SIPROTEC 5 News

Main features from V9.20 and V9.30 and outlook

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Agenda

- Function Enhancement
- Device Specific
- Process Bus
- DIGSI 5
  Improvements in engineering
- Cybersecurity
- Classless Function Points

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Function Enhancement

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Auxiliary Direct-Voltage Supervision

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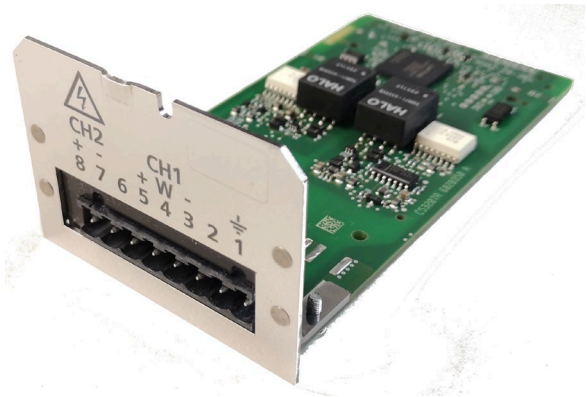
Auxiliary Direct-Voltage Supervision

New in V9.20

The direct-voltage input is located on the plug-in module ANAI-CE-2EL (1 input per module).
After configuring the plug-in module ANAI-CE-2EL, the function Auxiliary direct-voltage supervision is visible under the function group Analog units.



ANAI-CE-2EL

Highlights

- ✓ Measures the auxiliary direct-voltage of a substation battery system
- ✓ Provides sampled values for fault recording
- ✓ Monitors the battery direct-voltage by checking whether the measured voltage is greater or smaller than the specified threshold

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Continuous and Trend Recorder

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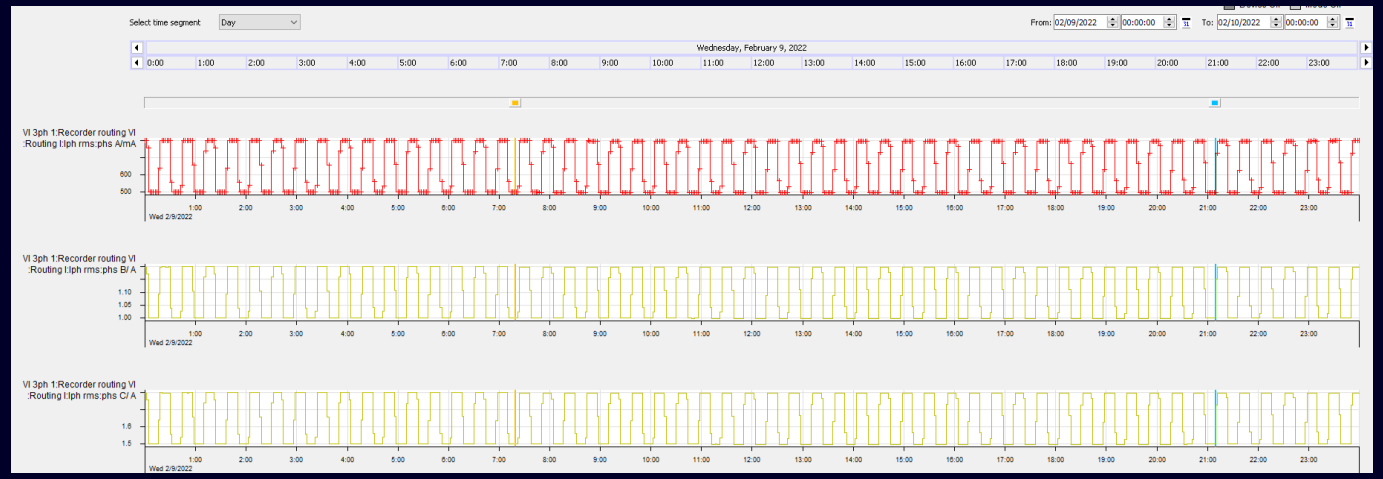
Continuous recorder (CR) in SIPROTEC 5

New in V9.20



Access

- ✓ DIGSI: Full configuration, evaluation, record list (download and delete)
- ✓ WEB UI: Changing settings, evaluation, record list (download and delete)

Highlights

- ✓ Continuously recording mean values (load profile)for routed channels without triggering mechanism over long time (day ... month)
- ✓ Long-term analyzes of the network behavior can be carried out
- ✓ The visualization can be performed by SIGRA or SICAM PAS / PQS (IEC 61850 protocol) together with SICAM PQ Analyzer

