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Latest Approach in Substation Automation - IEC 61850

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Energy Sector

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Agenda

- Change in Communication
- Plus Points
- Solutions and Visions

Ethernet and IEC 61850
The Initial Situation

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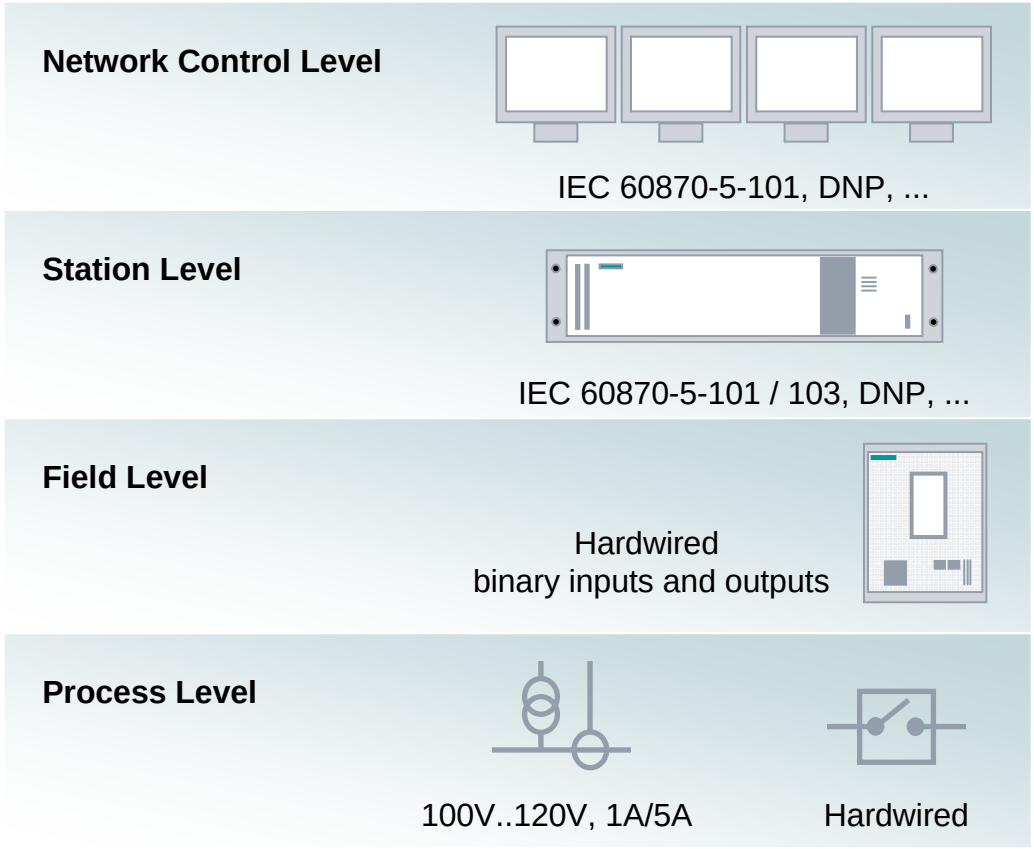

- Devices communicate with one another through wiring.
- Slow serial communications protocols are used (master-slave technique).
- Within a switchgear system, diverse, in part proprietary communications protocols are used.
- Frequently, a cost-intensive data conversion is necessary.
- Redundancy can only be achieved by doubling the communication (two busses).

Ethernet and IEC 61850
The User's Needs

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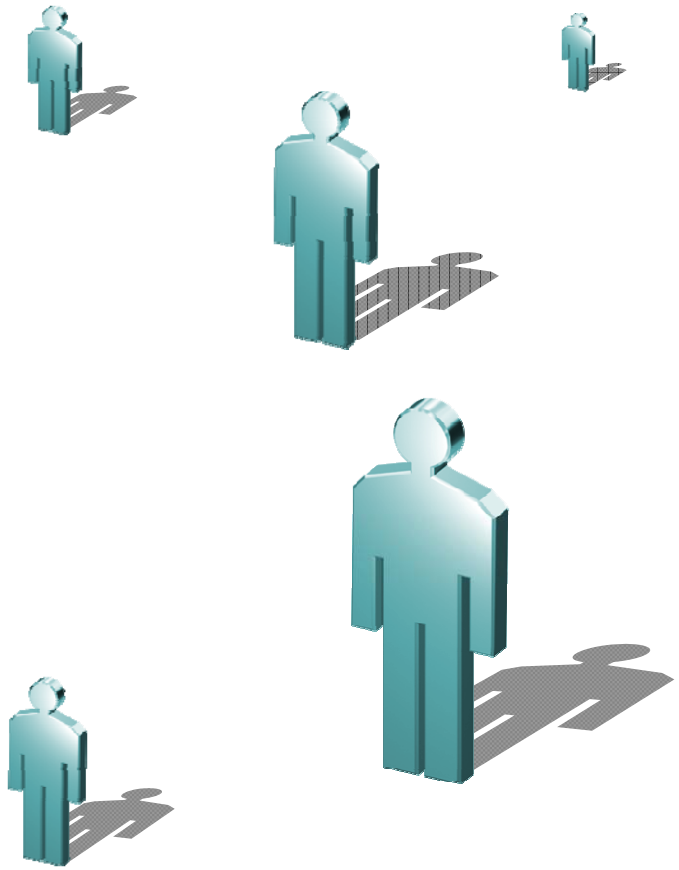

- Integration in engineering, communication and documentation
- Support of modern service concepts
- Long-term expandability
- Flexibility in the selection of components
- Cost optimization

Ethernet and IEC 61850
The Solution

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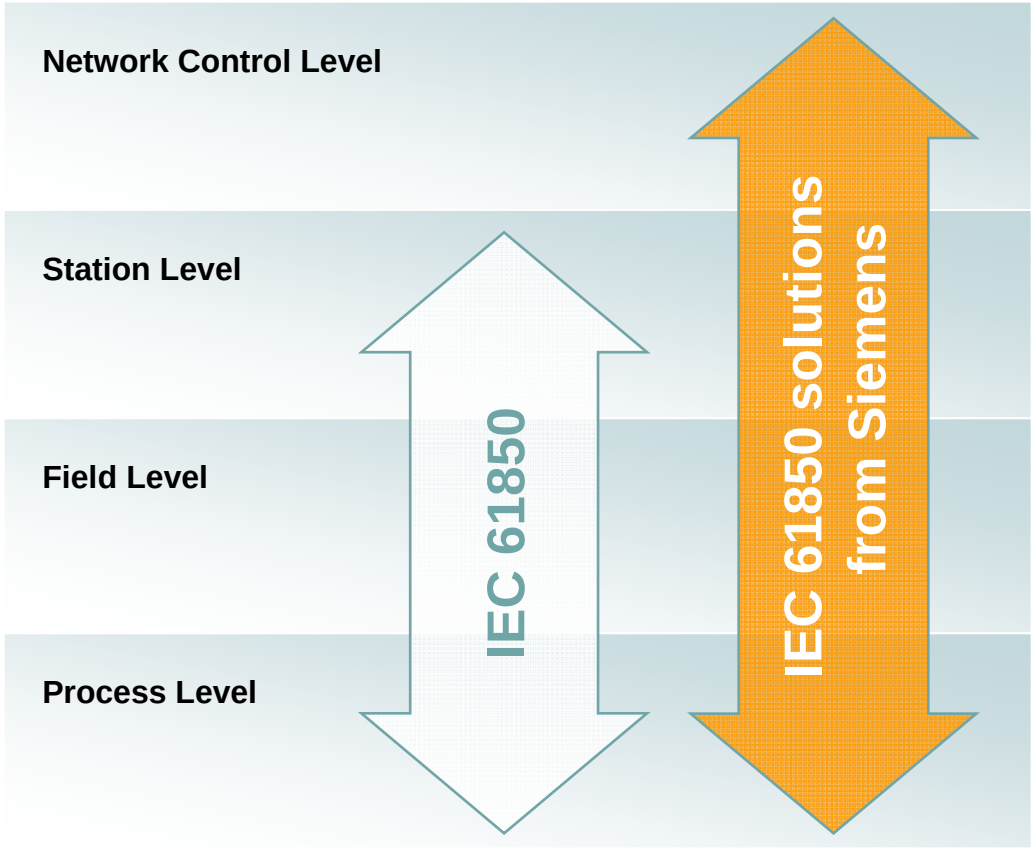

- Currently, an integrated communication without protocol conversion is possible up to the Station Level.
- Siemens masters and implements communication up to the Network Control Level and brings this experience into the continuous standardization.
- IEC 61850 uses the standard Ethernet.
- The standard supplies thought-out migration concepts, even for heterogeneous systems.
- The data model is future-oriented, independent of innovation advancements.

