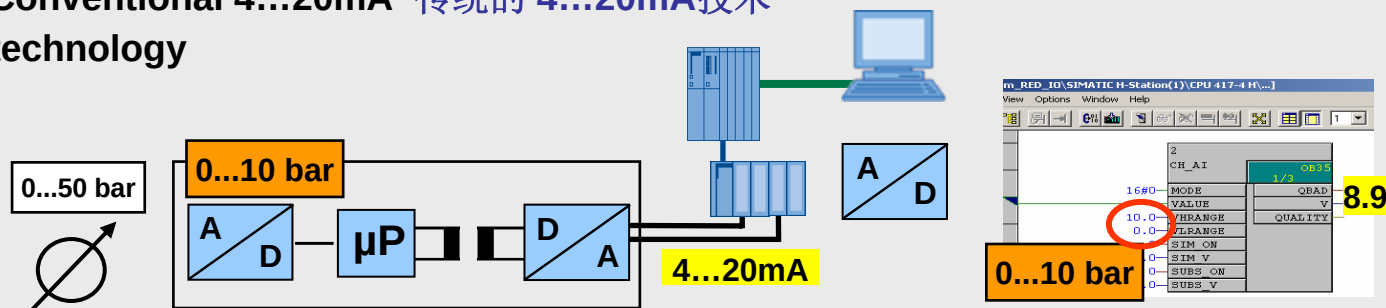
Outlook

Conclusion

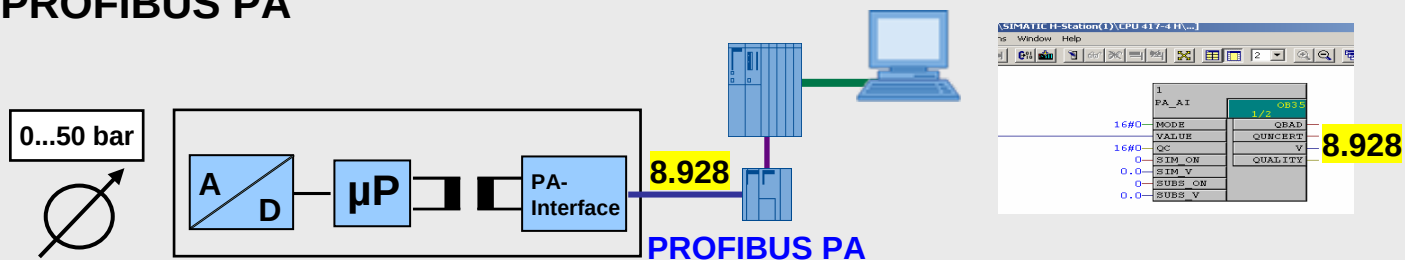
Higher Accuracy 高精度度

- Less conversions
- 32 bit resolution, digital transmission
- No application specific measuring ranges

Conventional 4...20mA 传统的 4...20mA 技术 technology



PROFIBUS PA

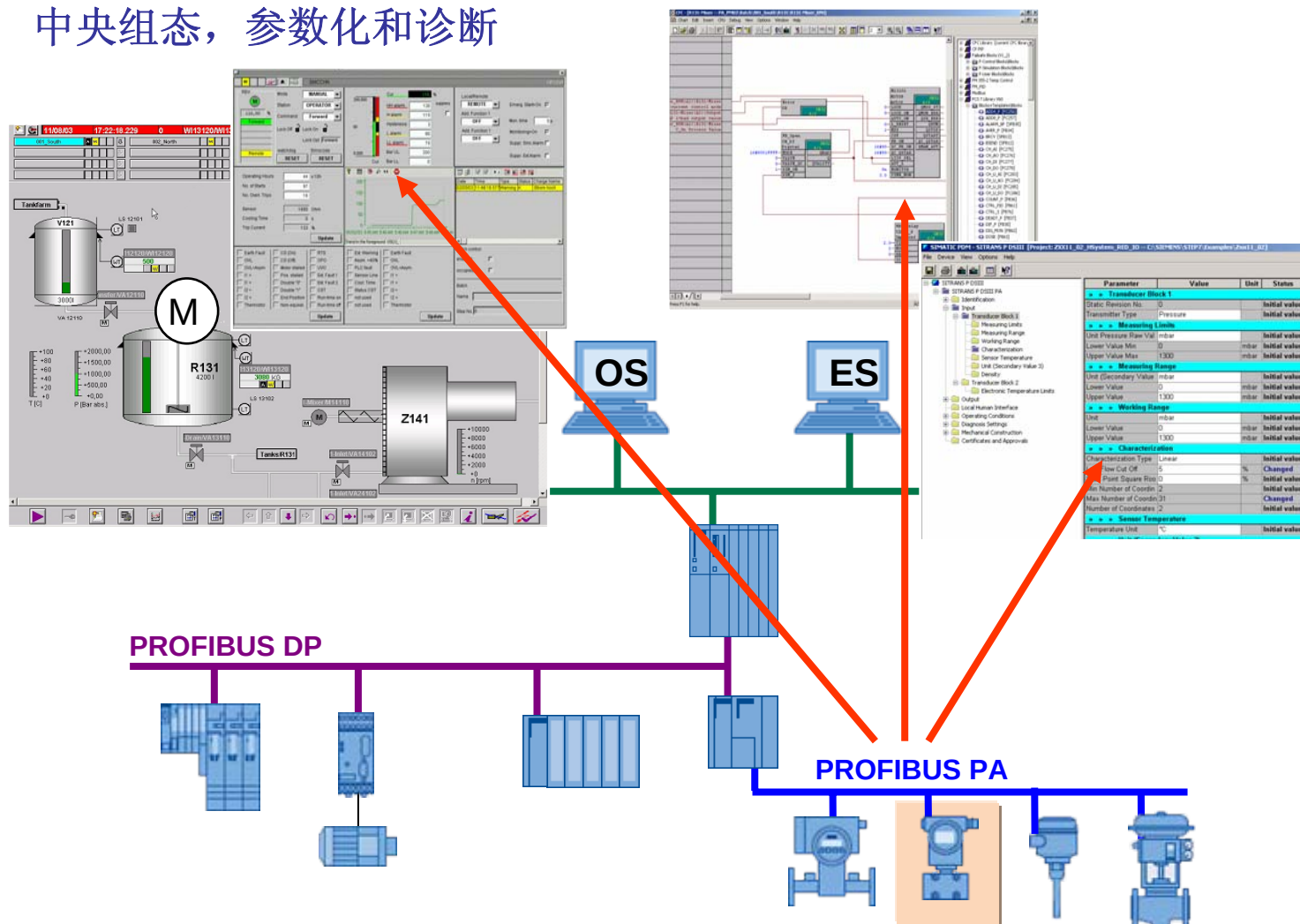


PROFIBUS PA already features ...

现有特性 ...

Central configuration, parameterization and diagnostics

中央组态，参数化和诊断



PROFIBUS PA already features ...

现有特性 ...



Motivation

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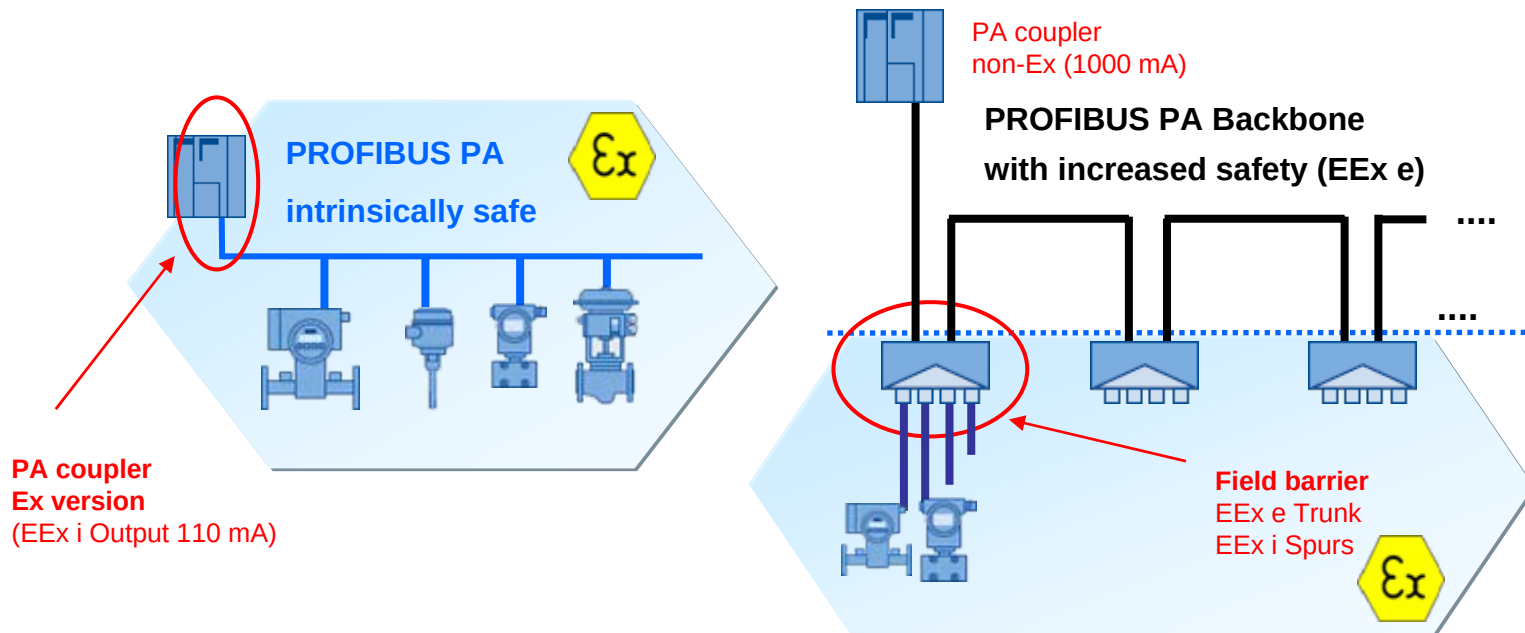
Conclusion