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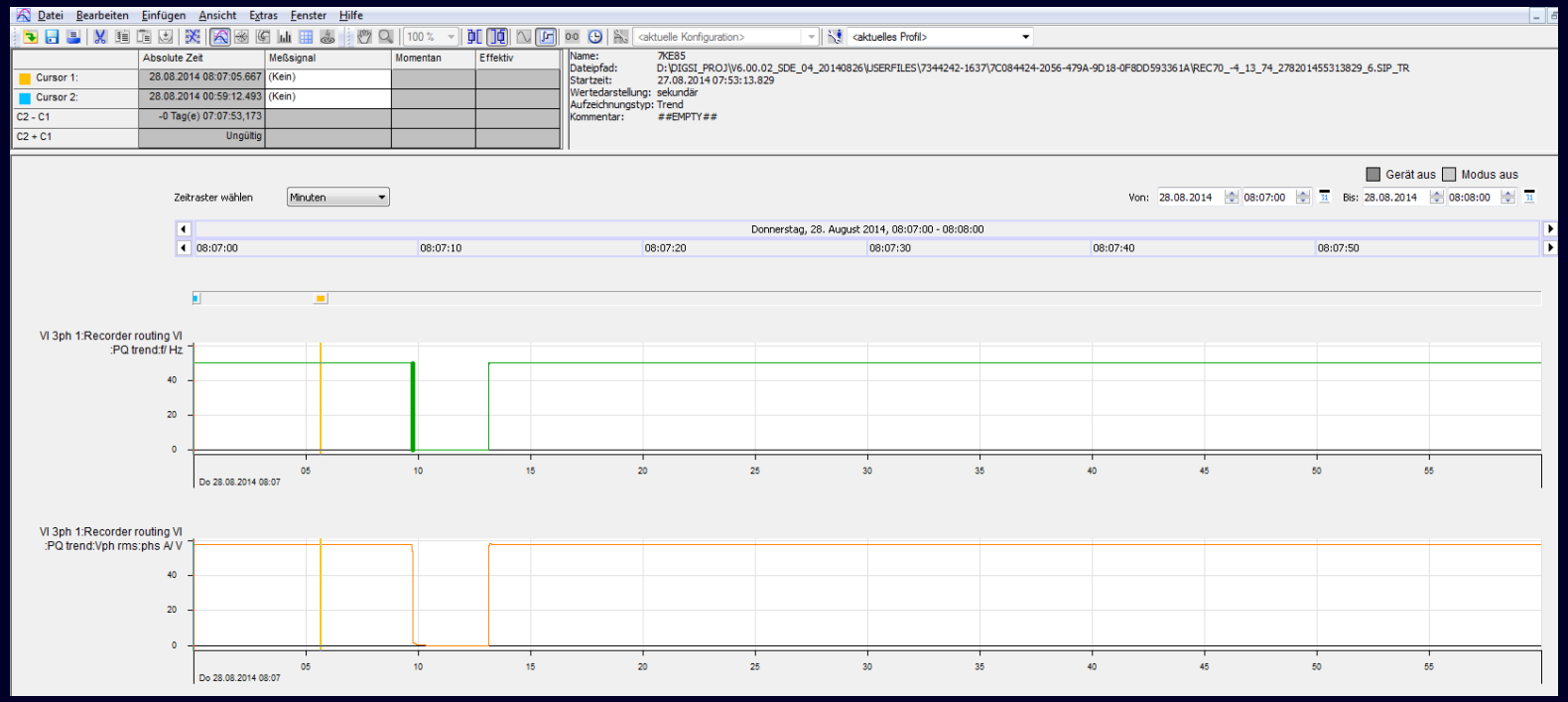
Trend Recorder (TR) in SIPROTEC 5

New in V9.30

TR works like a continues recorder, but instead of a defined averaging time the recorder have a defined tolerance band - e.g. it could save the values of frequency or voltage related events in extreme cases every 10 ms



Benefits

- ✓ SIPROTEC 5 platform devices support **full scope of recorder** options: Fast Scan Recorder , optional Slow Scan Recorder, Continuous Recorder and Trend Recorder
- ✓ Saving of invest by Distributed Monitoring (more functions in one device not need for additional hardware)
- ✓ Increased safety and availability by Distributed Monitoring

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Line Differential Protection

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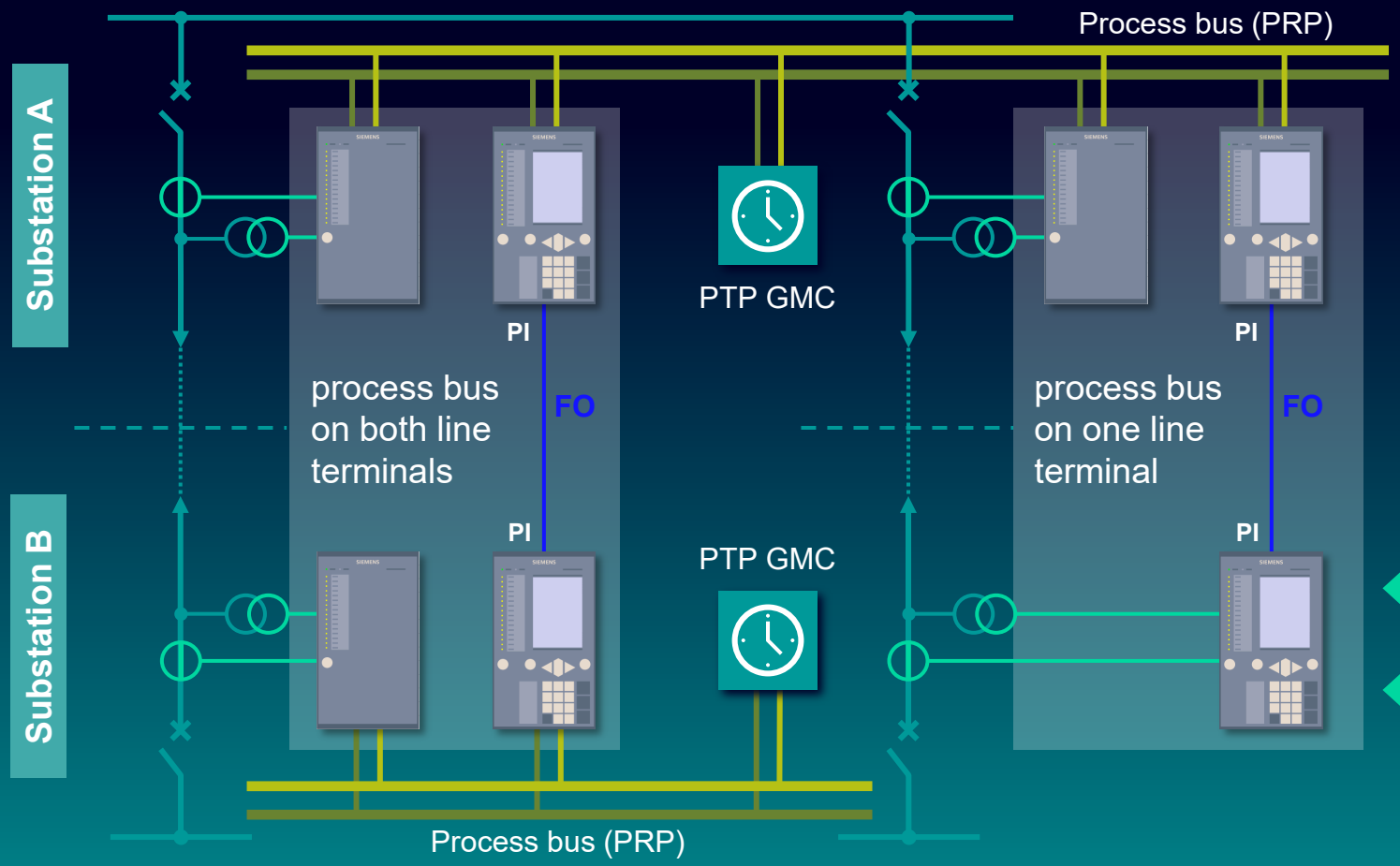
Line differential protection and teleprotection
IEEE C37.94 in the SIPROTEC 4 – SIPROTEC 5 compatible mode