Ethernet and IEC 61850
Pilot Project Industry

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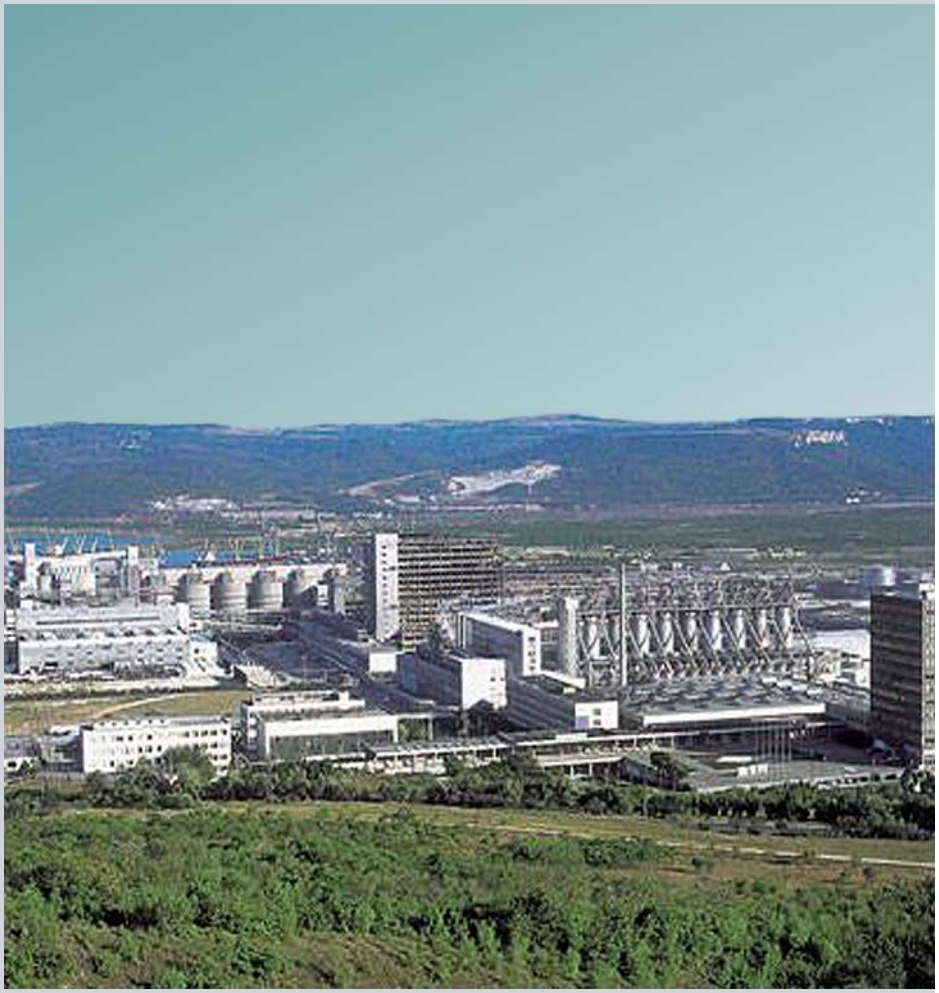
Solvay Group:
International Chemical and Pharmaceutical Company

- Operation of high, medium and low voltage systems
- Worldwide systems in use with IEC 61850 up to the network control level, others being planned



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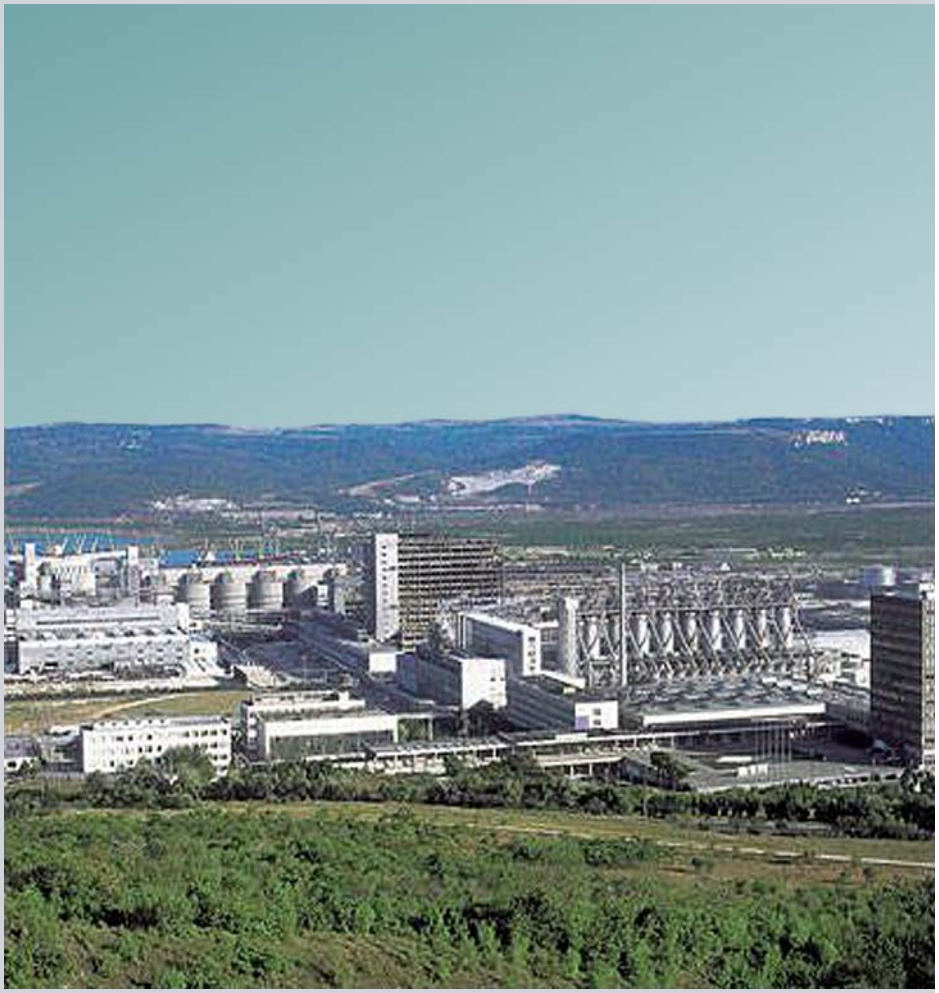
Motivation to Use IEC 61850

- Worldwide accepted, manufacturer-neutral standard
- Object-oriented, self-describing data model
- Future-oriented data model
- High performance
- Great flexibility in case of changes and expansions



Ethernet and IEC 61850
Pilot Project Industry - Experiences

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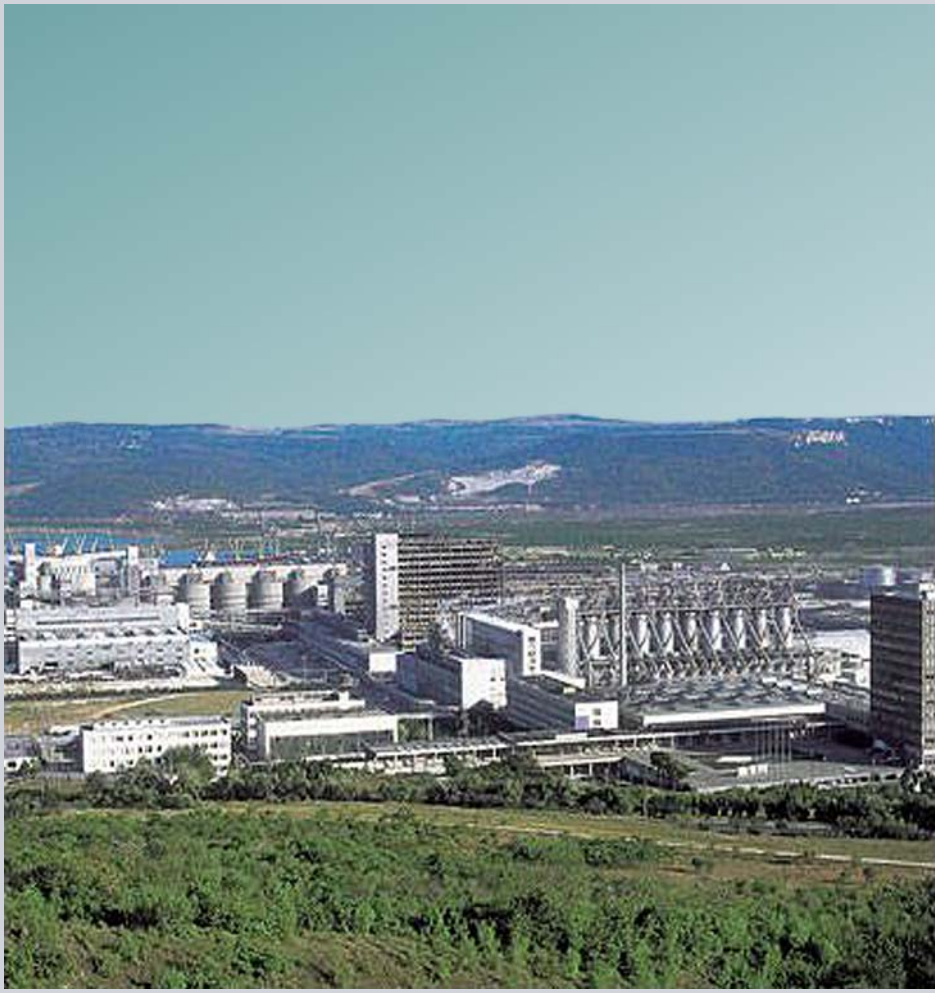
Customer‘s Experiences