■ Online Changes 在线更改

- Add, remove, replace Devices

■ Plug & Play also in hazardous areas 在高危险区也支持即插即用

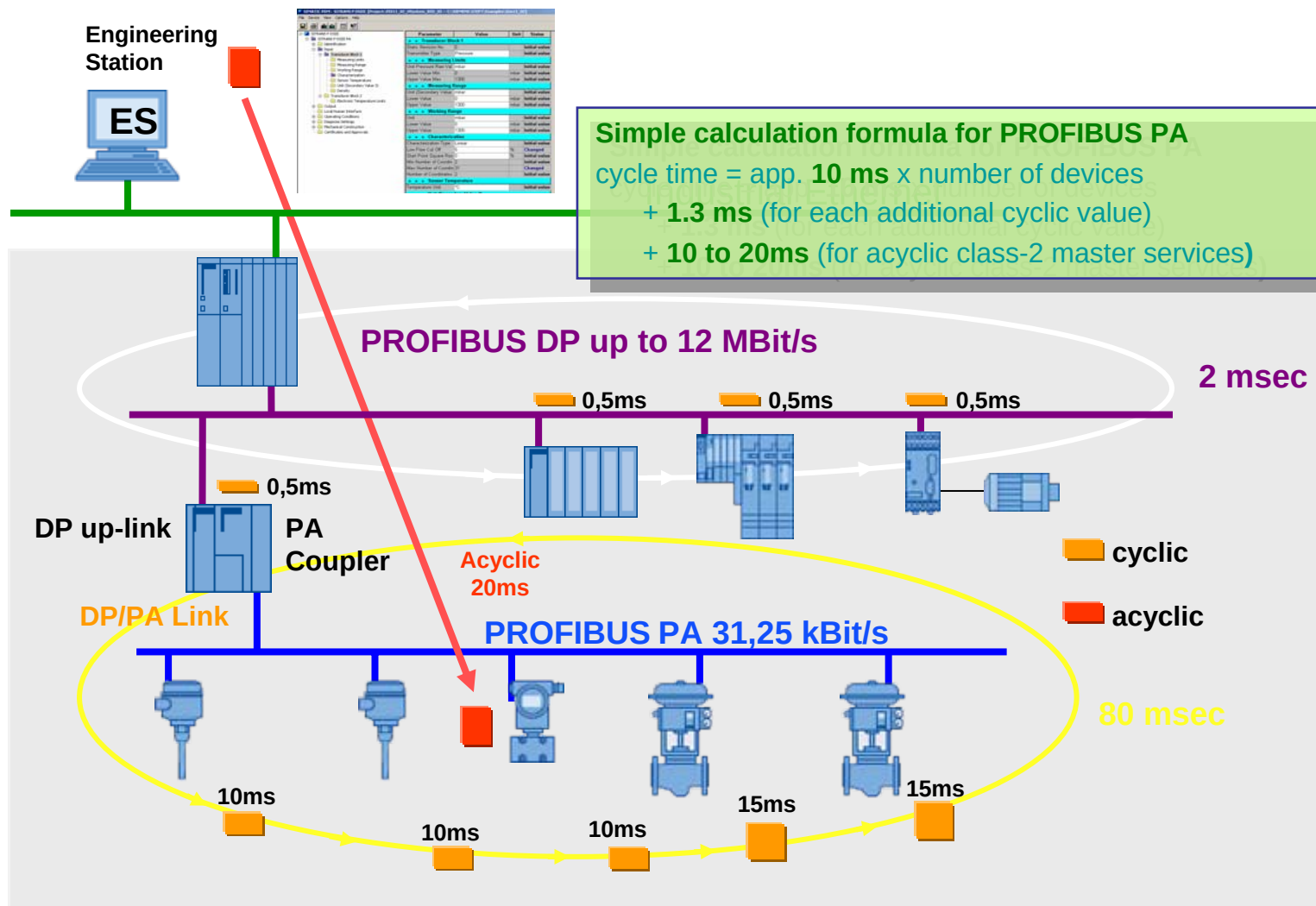
- Definition of max. values (voltage and current) for a segment
- Fieldbus Intrinsically Safe Concept (FISCO)
- Neither recalculation nor EEx system certification required



PROFIBUS PA already features ...

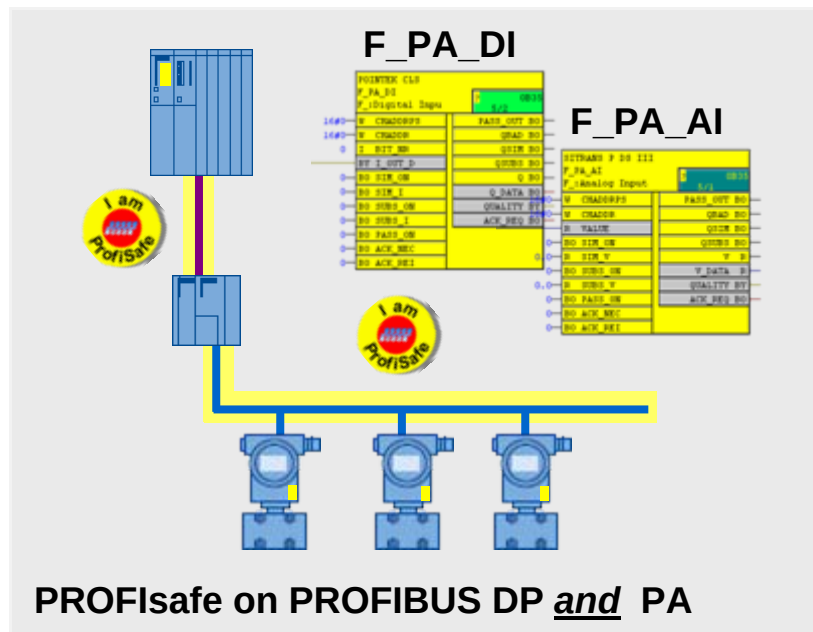
现有特性 ...

- High performance for fast control loops 在快速控制回路中体现出高性能
- Two separated cycles on PROFIBUS DP and PROFIBUS PA 在PROFIBUS DP 和 PROFIBUS PA上的循环是相互独立



通过PROFISafe完成过程安全通讯

- IEC 61508/11:
- The whole communication path to the field device is failsafe now!
- No fail-safe-I/Os required, less cabling



... our customers expect furthermore

用户更高的期望

Motivation

Initial Situation

Redundancy
Concept

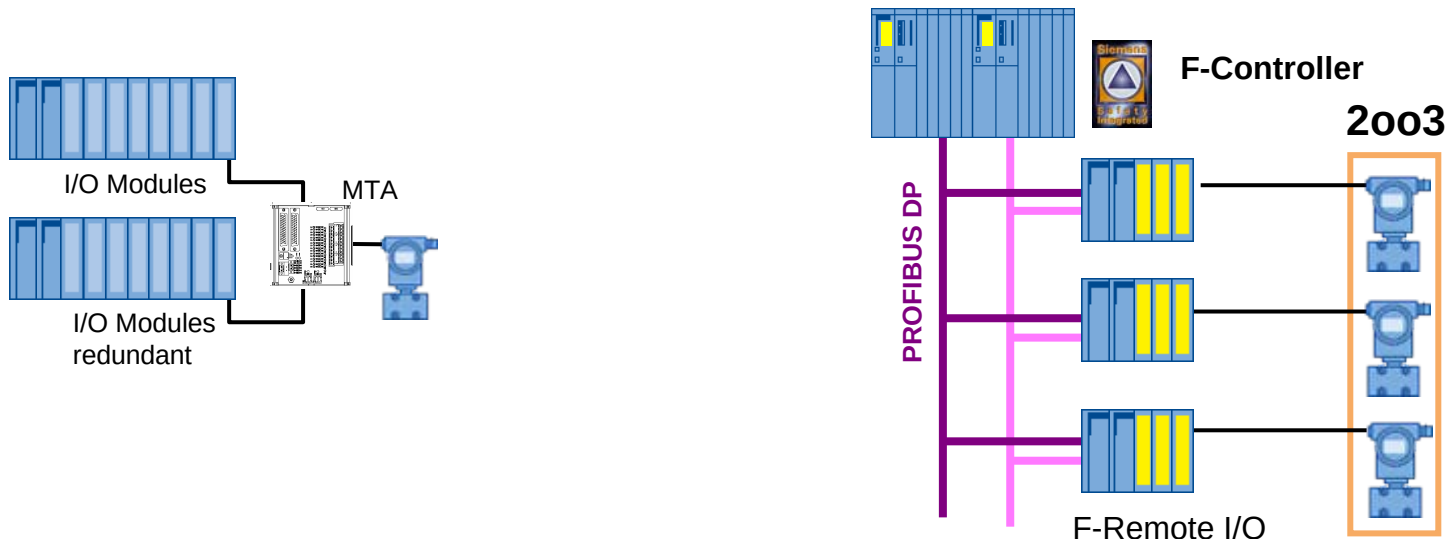
Economic
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- Real alternative to conventional technology also covering high available and failsafe applications