Highlights using 87L

Classically connected line terminals do not require high-precision time synchronization

Protection Interface (PI) connects

- ✓ SIPROTEC 5
- ✓ SIPROTEC 4
- ✓ C37.94

New in V9.20

No high-precision synchronization for classical connected terminals

SIPROTEC 4 or SIPROTEC 5 Line differential protection device

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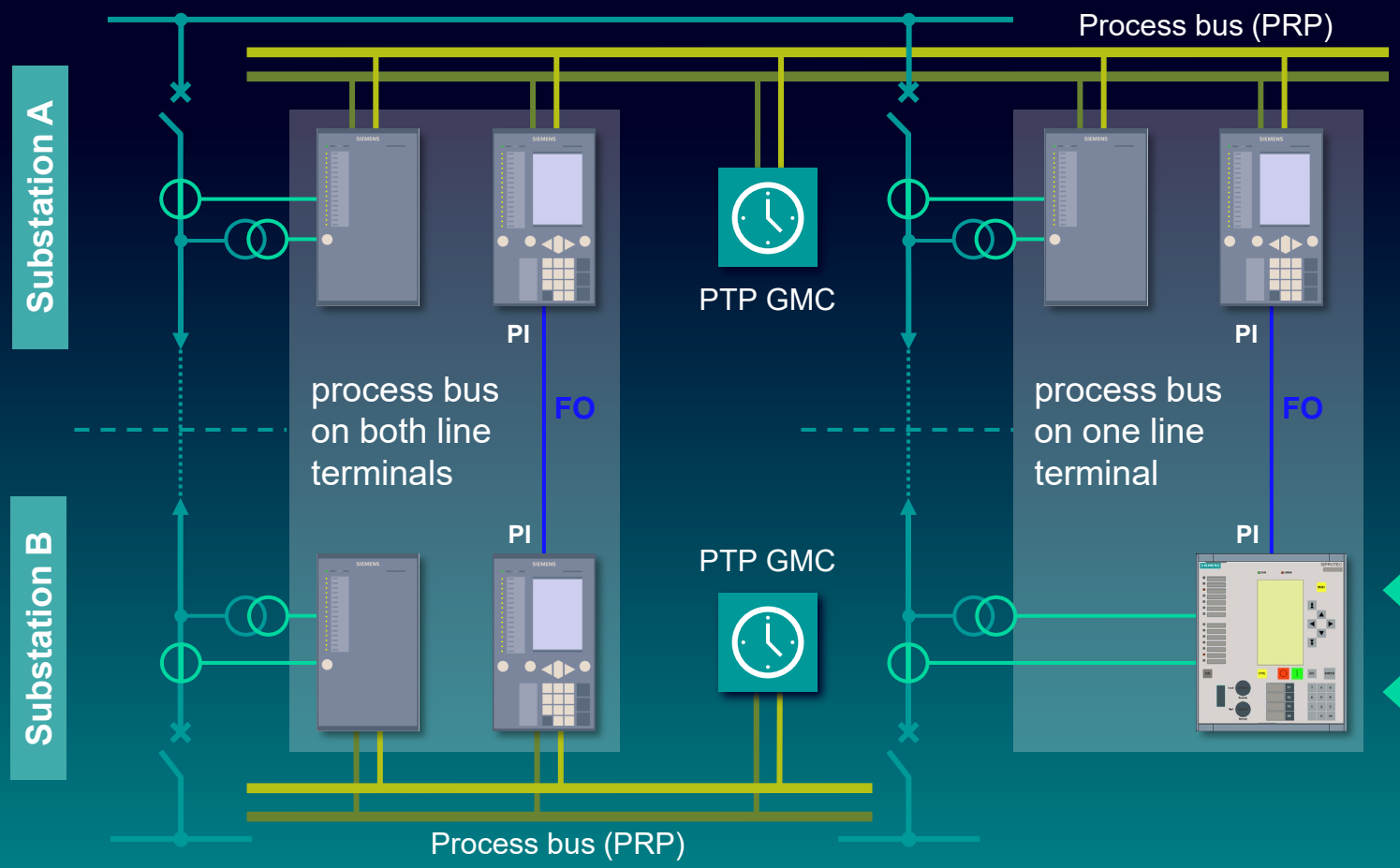

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New in V9.20

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SIPROTEC 4 or SIPROTEC 5 Line differential protection device

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Communication

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SIPROTEC 5
Modbus RTU Serial

New in V9.20

Highlights

- ✓ Provides Modbus Slave functionality over serial electrical or optical connections through USART modules
- ✓ Modbus RTU slave is available through communication modules USART-AB-1EL, USART-AC-2EL, USART-AD-1FO, USART-AE-2FO

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Device Specific

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SIPROTEC 5 Compact 7SX800

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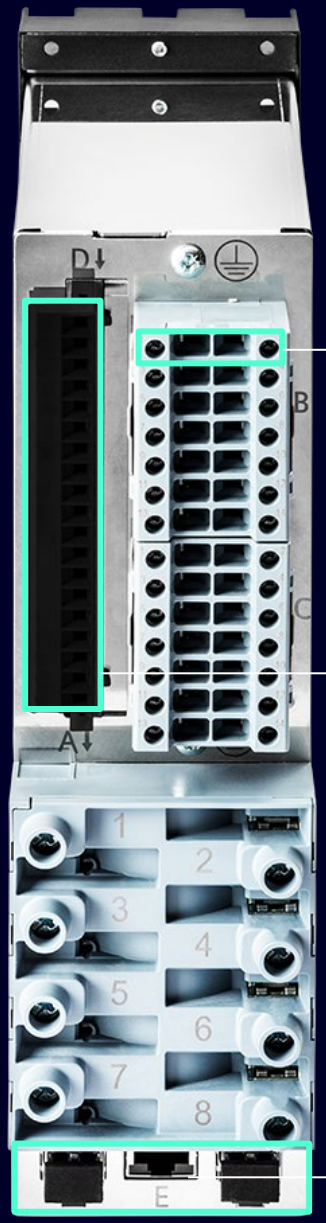
Robust metal housing
1/6 * 19”

Graphic display
(with single line)