- “The export of IED configuration data (SCL) and the subsequent import in a data management tool simplifies the engineering considerably and reduces the testing effort significantly.“
- “IEC 61850 enables easy remote maintenance and support of service locally.“



Ethernet and IEC 61850
Pilot Project Industry - Experiences

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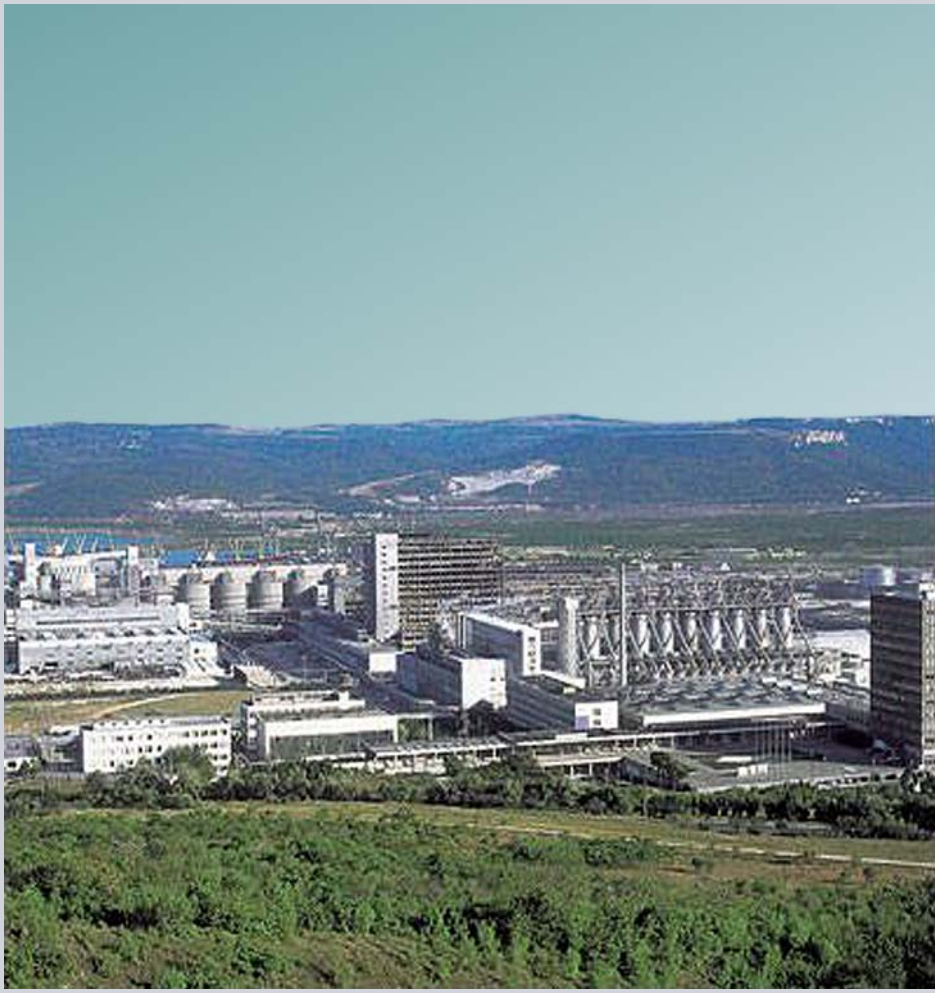
Customer‘s Experiences

- “A central and extremely exact time synchronization is ensured through GPS/SNTP.“
- “With slight changes to an IED, you have to pay attention to the consistency of the configuration data.“



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“Collect the plus points with IEC 61850 and Ethernet.“

Ethernet and IEC 61850
The Plus Points at a Glance

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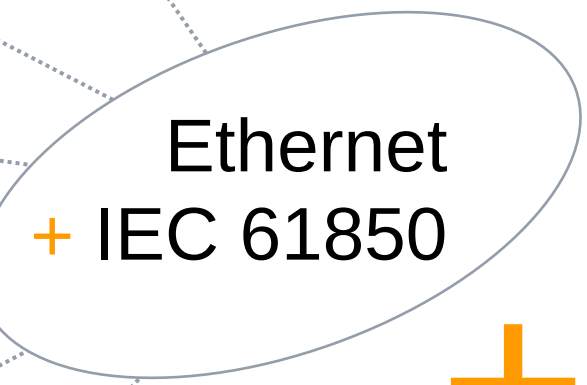
- Modular hardware
- Variable system topologies
- Parallel processing of services
- High interoperability
- Standardized engineering
- Efficient service concepts



Ethernet and IEC 61850
Plus Point: Modular Hardware

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Select the Ethernet interface that fits your application!

Ethernet and IEC 61850
The SIPROTEC 4 Ethernet Ports

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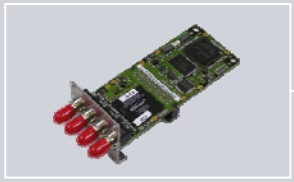
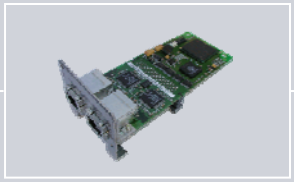
The Ethernet system interfaces for SIPROTEC 4 enable a retroaction-free communication, independent of protective functions and control functions.

You choose between optical and electrical versions.

Optical



Electrical



Ethernet and IEC 61850
Optical Ethernet Module

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Essential Properties of the Optical Module:

- **Line** operating mode:
  Only one of the two interfaces is active, the other is passively monitored.

- **Switch** operating mode:
  You implement connections between SIPROTEC 4 devices without additional external switches.

Ethernet and IEC 61850
Plus Point: Variable System Topologies

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Design topologies to fit the local requirements and the desired redundancy!