传统技术的真正替代物，具有高可用性并且能应用在故障安全领域



- Enhanced diagnostics and seamlessly integrated asset management support

更强的诊断性并支持无间隙整合的资产管理

- Prevention of installation faults (e.g. wrong termination)

防止安装错误（如：错误的终端）

- Online repair and update for topology as well

在线拓扑修复与更新

PROFIBUS PA redundancy prevents major potential faults

PROFIBUS PA的冗余可以避免主要的潜在危机

Motivation

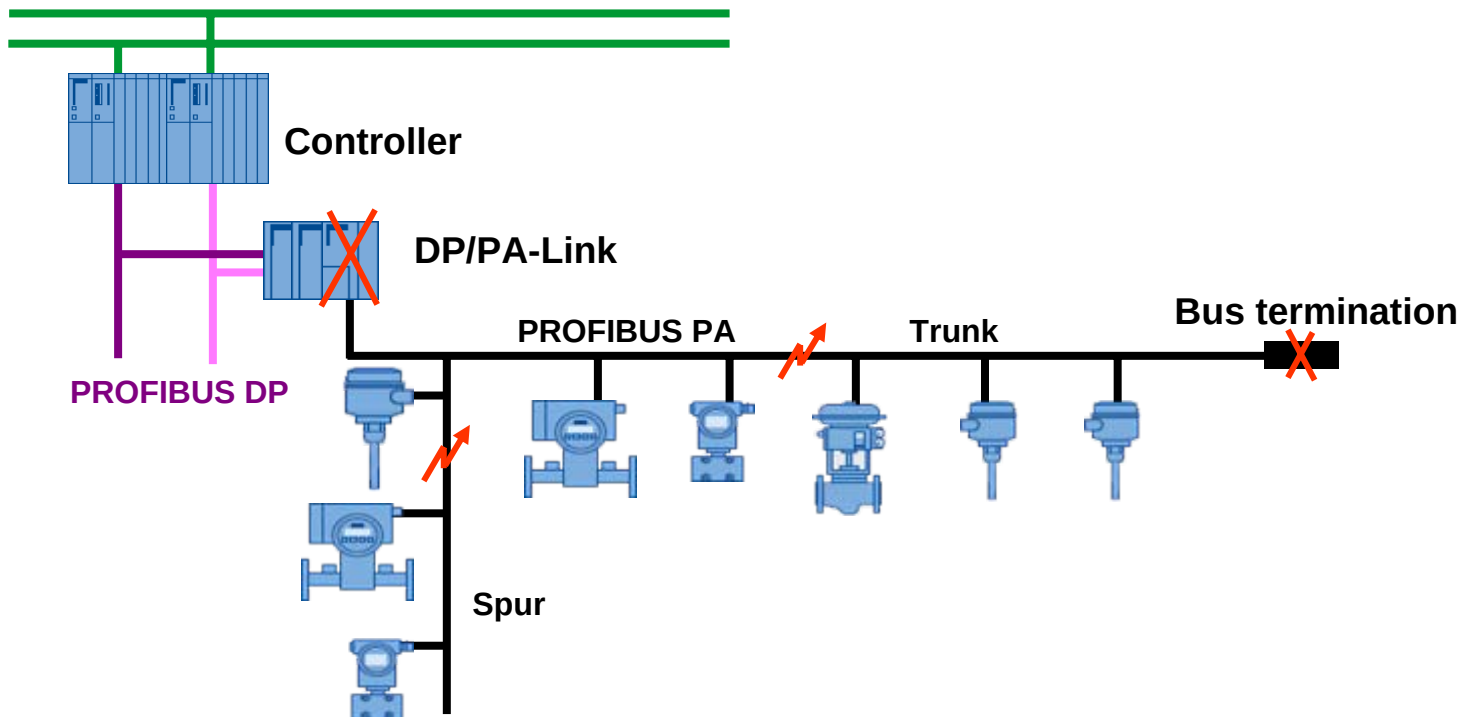
Initial Situation

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Failure	Effect
PA Coupler	Breakdown of up to 31 devices
Short-circuit / wire break on trunk line	Breakdown of up to 31 devices
Wire break on spur line	Breakdown of typ. 1-4 devices
Short-circuit on spur line	Breakdown of up to 31 devices
Missing bus termination	Disturbance of communication