USB interface for
DIGSI and Web UI



New in V9.30

Universal power supply:
DC 24V-250V / AC 100V–230V

3 I/O options:
- 4 BI / 5 BO
- 14 BI / 11 BO
- 17 BI / 8 BO (IO050)

Interfaces

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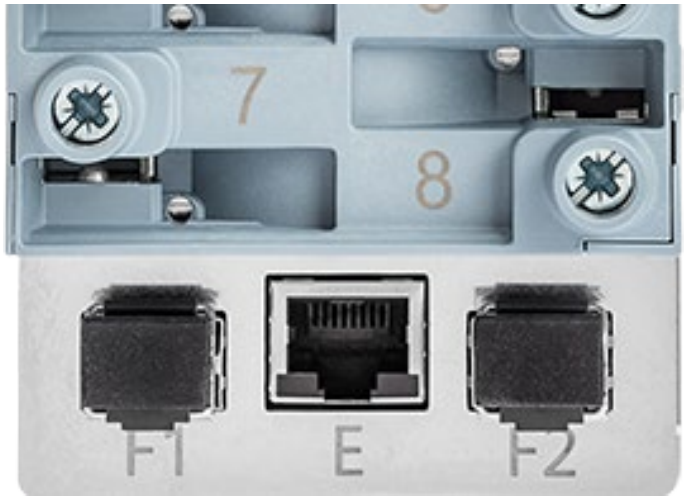
7SX800 - Communications:
All interfaces are already built in …

New in V9.30

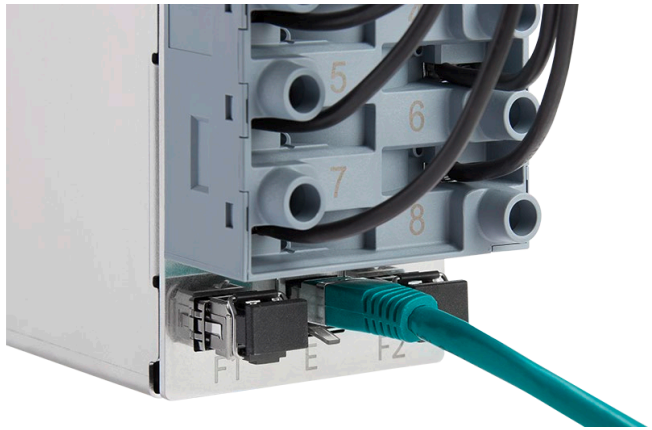
Ethernet Interface (Port F1/F2):

- Optical or electrical* interface
  - IEC 61850
  - Modbus TCP
  - IEC 104
  - DNP3 IP
  - Profinet*



Serial interface* (Port E):

- RS 485 interface



Ready for communication

*: in preparation

SIPROTEC 7SS85 and 7SX85

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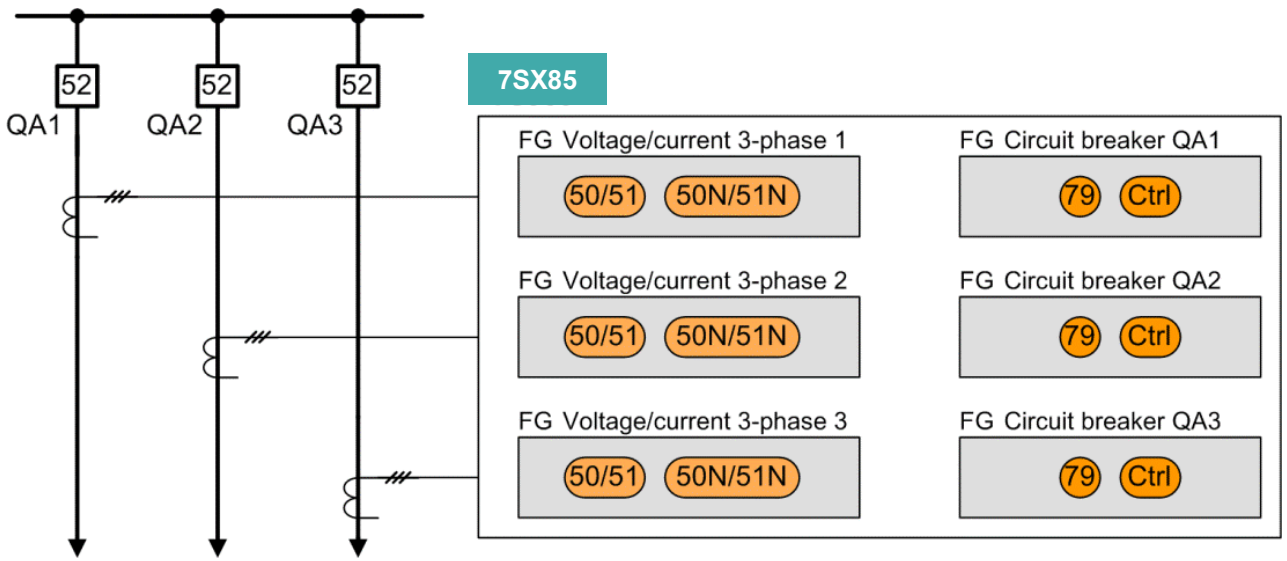
Small central protection - One device for multiple feeders



Highlights 7SX85

Several protection incl.

- Overcurrent protection
- Directional overcurrent protection
- Motor protection
- Capacitor protection
- Frequency protection
- …

New in V9.30

- ✓ Function Groups with underlying functions can be organized under a Bay Level
- ✓ it allows to test an individual bay, while the other bays remain into operation