Ethernet and IEC 61850
Ring Structure with External Switches

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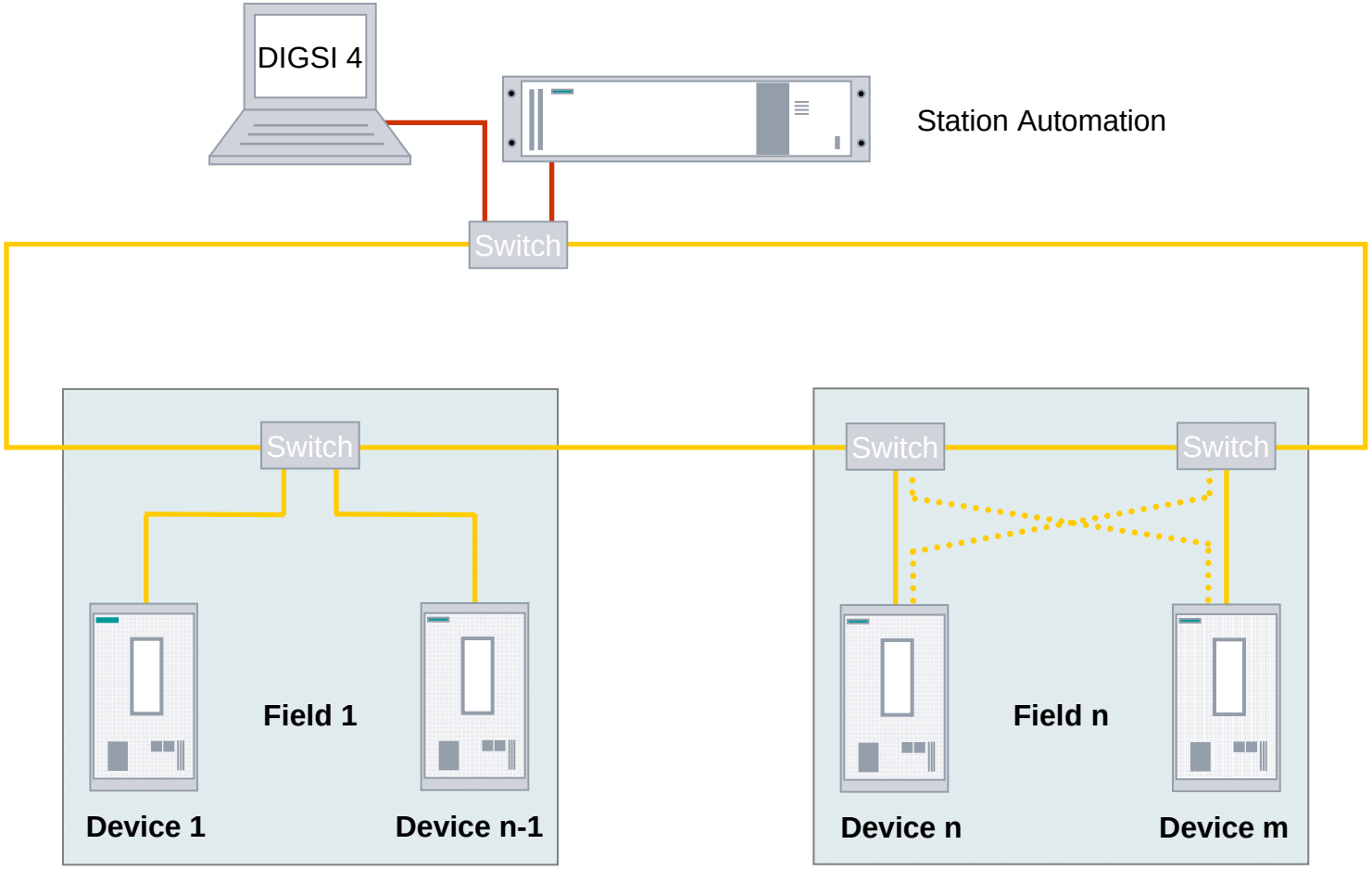

Ethernet and IEC 61850
Ring Structure with Integrated Switches

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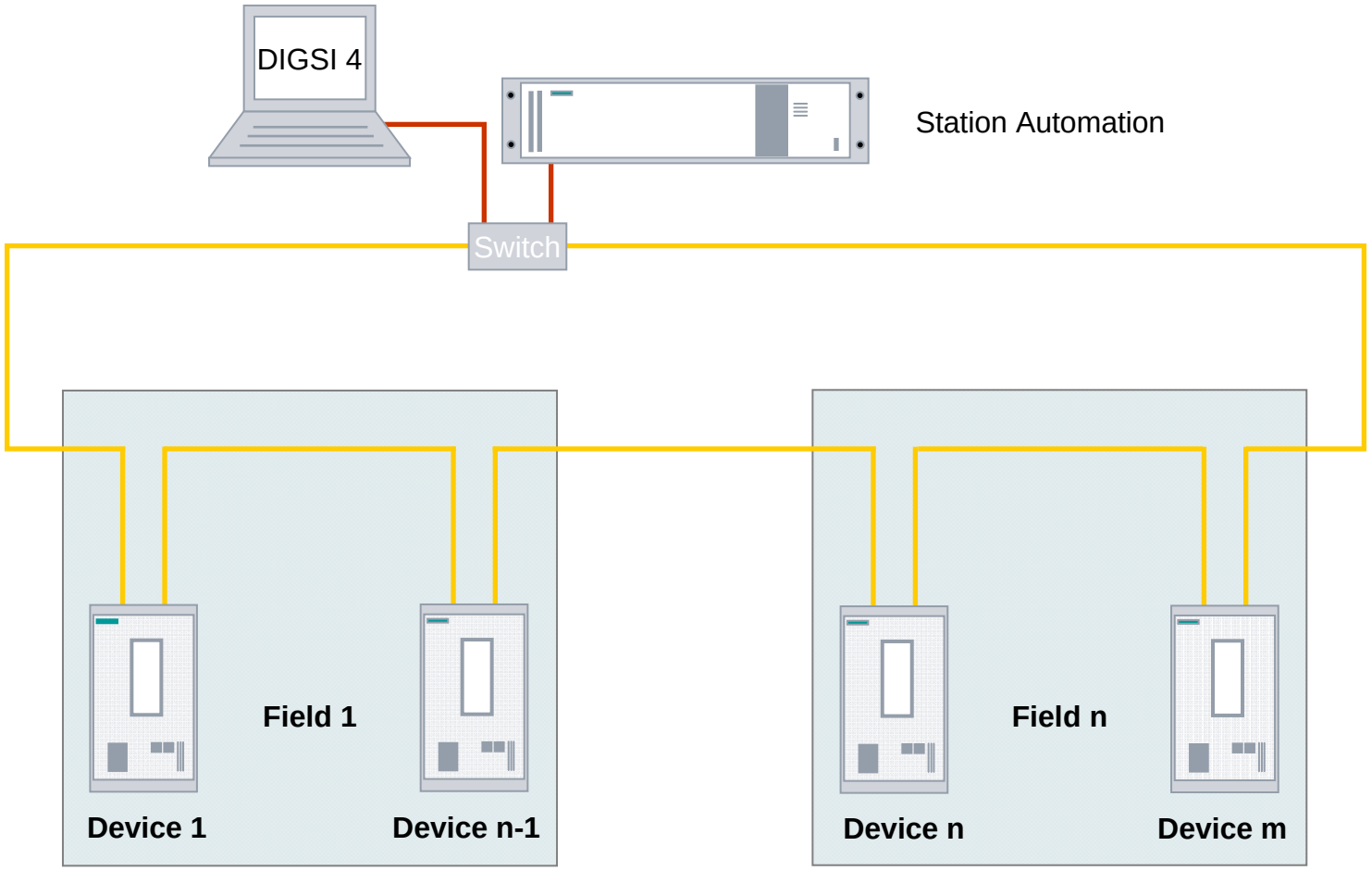

Ethernet and IEC 61850
Ring Structure with up to 16 Rings

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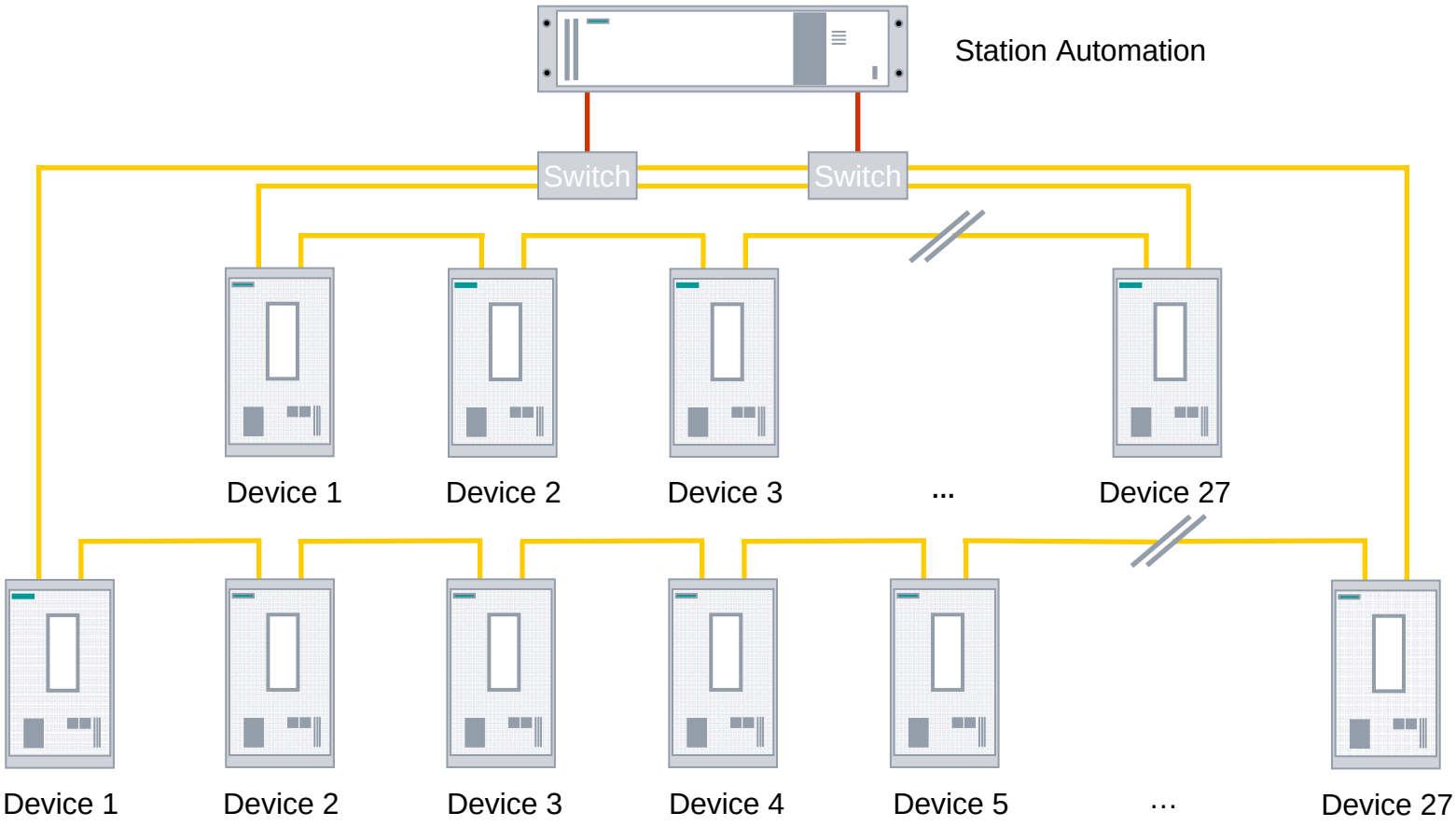