Scalable redundancy concept

可扩展的冗余概念



Motivation

Initial Situation

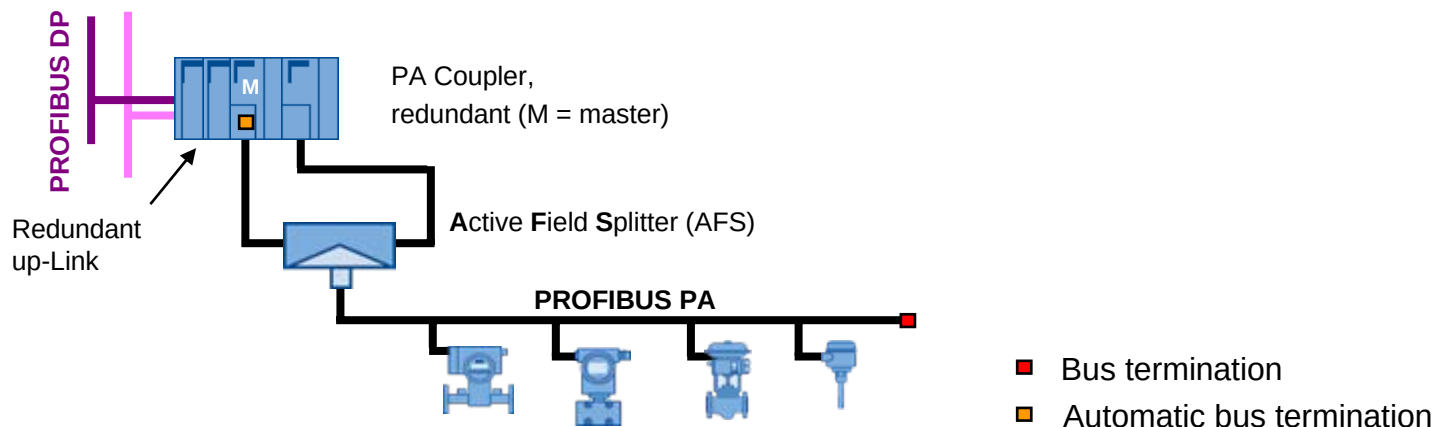
Redundancy
Concept

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Aspects

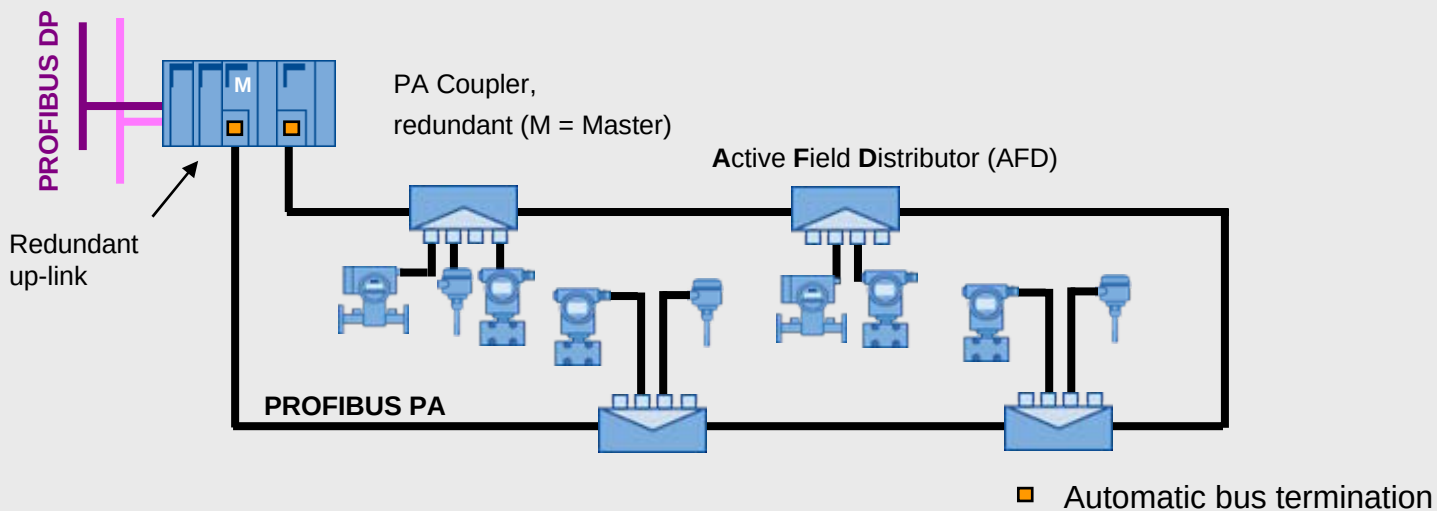
Outlook

Conclusion

Coupler Redundancy



PROFIBUS PA ring redundancy



Higher availability with ring redundancy

具有高可用性的环状冗余

Motivation

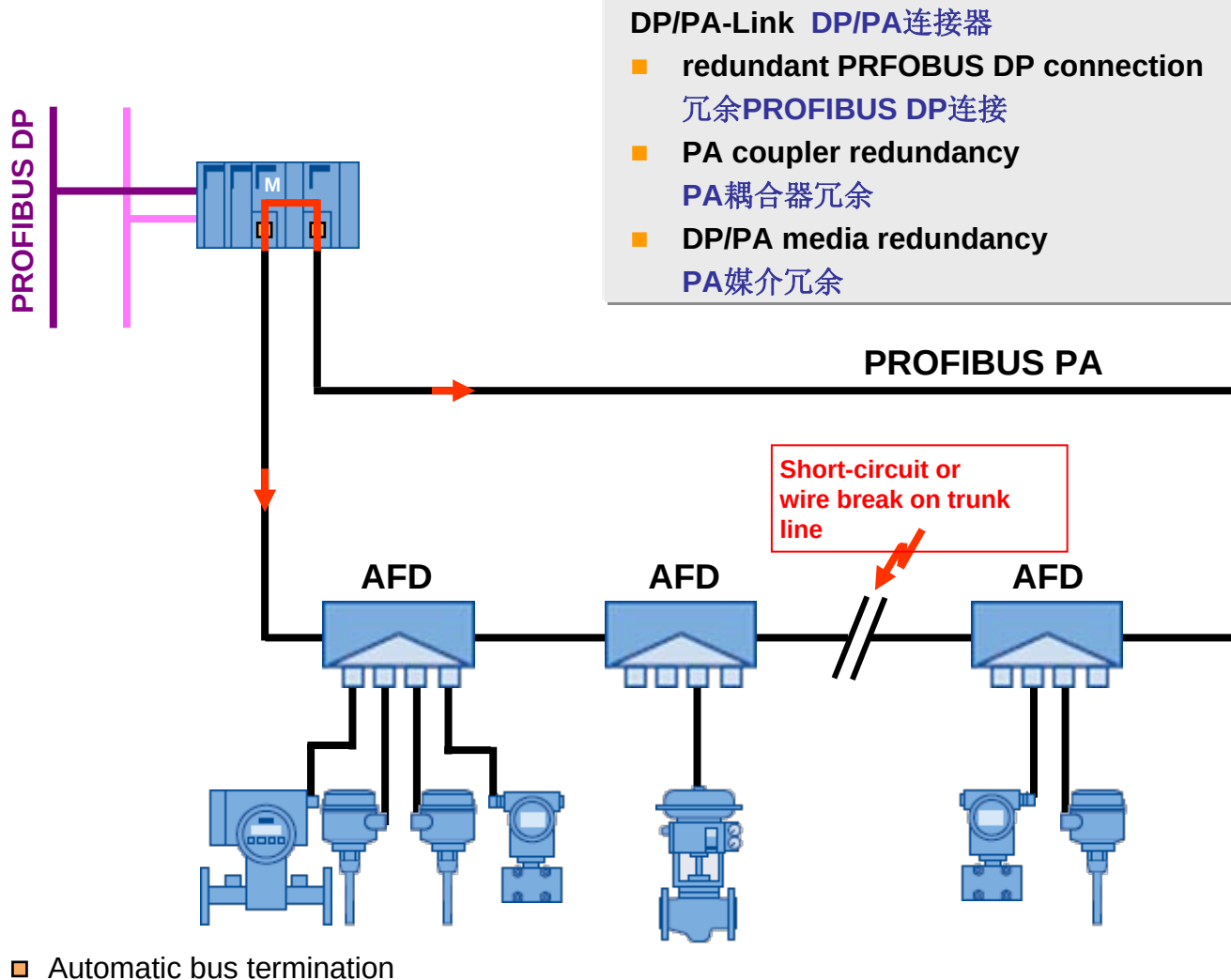
Initial Situation

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Automatic bus termination - how does it work ?