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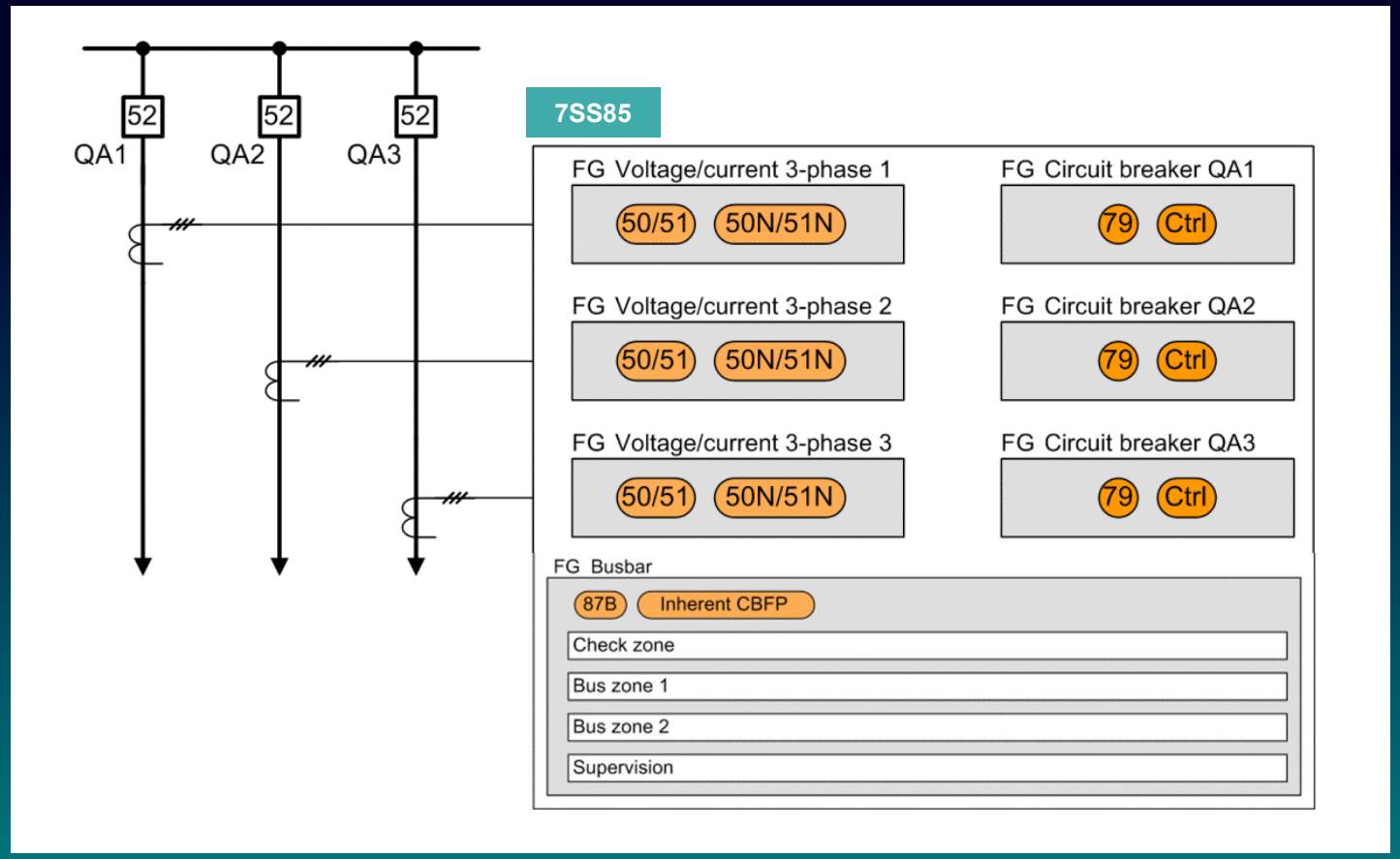
Small central protection - One device for multiple feeders



Highlights 7SS85

10 feeder protection incl.

- Impedance protection
- Overcurrent protection
- Frequency protection
- …

Busbar differential protection

New in V9.30

- ✓ Function Groups with underlying functions can be organized under a Bay Level
- ✓ it allows to test an individual bay, while the other bays remain into operation

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SIPROTEC 7VU85
High-Speed Busbar Transfer Device