Ethernet and IEC 61850
Plus Point: Parallel Processing of Services

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Use one and the same bus connection for different communication services!

Ethernet and IEC 61850
Parallel Running Communications Services

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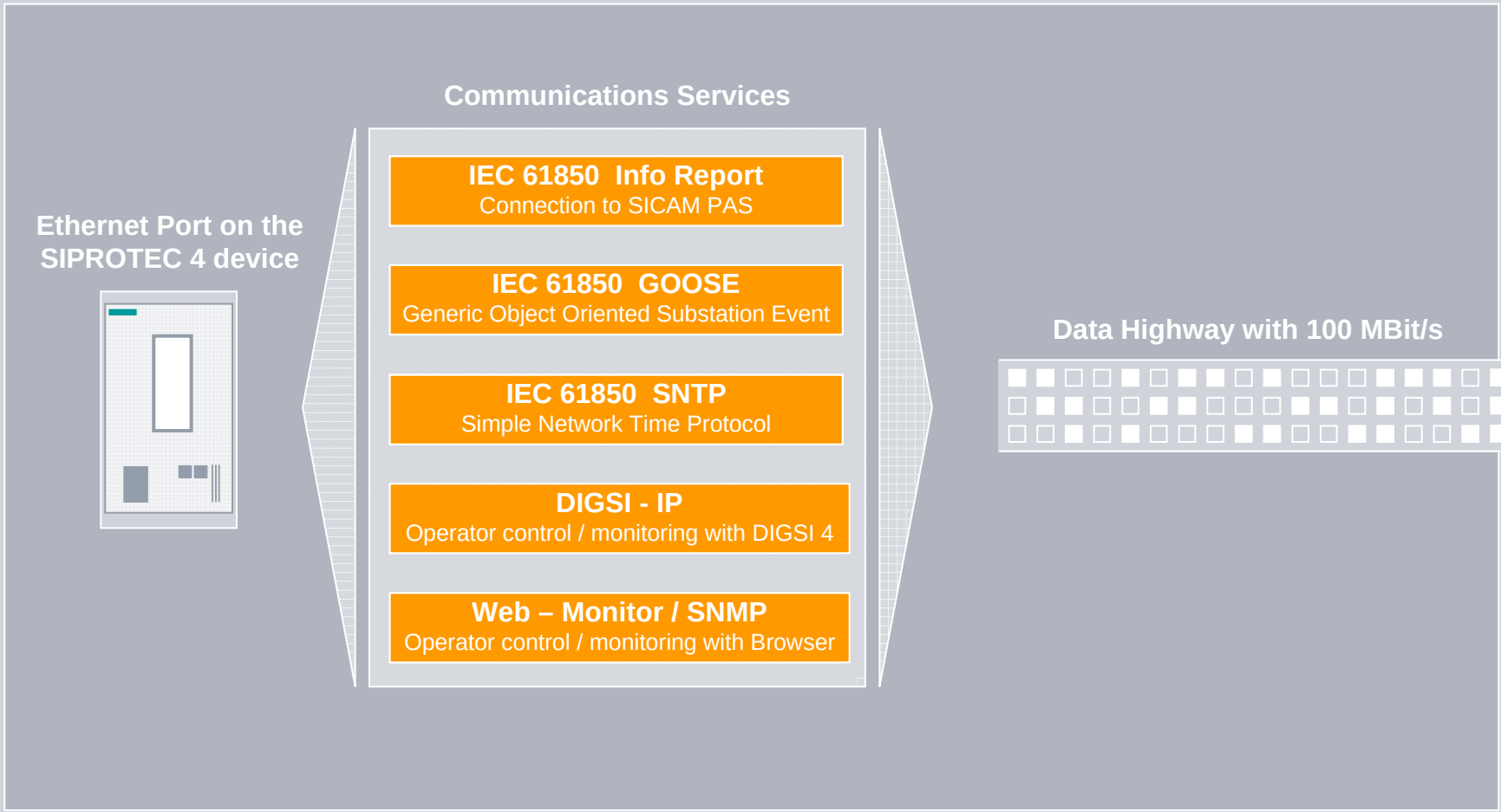

Ethernet and IEC 61850
Plus Point: High Interoperability

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Combine different standard-conforming components in a system and let them communicate with each other!

Ethernet and IEC 61850
Interoperability

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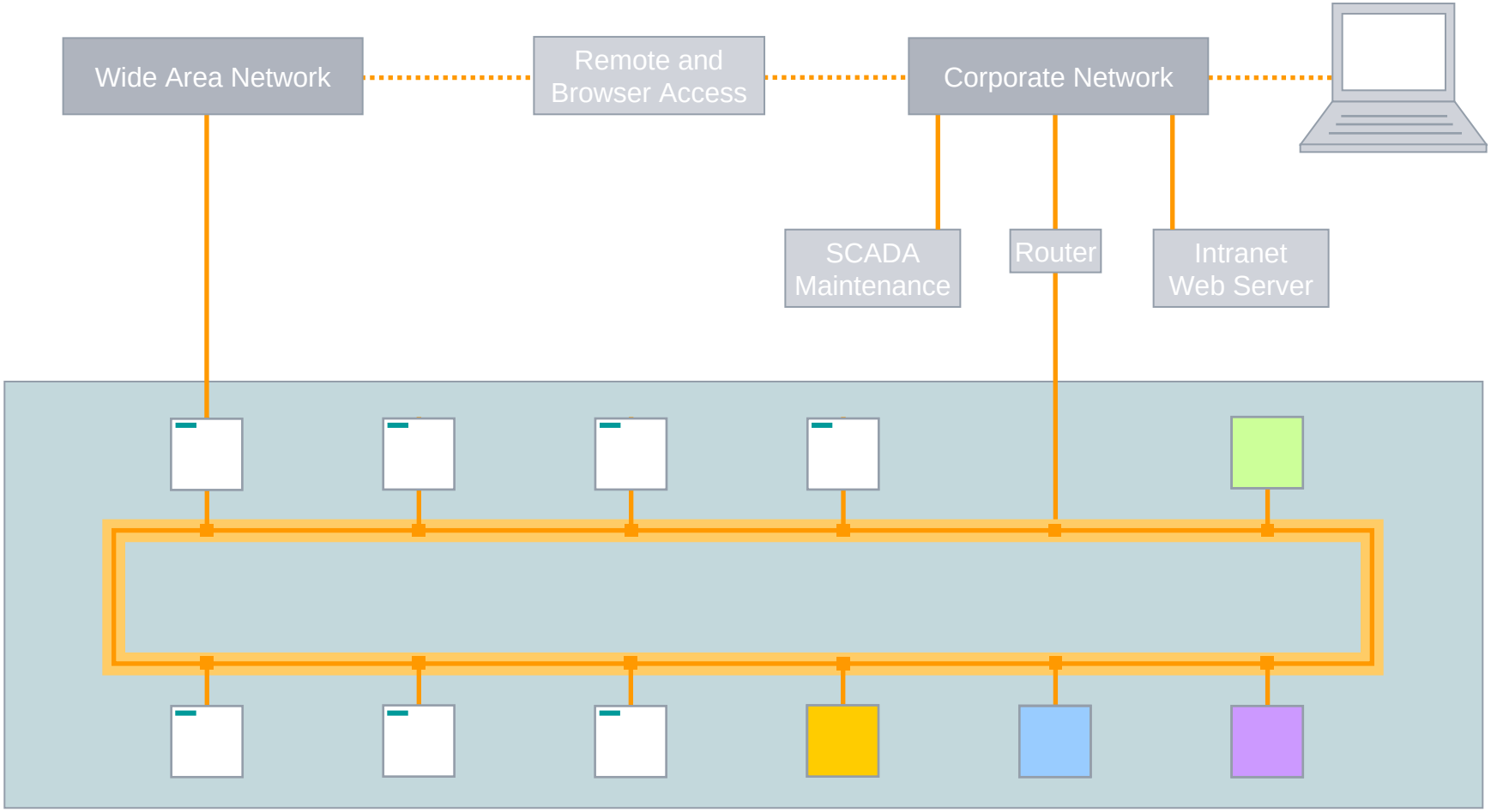