自动总线终端 - 如何实现？

Motivation

Initial Situation

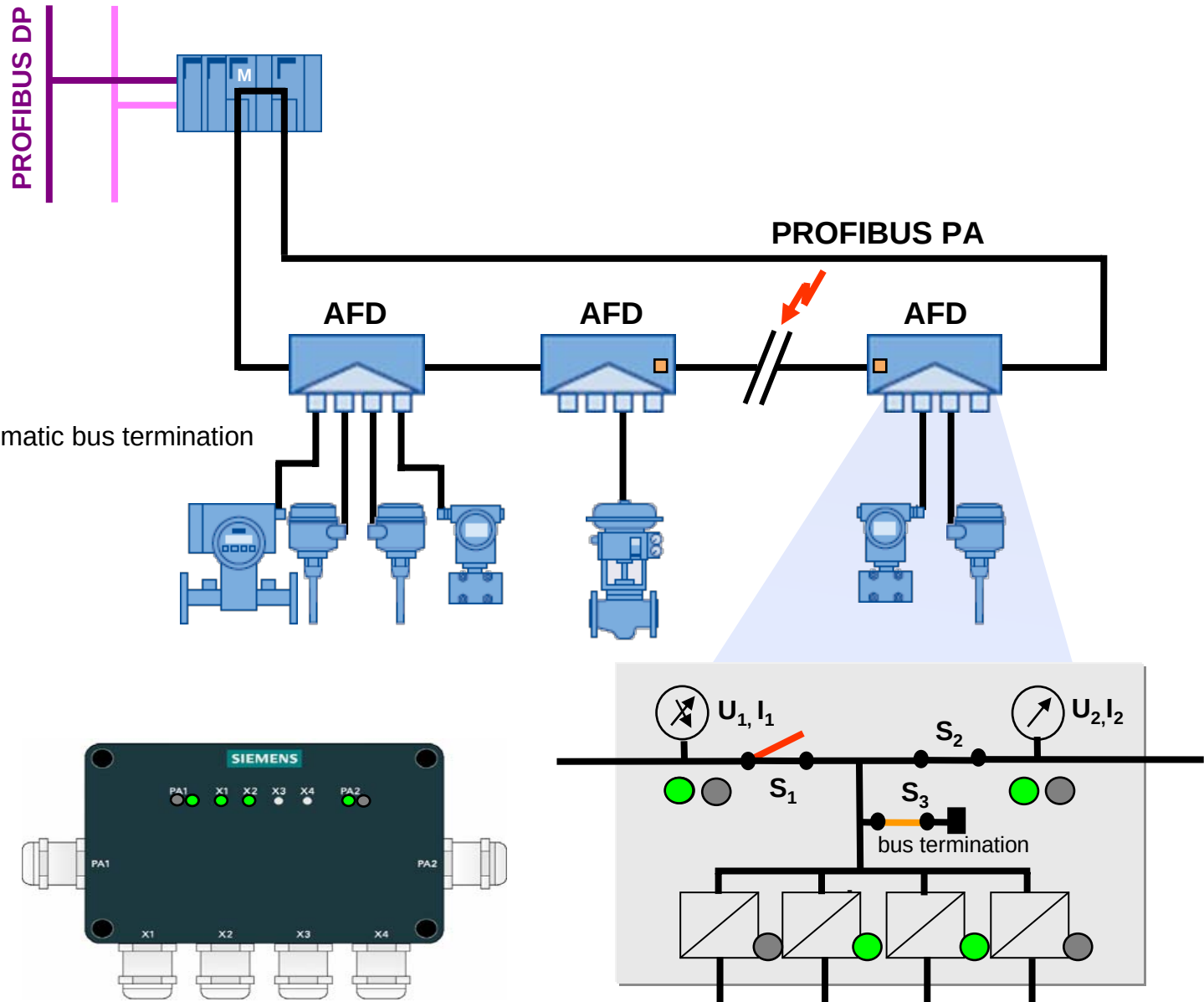
Redundancy
Concept

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Automatic bus termination



Online change possibilities due to automatic bus termination

由于自动总线终端可以实现在线更改

Motivation

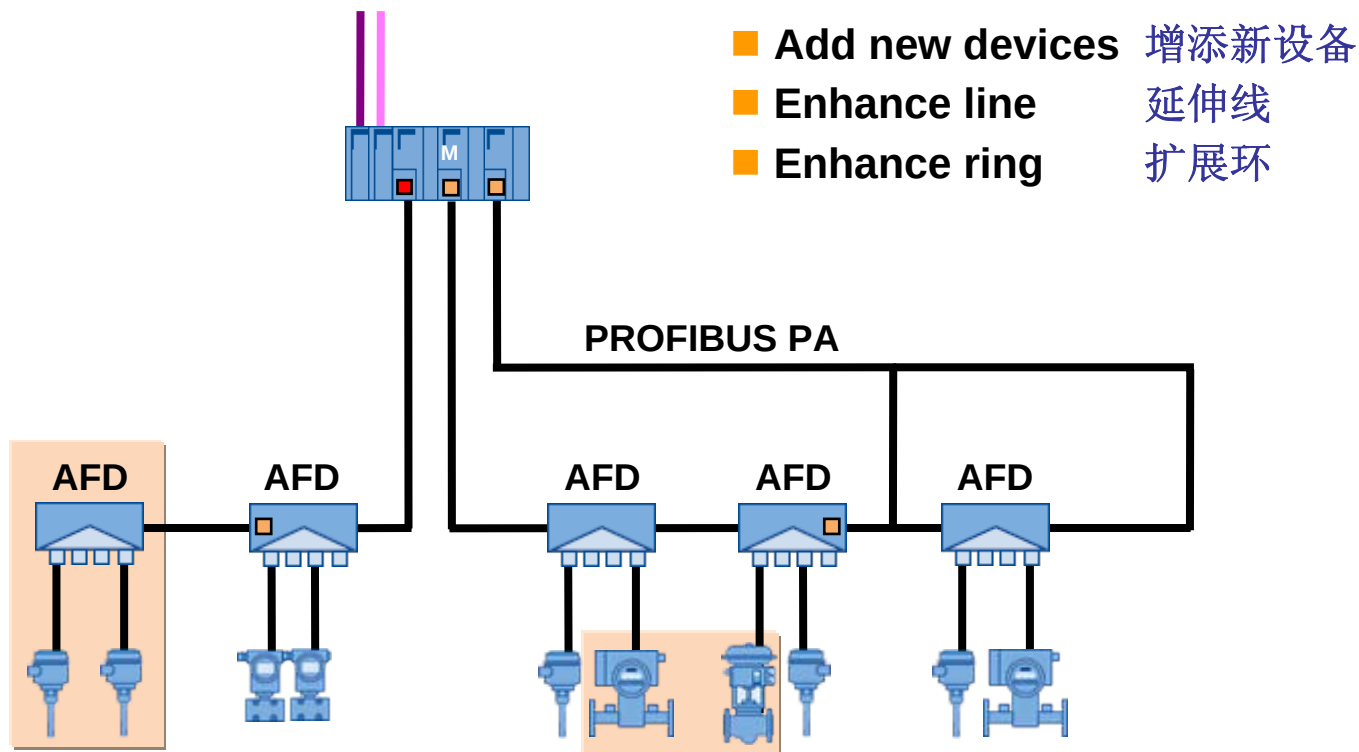
Initial Situation

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There is no need to reserve spare ports of the AFDs !

- Bus termination
- Automatic bus termination

Motivation

Initial Situation

Redundancy
Concept

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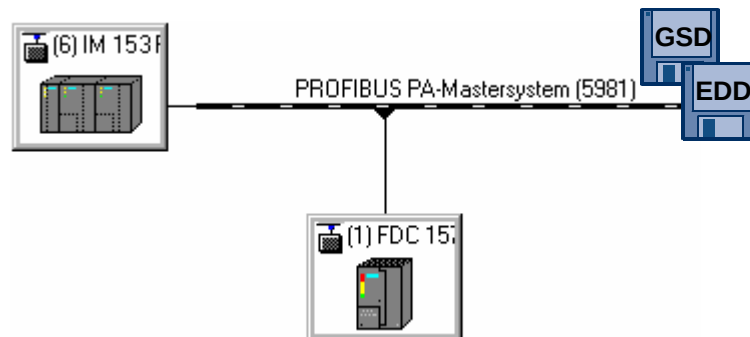
Outlook

Conclusion

PA Coupler as PROFIBUS diagnostic-slave based on GSD / EDDL

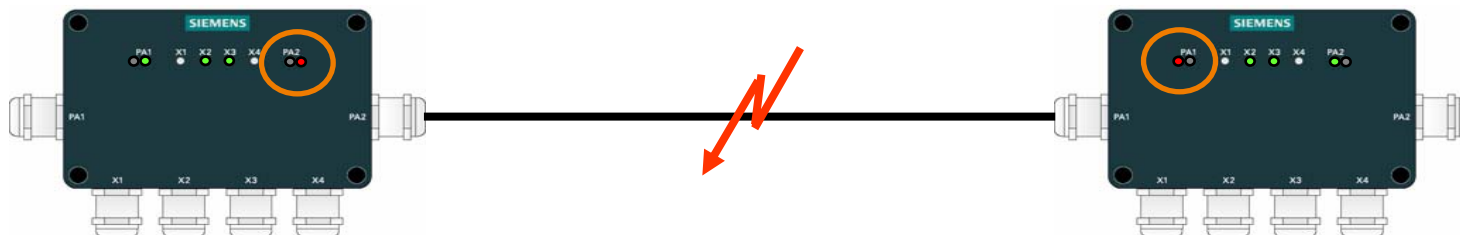
基于GSD/EDD文件，PA耦合器可作为PROFIBUS的诊断客户

- I&M Data
- Redundancy state
- Current value
- Voltage value
- Shortcut und wire break
- Signal level
- Local life list



Diagnostics through LEDs 通过LED进行诊断

- Shortcut or wire break
- Support in determination of failure locations



Seamless integration into asset management of the DCS

无间隙地整合在DCS资产管理中



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The screenshot displays the Siemens PCS 7 software interface. At the top, a status bar shows the date 01/01/94, time 06:58:30.259, and a device identifier S7\$Program(1)/@ (11)/FDC_rechts_2 Device 1. Below this, a 'Diagnose' tab is active, showing a table of devices. A red arrow points from a green square icon in the 'FDC links 2' section to a 'Message Diagnostic PA Slave DP V0 link DP_Mastersyst' window. This window displays a 'Component' status of 'good' and a 'Comment' field. A blue callout box labeled 'Detailed diagnostics via device manager' points to the 'Ident' button in the window. Another red arrow points from a green square icon in the 'FDC rechts 2' section to a 'Detailed diagnostics via device manager' window. This window displays a 'Component' status of 'good' and a 'Comment' field. A blue callout box labeled 'Available views:' points to the 'Ident' button in the window. The 'Available views:' list includes: I&M, Alarm, Diagnostic, Parameters, Change Report, and Maintenance. The background of the software interface shows a complex network diagram with various components and connections.

01/01/94 06:58:30.259 0 S7\$Program(1)/@ (11)/FDC_rechts_2 Device 1

Diagnose

FDC links 2 FDC rechts 2 SITRANS P DSII 2 SITRANS T3K 2

Message Diagnostic PA Slave DP V0 link DP_Mastersyst

S7\$Program(1)/@ (11)/FDC_rechts_2

Ident

Component

good

Comment

TAG

Description

Message

Device Type

Manufacturer

Order Number

Serial Number

Install date

HW-Revision

SW-Revision

DP/PA-Coupler

0

6ES7 157-0AC83-0XA0

0

R 1.1.9

Available views:

- I&M
- Alarm
- Diagnostic
- Parameters
- Change Report
- Maintenance

Central diagnostics with device management tool

通过设备管理工具进行中央诊断



Motivation

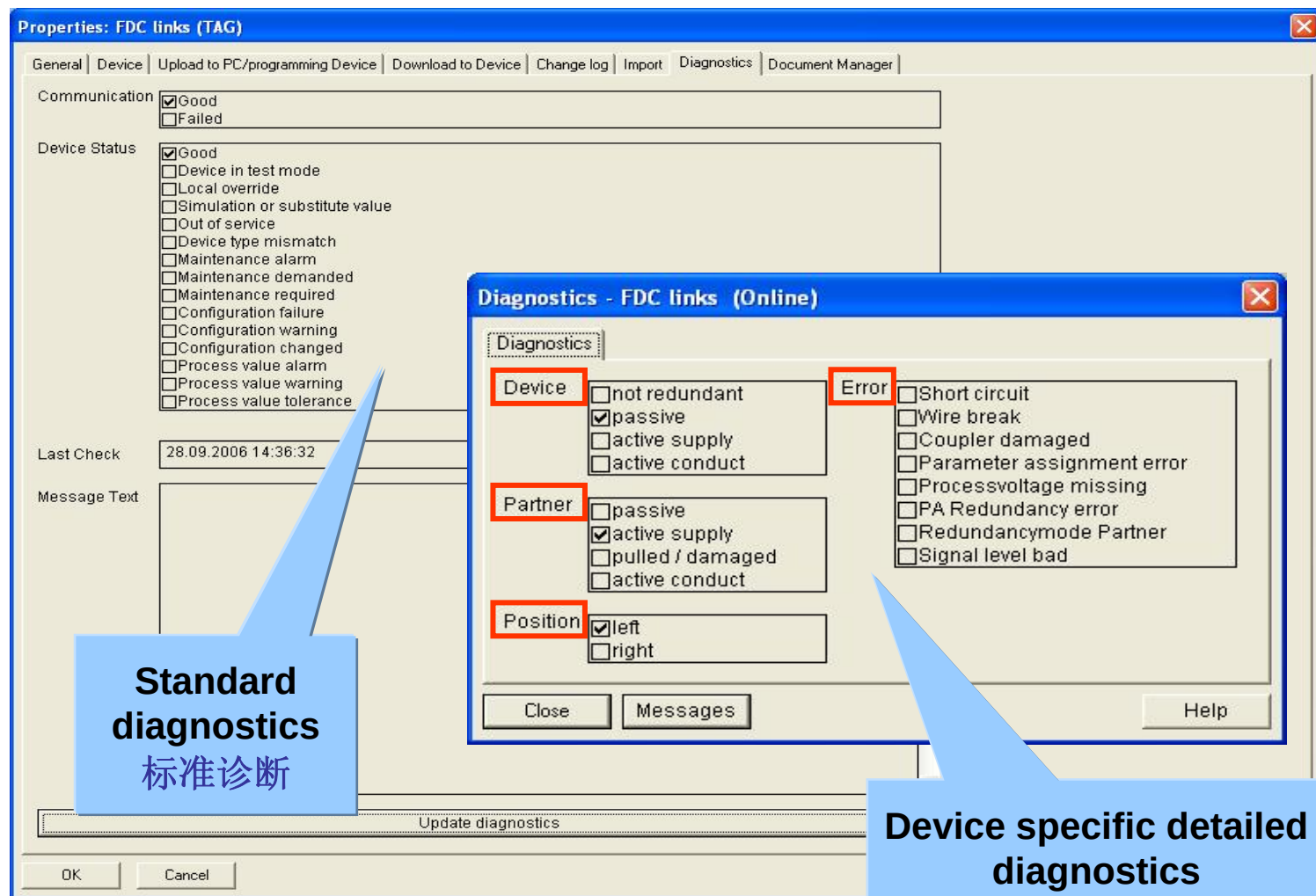
Initial Situation

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Conventional setup for high available and fail-safe applications 在高可用性和故障安全应用中的传统组建

Motivation

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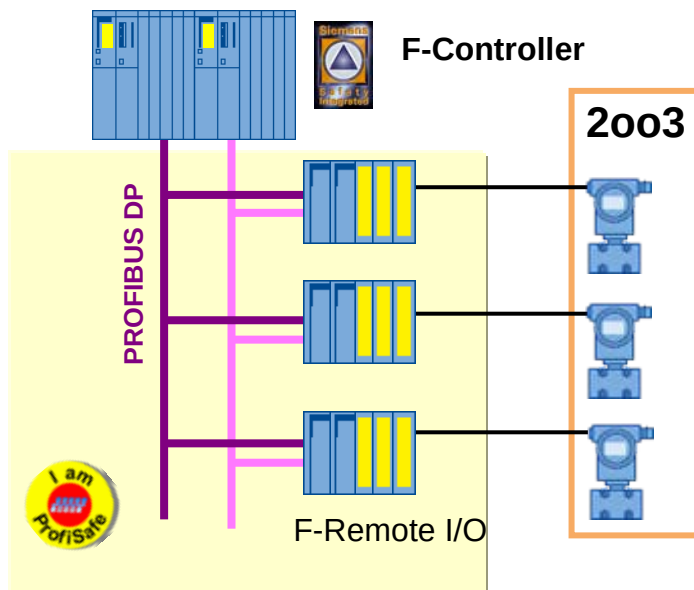
Outlook

Conclusion

Today's architecture

今天的架构

High available and fail-safe measurement (e.g. 2 out of 3)



- Safe communication up to the I/O card
- Safety and high availability requires multiple I/O cards

Cost saving architecture for high available and fail-safe applications

在高可用性和故障安全应用中节约成本的架构

Motivation

Initial Situation

Redundancy
Concept

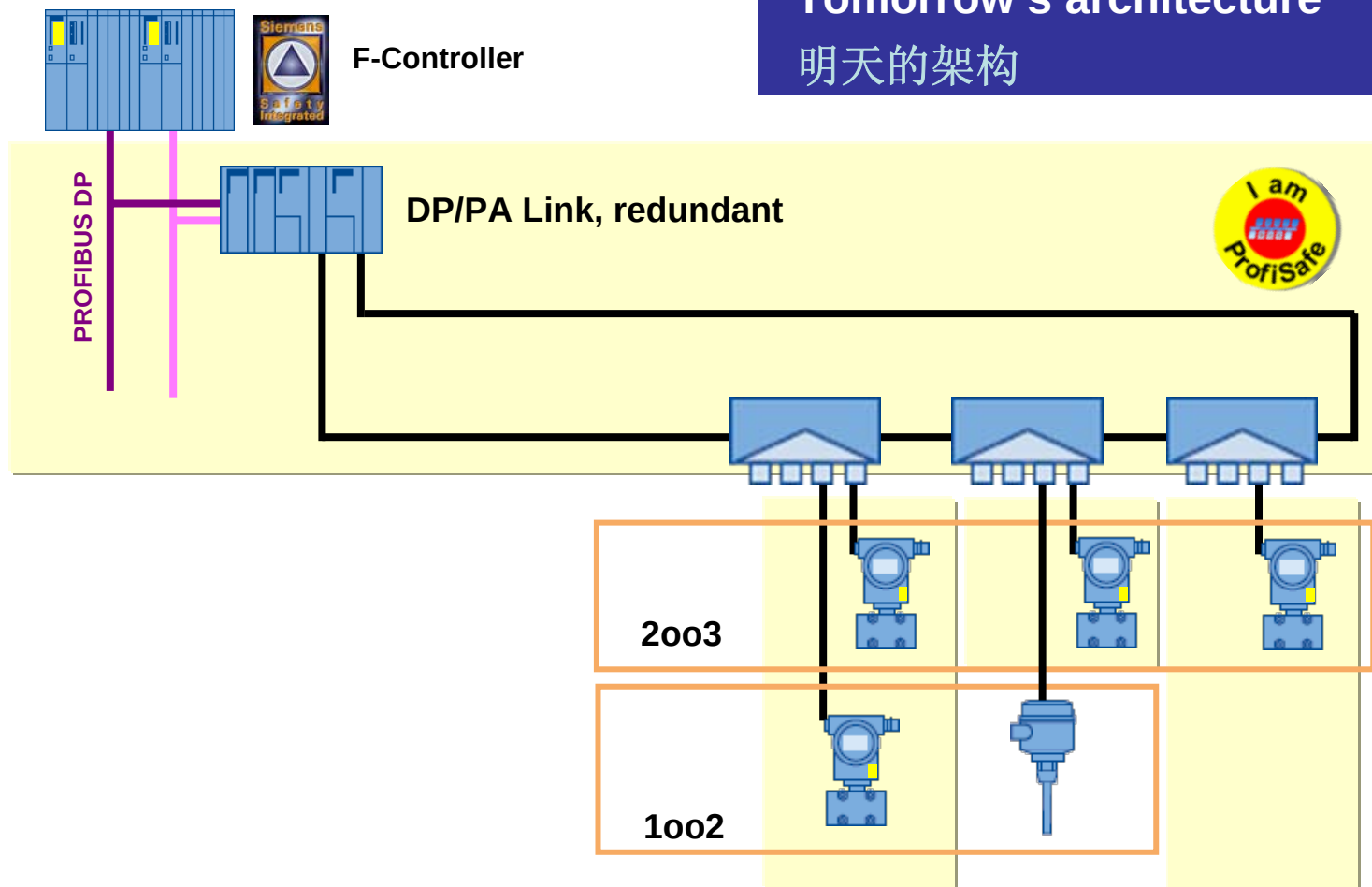
Economic
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Tomorrow's architecture

明天的架构

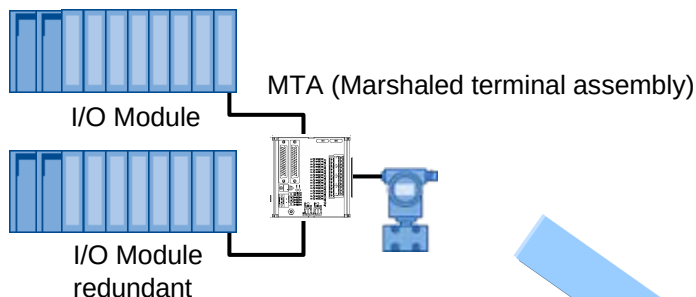


- Safe communication down to the field device
- Safety and high availability on one segment
- Allows combination of standard and PROFISafe devices

Real alternative to conventional I/O technology

传统I/O技术的真正替代物

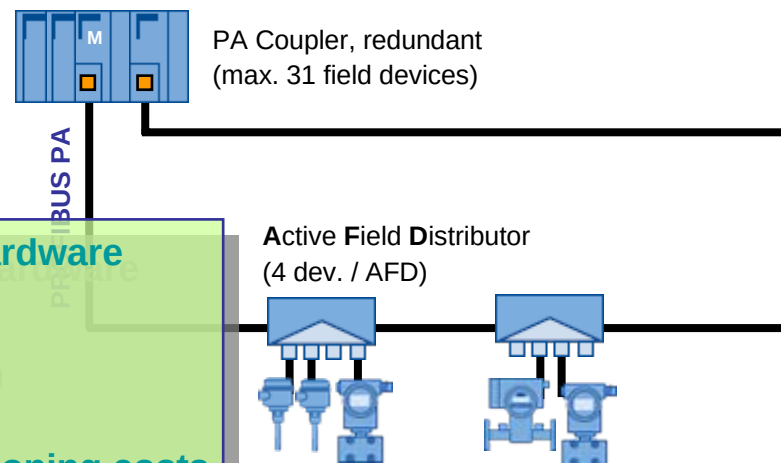
Redundant AI/AO (100 AI / 50 AO)