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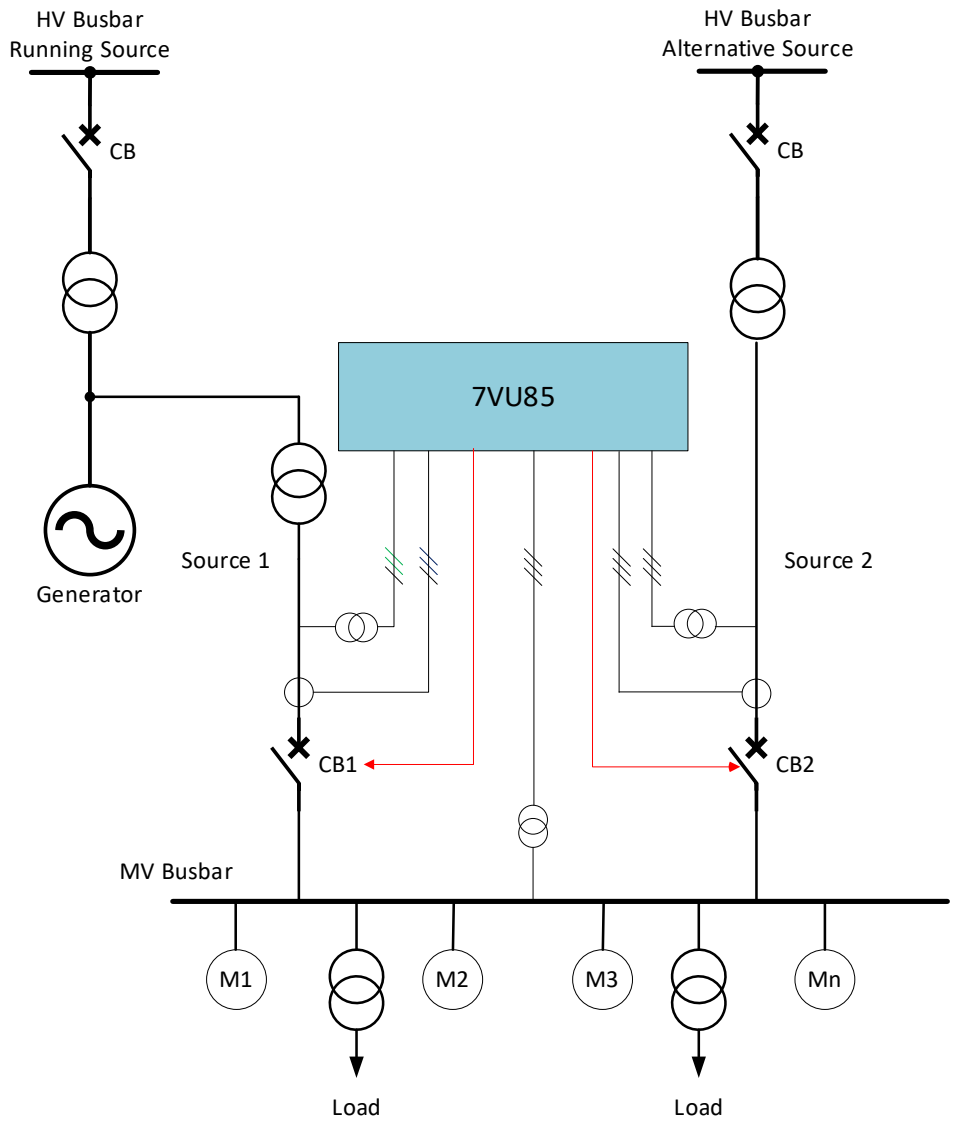
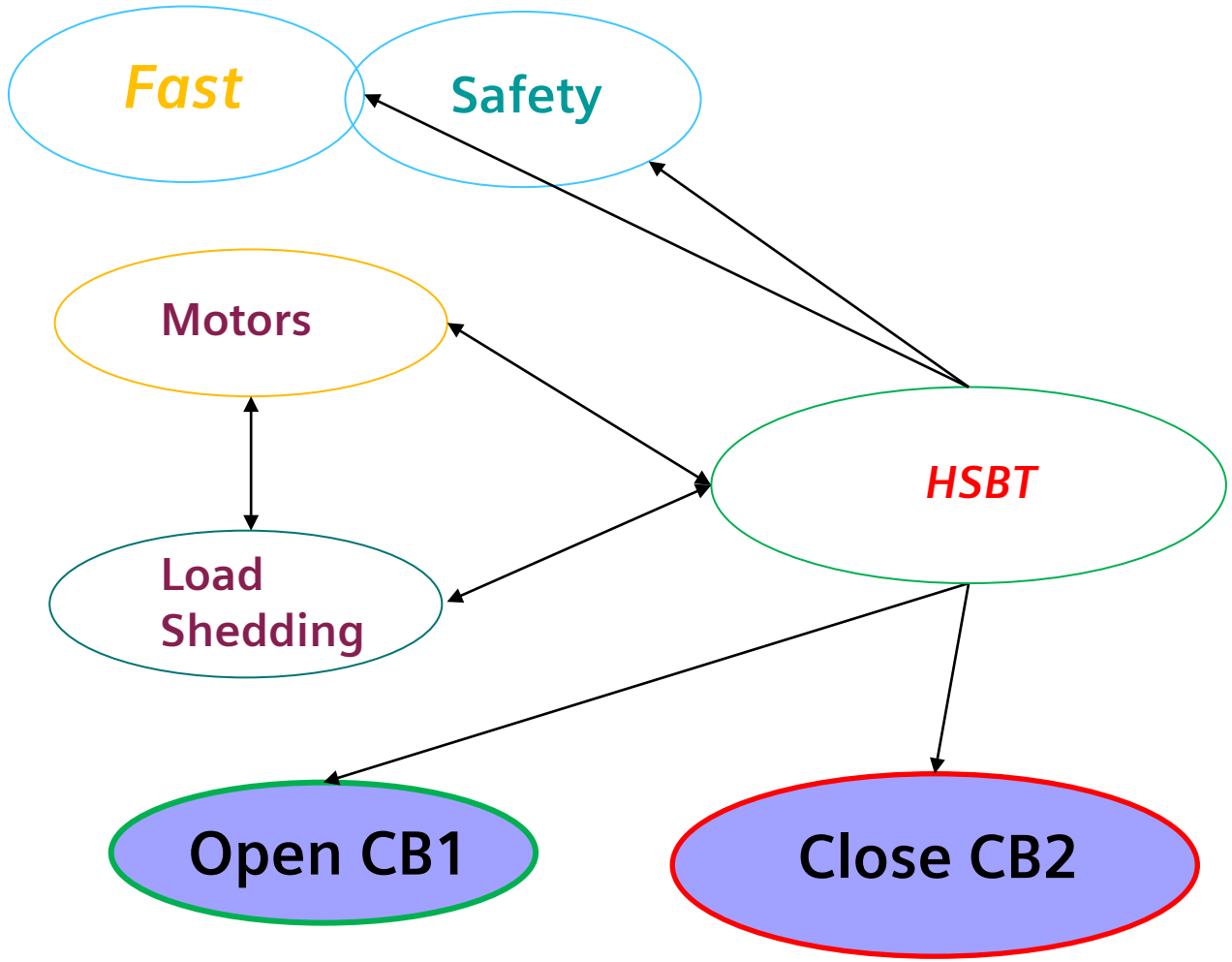
Main Function of a High-Speed Busbar Transfer HSBT





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SIPROTEC 5 7VU85 Overview

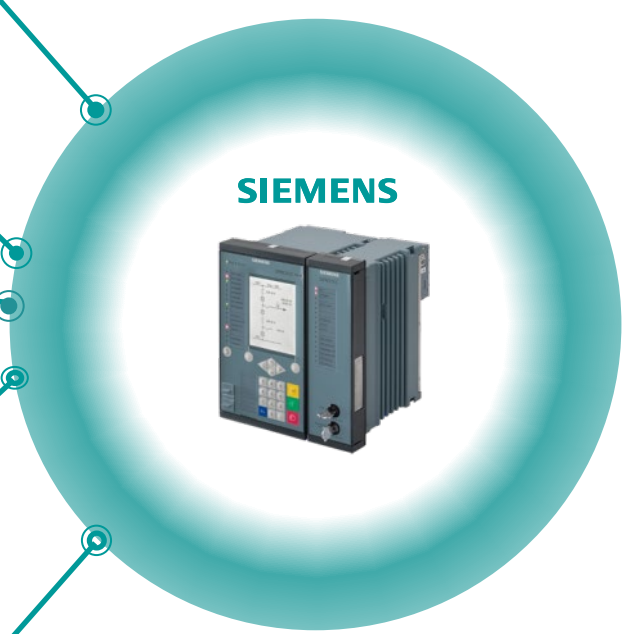
High-speed busbar transfer device

Supports up to 20 circuit breakers in a device

Automatic load-shedding

Powerful monitoring ensures reliable switching in fast time

Additional protection functions can be activated



High-speed transfer and protection in one device

SIPROTEC 7VU85 Functions

- Modular hardware supports numerous applications and reduces wiring
- Simultaneous and sequential switching is possible
- Different switching types are available (fast, real-time, synchronous, residual voltage and long-term switching)
- Switching time approx. 10ms (fast)
- Current, voltage and frequency protection functions can be added via DIGSI 5 library