Ethernet and IEC 61850
Plus Point: Standardized Engineering

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Replace wiring through data telegrams!

Ethernet and IEC 61850
Simple Wiring saves Costs

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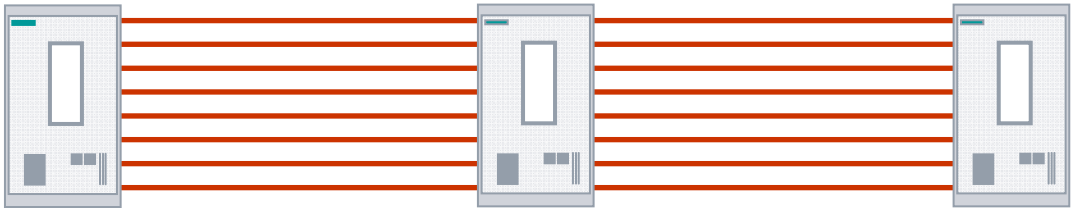
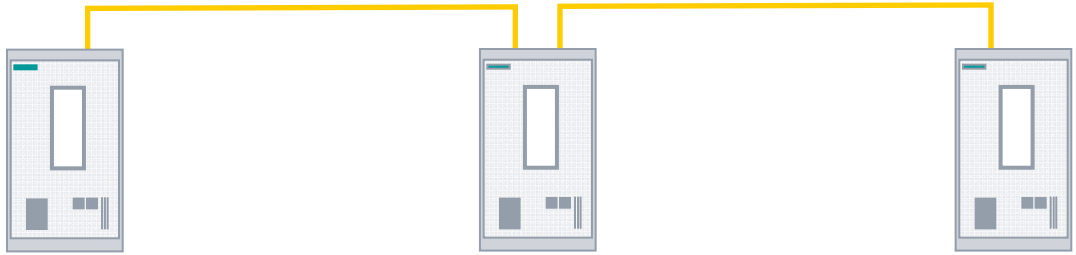
Conventional Wiring



Wiring with IEC 61850



Ethernet and IEC 61850

Collaborative Engineering saves Time

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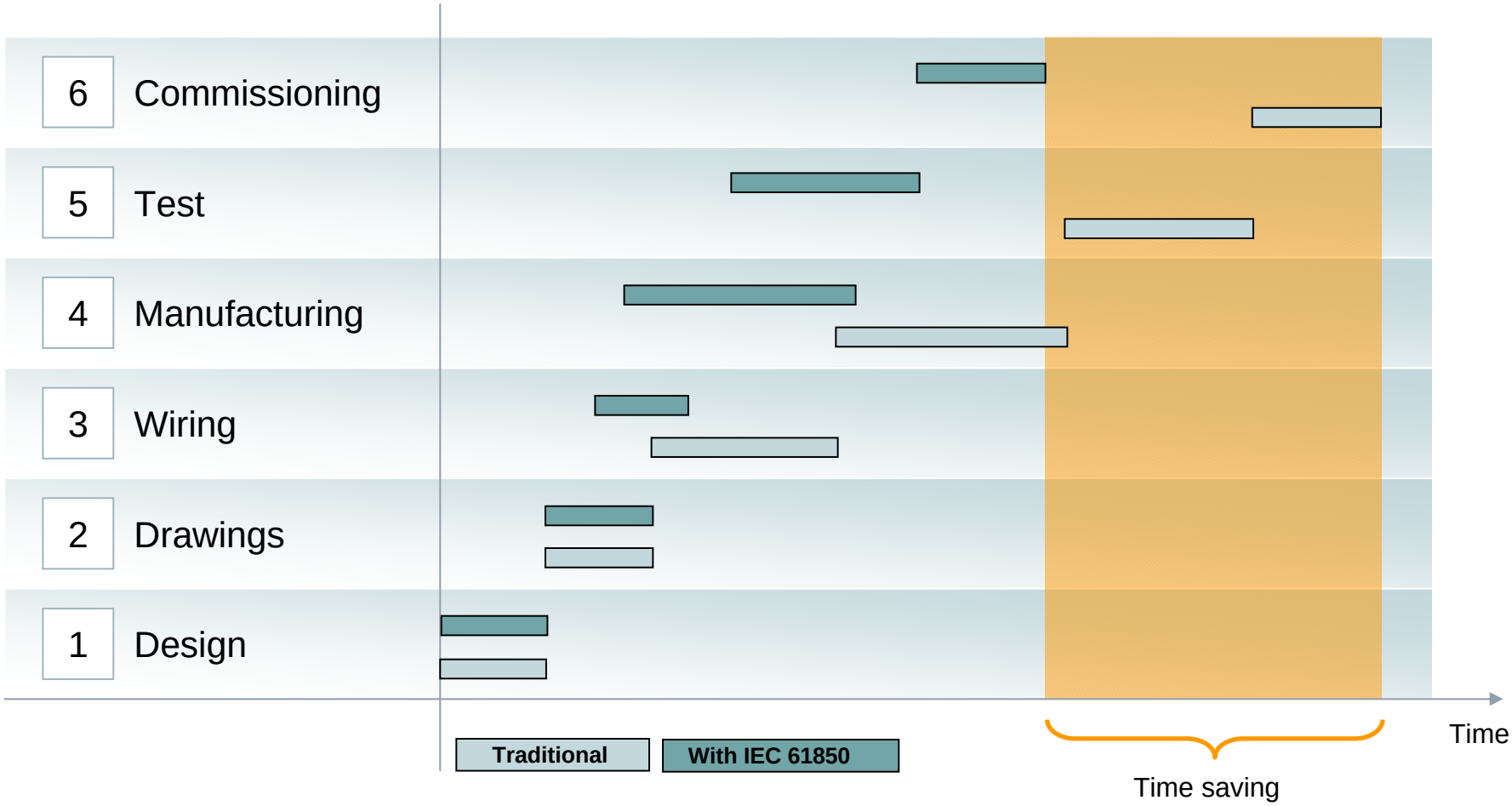