- 6 Remote I/O Stations
- 26 AI modules (8 Ch)
- 14 AO modules (8 Ch)
- 13 AI MTA
- 7 AO MTA
- 3 Cabinets

Redundant PROFIBUS PA (150 PA devices)

- 5 Rings (5 DP/PA-Links)
- 40 AFDs
- 1 Cabinet



33 % less costs for communication hardware

通讯硬件的成本可节省33%

66 % less space consumption

可节省66%的空间消耗

Further savings on installation & commissioning costs

另外还能节省安装和试车的成本

Central 4...20mA configuration vs. Distributed configuration with PROFIBUS

中央4...20mA结构 对 应用PROFIBUS的分布式结构

Motivation

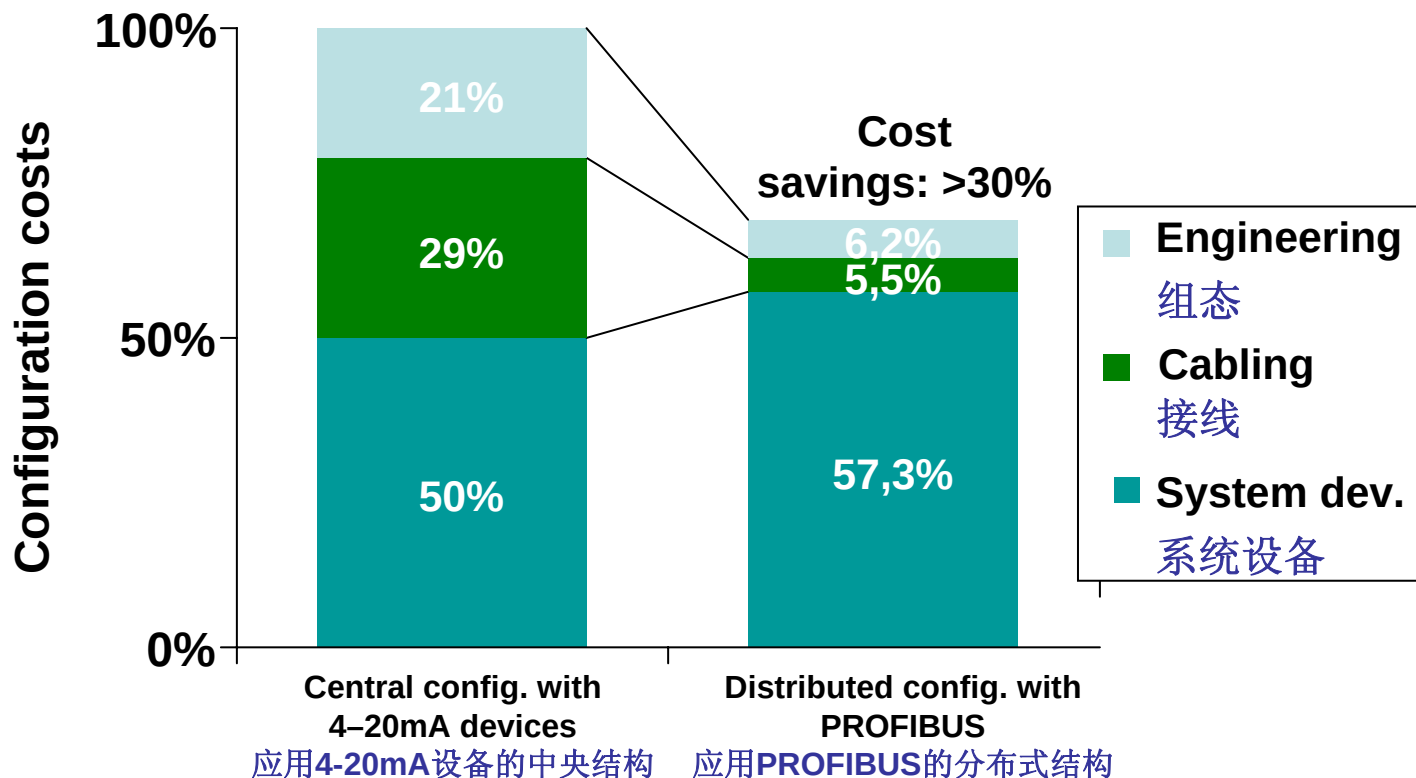
Initial Situation

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PROFIBUS reduces the costs in a typical chemical plant by >30%
在典型的化学工厂中，应用PROFIBUS能降低>30%的成本

*Source: "The Value Proposition of PROFIBUS in the Process Industries", David Humphrey, ARC, April 2005

PROFINET will be the backbone for all fieldbusses

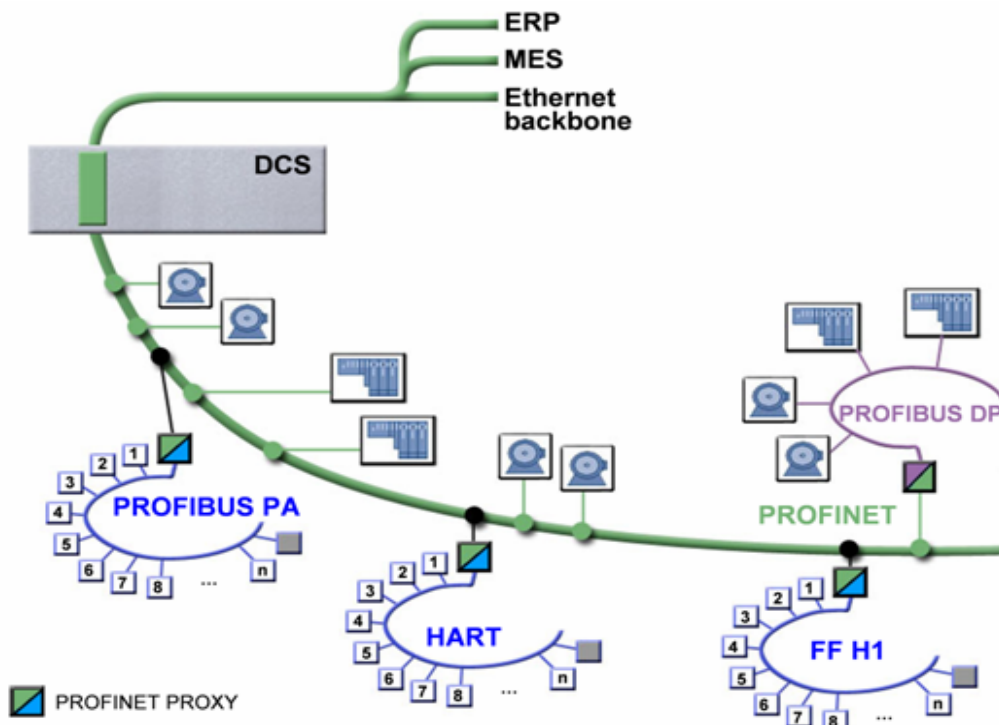
PROFINET将成为所有fieldbus的中枢

Initial premises of PI Working Group “DCS Requirements”

PI工作组最初的提论“DCS需求”

- PROFIBUS won't replace existing fieldbusses, but will seamlessly integrate them (investment protection).
PROFIBUS将不会替代现有的fieldbus,但是会无间隙地整合它们（保护投资）
- Intrinsic safety and bus-powering is already solved with PROFIBUS PA and therefore no requirement to PROFINET

通过PROFIBUS PA已能实现本质安全和总线供电，因此对PROFINET没有需求



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Key features for PROFINET in process automation

PROFINET在过程自动化中应具备的关键特性

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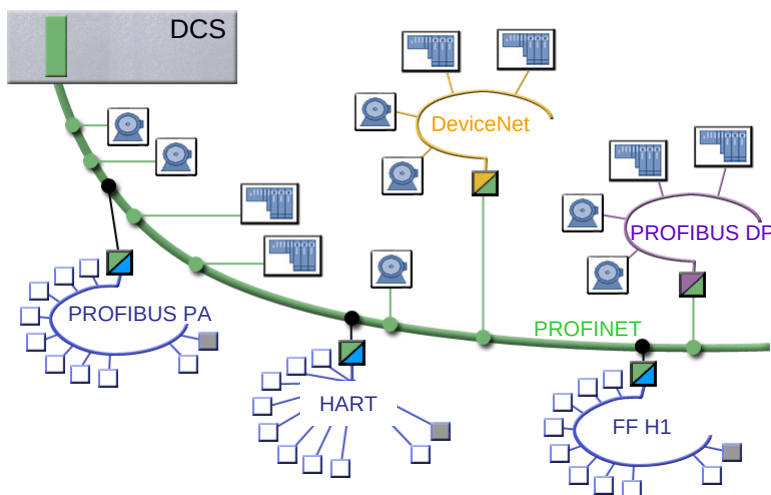
Economic
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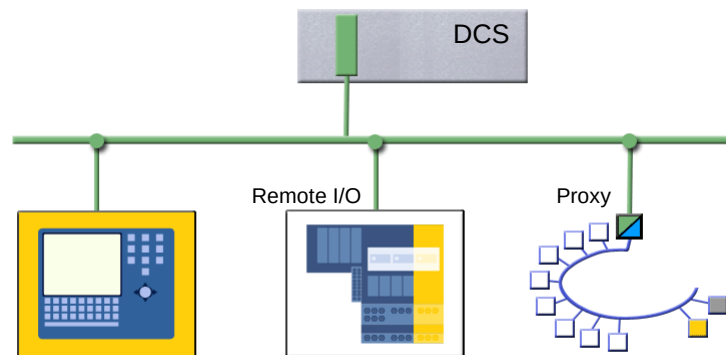
Complete fieldbus integration