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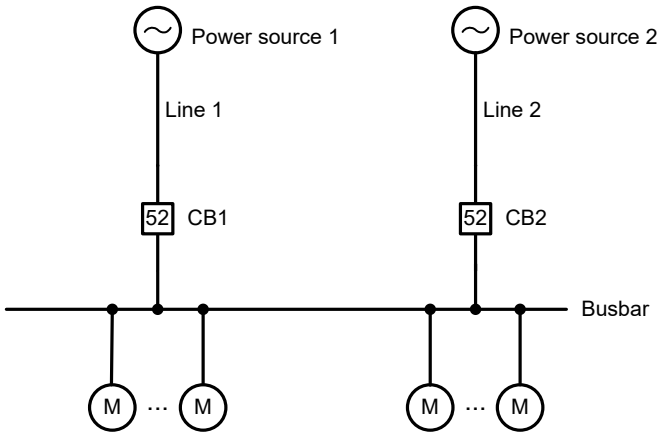
SIPROTEC 7VU85 – Typical applications

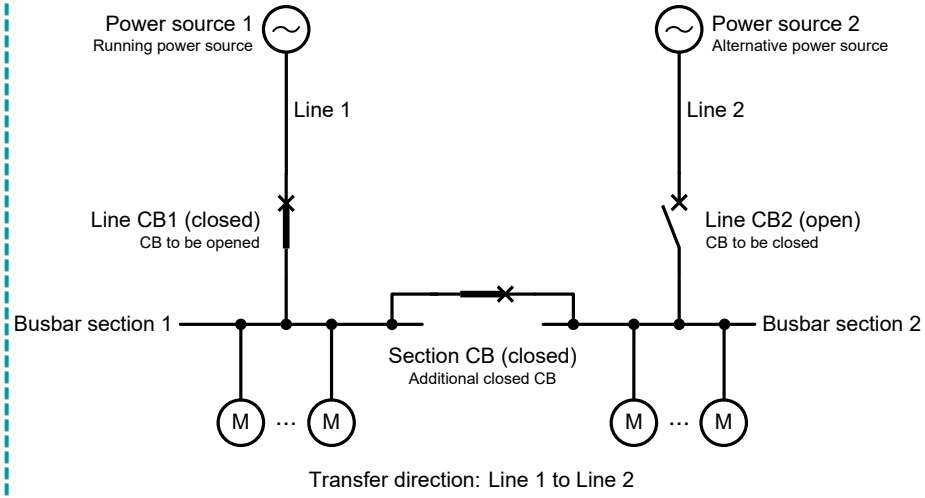
APP Template 1

Single busbar with 2 sources



APP Template 2

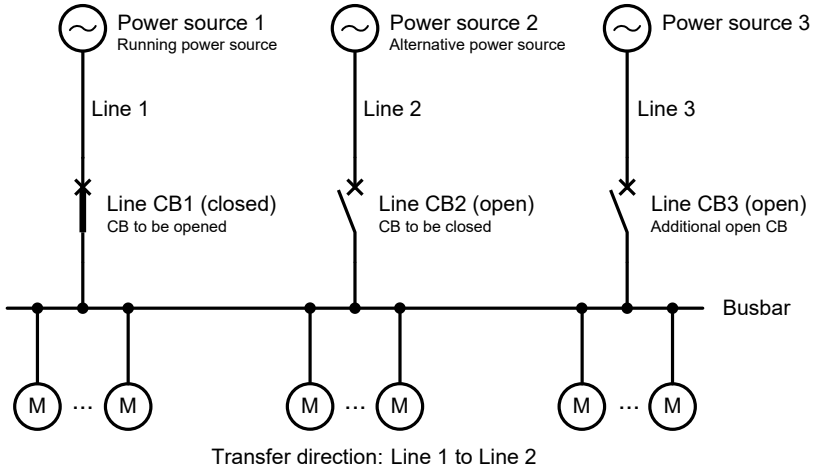
Single busbar with 2 sources and coupler



Transfer direction: Line 1 to Line 2

APP Template 3

Single busbar with 3 sources



Transfer direction: Line 1 to Line 2

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SIPROTEC 5 Universal Device 7SX82

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NEW

SIPROTEC 5
7SX82
(see separate presentation)

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Process Bus

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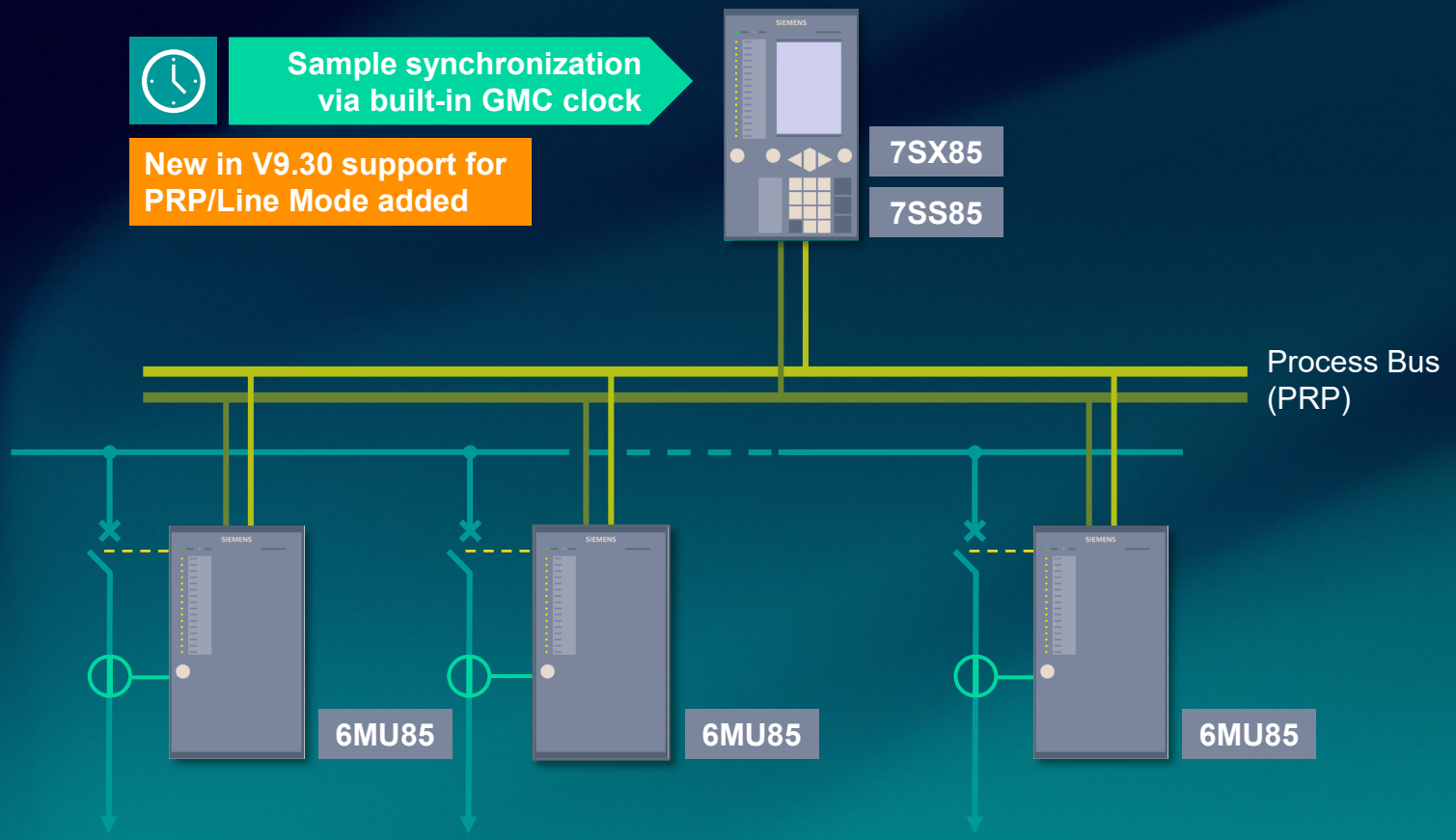
Built-in IEEE 1588v2/PTP Grandmaster Clock functionality