Ethernet and IEC 61850
Re-usability Saves You Additional Effort

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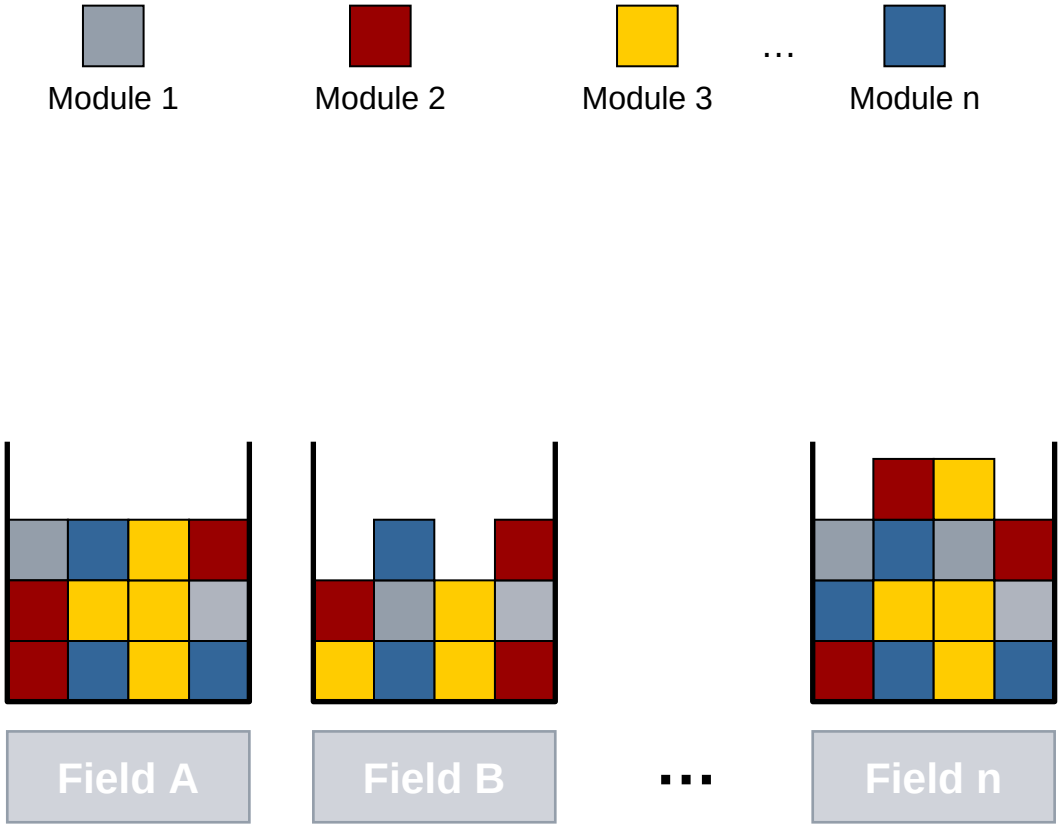

- You use function modules that you have designed once as often as you like and in different combinations.

Ethernet and IEC 61850
Object-orientation Provides Consistency

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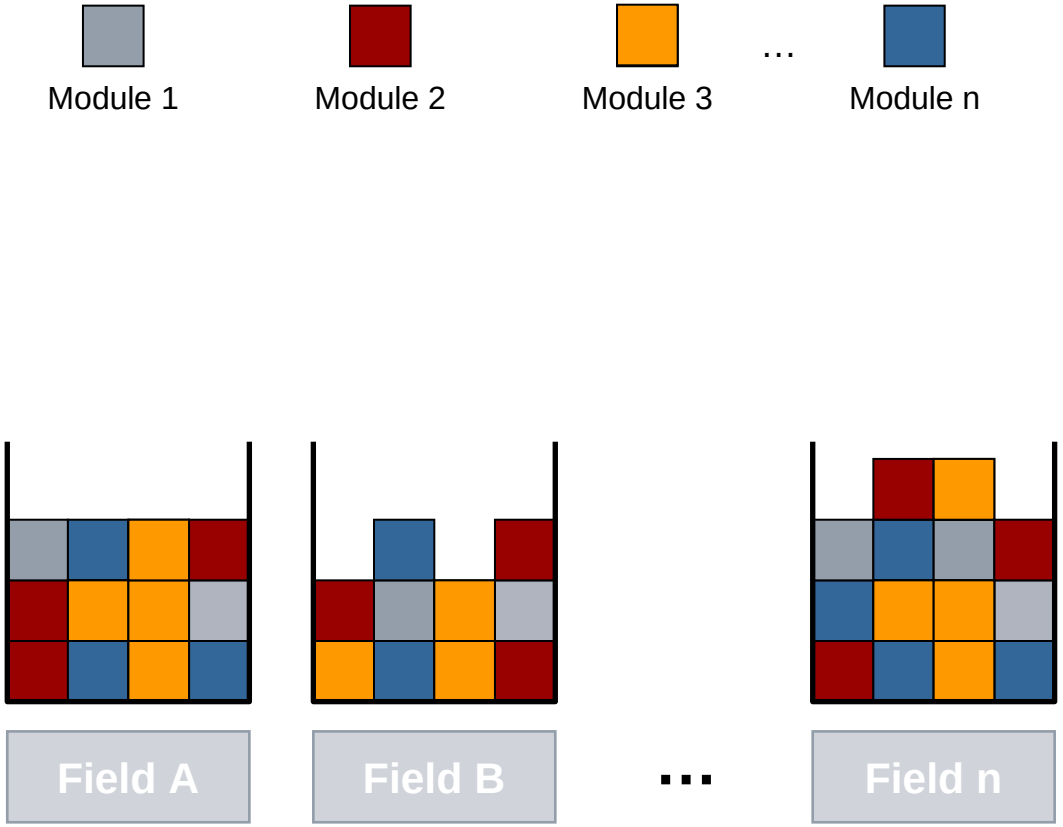

- You use function modules that you have developed once as often as you like and in different combinations.
- Changes that you make later on to a function module automatically take affect on already used modules.

Ethernet and IEC 61850
Plus Point: Efficient Service Concepts

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Use service resources exactly where you need them!

Ethernet and IEC 61850
Fewer Resources, Faster Task Solutions

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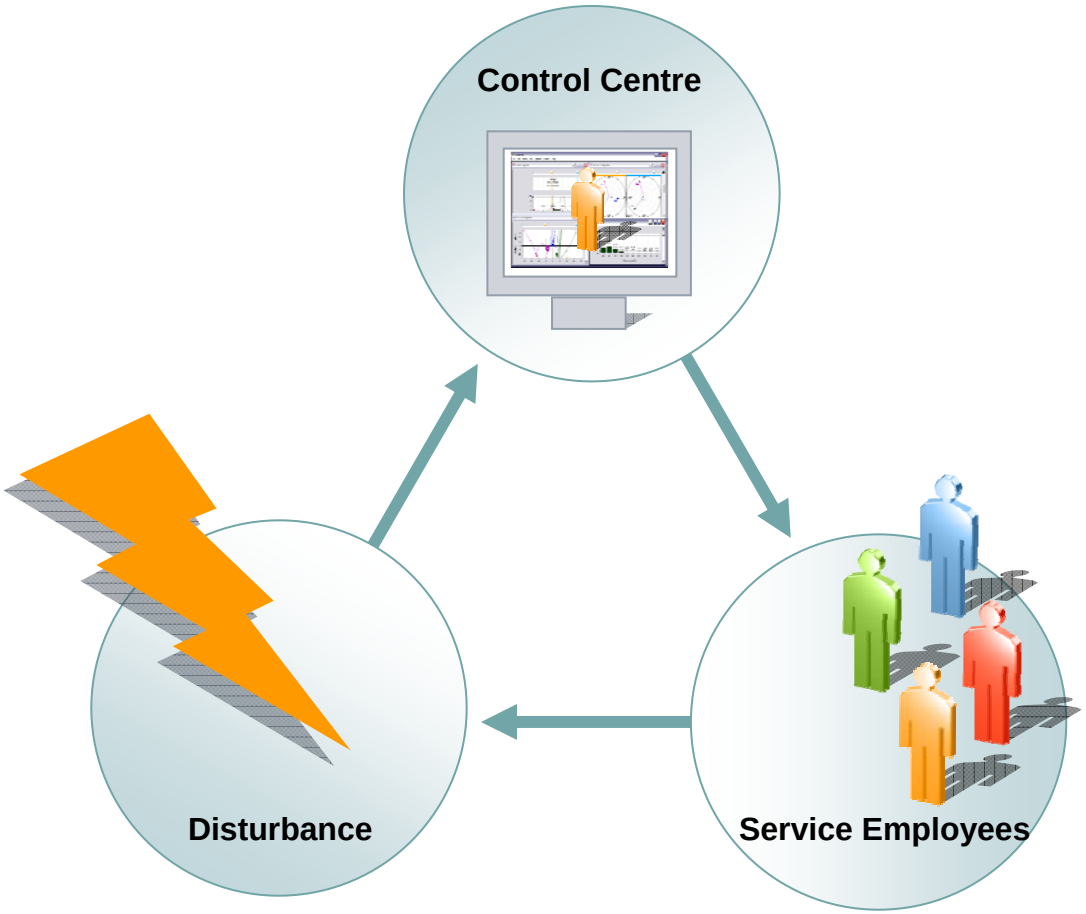

- The control centre detects an error from the remote location and evaluates it.
- The control centre decides which employee must go to the disturbance location and with what material.
- The employee goes to the location and completes his task.