完全总线整合



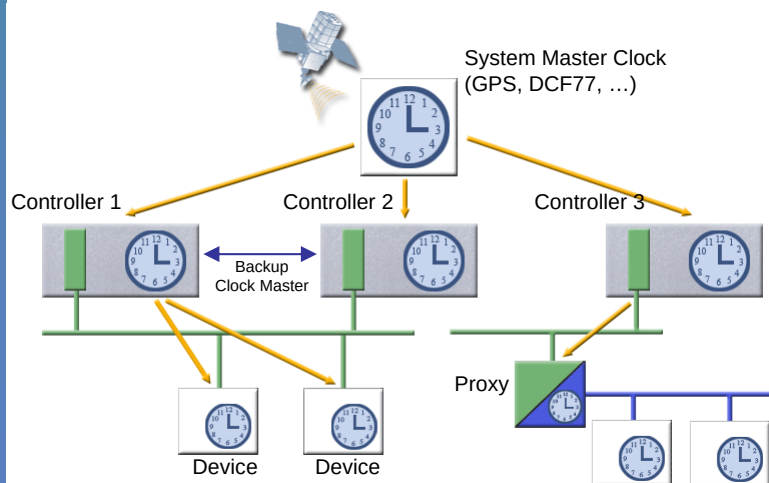
Configuration in Run (CiR)

在线更改组态



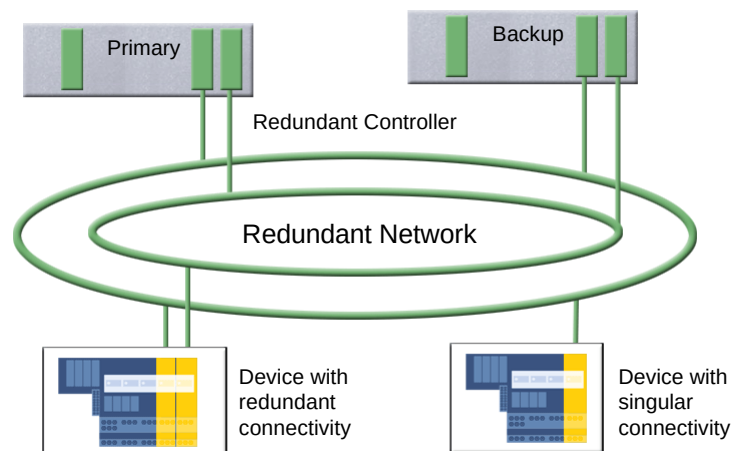
Time synchronization & stamping

时间同步化和标签



Scalable redundancy concept

可扩展的冗余概念



Redundant PROFIBUS PA enables ...

冗余PROFIBUS PA能 ...



Motivation

Initial Situation

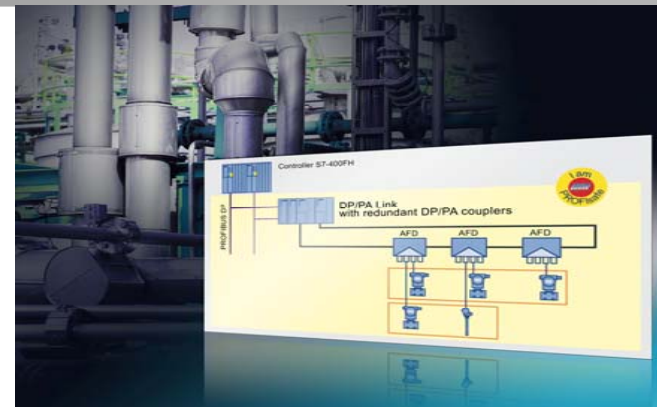
Redundancy
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- Fast and easy installation because of bus-powering and automatic bus termination
由于总线供电和自动终端能完成快速和简单的安装
- Prevention of unexpected plant downtimes due to scalable redundancy concept
由于可扩展的冗余概念能防止意外的工厂停车
- Early fault recognition and preventive maintenance due to enhanced diagnostics and asset management support
由于增强的诊断能力和资产管理的支持能尽早地检测到错误并对其进行预防性的维护
- Cost- and space saving configurations as a real alternative to conventional technologies (4 ... 20mA, HART, fail-safe etc.)
节省成本和空间的组态能成为传统技术的真正替代物 (**4...20mA, HART**等等)
- Complete hardware configuration change in run without production downtimes (including modifications on trunk line)
在线彻底地更改硬件组态而不会导致生产停车 (包括更改躯干线路)



PROFIBUS and PROFIBUS PA are state-of-the-art and fit for the future !

PROFIBUS和PROFIBUS PA是当前能迎合未来发展趋势的最先进技术!





**PROFIBUS and PROFINET
Expert Days 2008**

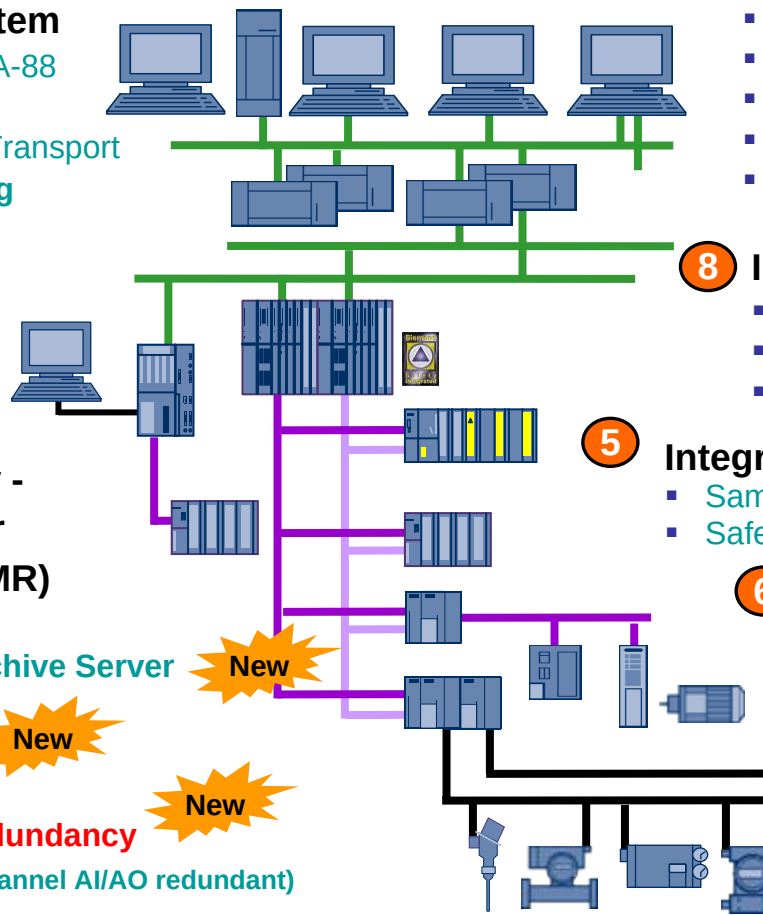
Thank You !!!

感谢!!!

SIMATIC PCS 7 - TOP 10 Unique Features

- 1 **SIMATIC Platform** World Market Leader – high quality standard, worldwide logistics and support, ongoing innovation
- 2 **One Stop Shop** All components developed and manufactured by Siemens
- 3 **TIA Concept** Covering all automation tasks – from raw material to packing, from field to ERP level
- 4 **Scalability** From 100 to 100.000 I/O's – from PCS 7 Lab to large client-server plants with 100's of controllers

- 10 **Integrated Batch / Route Control System**
 - 21 CFR Part 11 / ISA-88 compliant
 - Automatic Material Transport
 - Improved Reporting
- 7 **High Availability - Flexible Modular Redundancy (FMR)**
 - OS / Batch
 - Red. Central Archive Server
 - Ind. Ethernet
 - Controller
 - Profibus DP
 - Profibus PA Redundancy
 - I/O modules (8-channel AI/AO redundant)



- 9 **High-performance Operation&Engineering**
 - Single point of entry (Process Object View)
 - Integration of customer specific libraries
 - SMART Alarm Management
 - Security (Logon, Firewall etc.)
 - FDA Support
 - APC integrated
- 8 **Integrated Asset management**
 - Automatic generation of diagnostic screens
 - Easy fault analysis and repair tracking
 - Performance Monitoring of Plant Assets
- 5 **Integrated Fail Safe Technology**
 - Same hardware S7-400
 - Safety Matrix
- 6 **True decentralized architecture with Profibus**
 - World No.1 fieldbus
 - Integration of Remote I/O's, motors, drives, analyzers, intelligent field devices etc.
 - HART
 - FF interface