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“Profit from our solutions and our competence.“

Ethernet and IEC 61850
Switchgear Interlocking with IEC 61850-GOOSE

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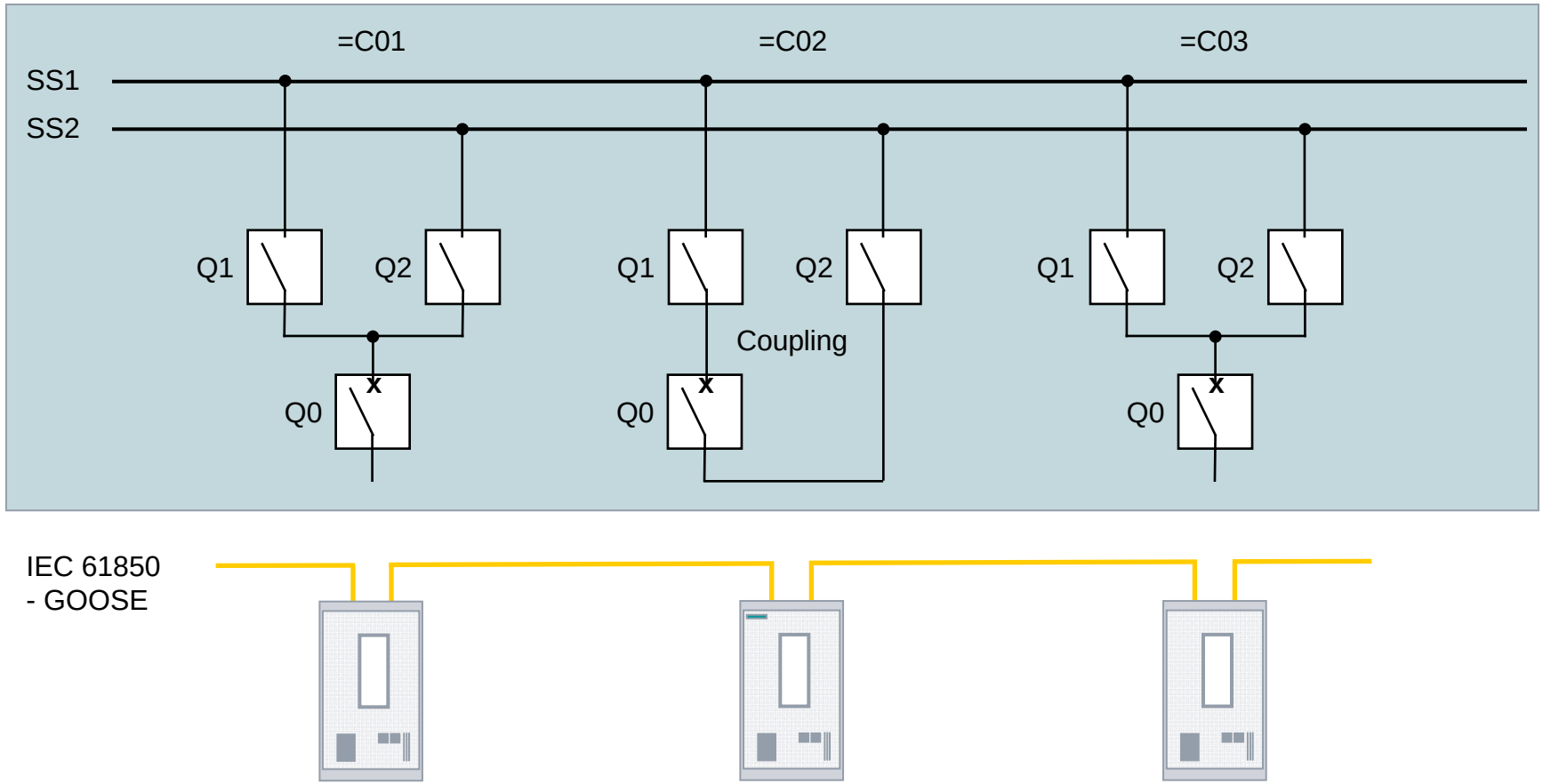

Ethernet and IEC 61850

We Think Beyond

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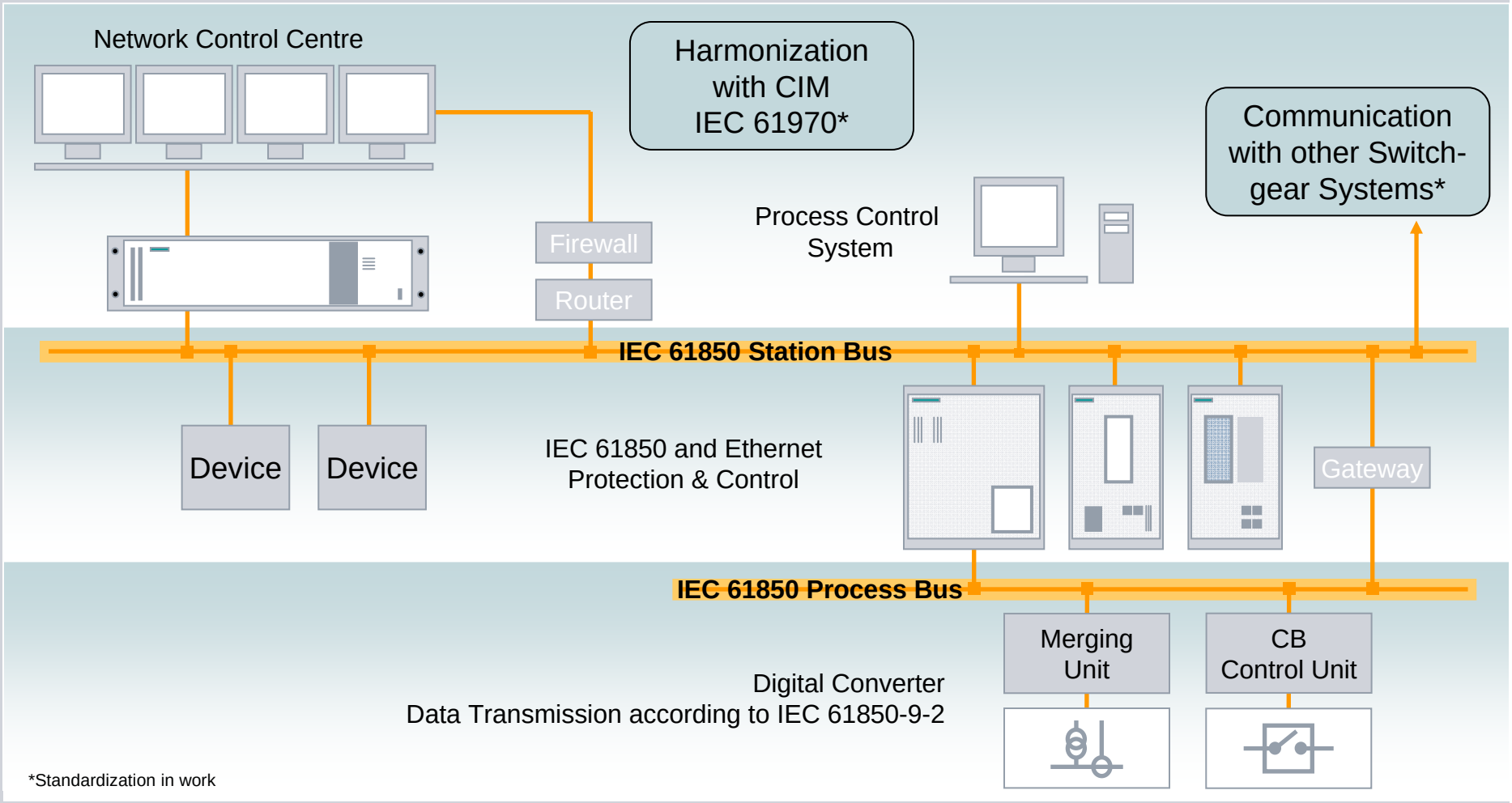

Ethernet and IEC 61850
Our Solutions in Use Worldwide

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Up to now more than 50.000 SIPROTEC devices with IEC 61850 Interface were delivered!

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Reasons for IEC 61850-Technology from Siemens

- **Years of experience**
  - more than 1.000 IEC 61850 systems with more that 50.000 devices speak for themselves
- **The full range of solutions**
  - we have been a full line provider of IEC 61850 server and client solutions since 2004
- **The better engineering tool**
  - only we offer you a simple and comfortable IEC 61850 system configurator
- **Compatibility**
  - only Siemens provides you with the IEC 61850 technology that has consistently been given the KEMA ‘s A Level certificate
- **Guaranteed future**
  - all SIPROTEC 4 protection devices that have been produced since 1998 can be easily upgraded for the IEC 61850 technology

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Surely These Benefits:

Benefits do you expect from the use of the IEC 61850 standard?

Reduced engineering costs
\+ Reliable operation
\+ High investment security

= **Reduced total cost of ownership**

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Thank you