Very useful for busbar and small central protection applications

From V9.20

Highlights GMC* functionality

IEEE 1588v2/PTP grand master capable clock

- ✓ Synchronize sampled values without additional synchronization equipment
- ✓ SIPROTEC 5 acts as 1588 grand master clock
- ✓ Network redundancy: PRP, Line Mode, HSR, RSTP
- ✓ Up to 16x IED + 2x Redbox in HSR ring for sample synchronization
- ✓ IEC 61850-9-3 profile

* One instance of master clock per physical network is allowed, Best Master Clock Algorithm (BMCA) will be supported with a future release

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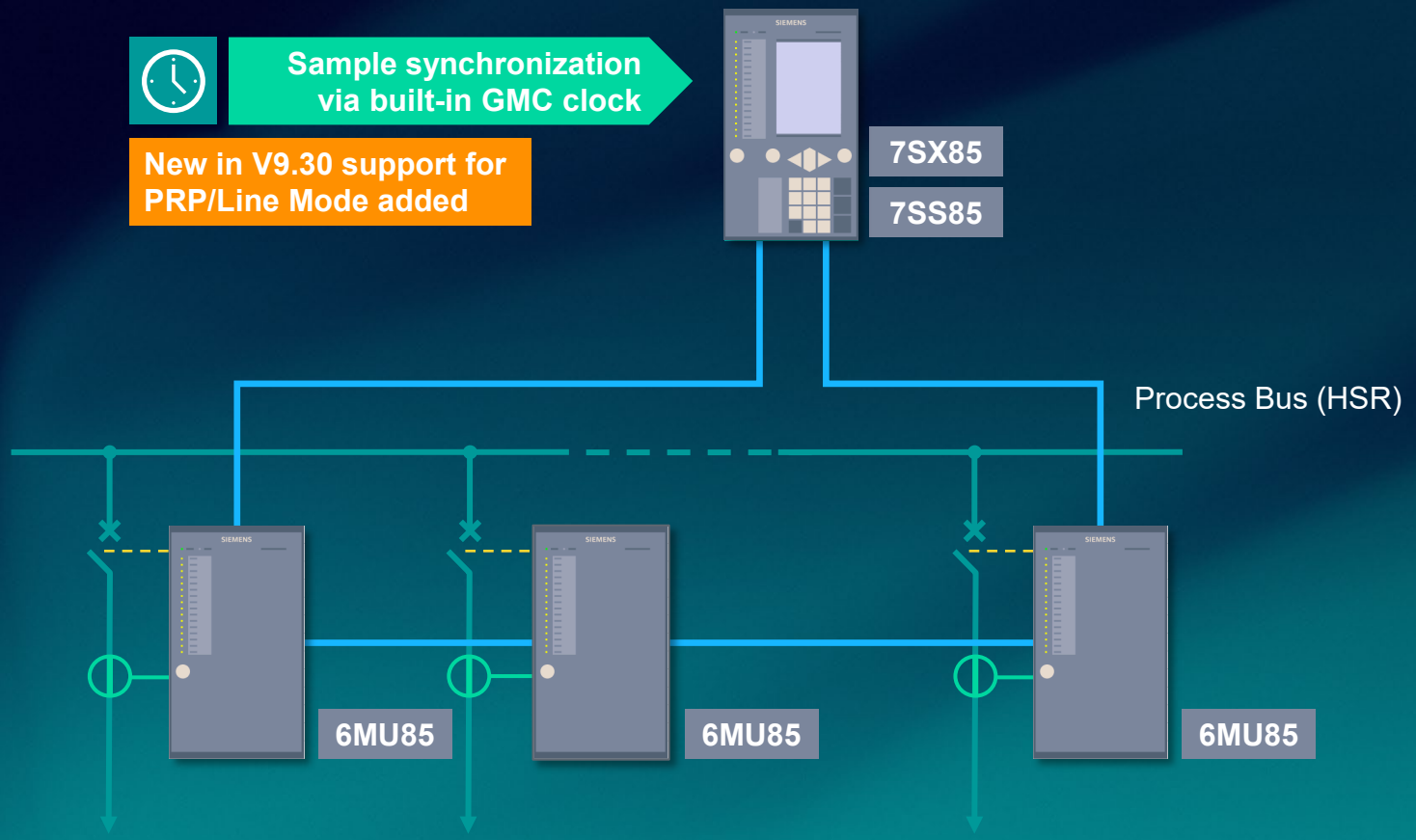

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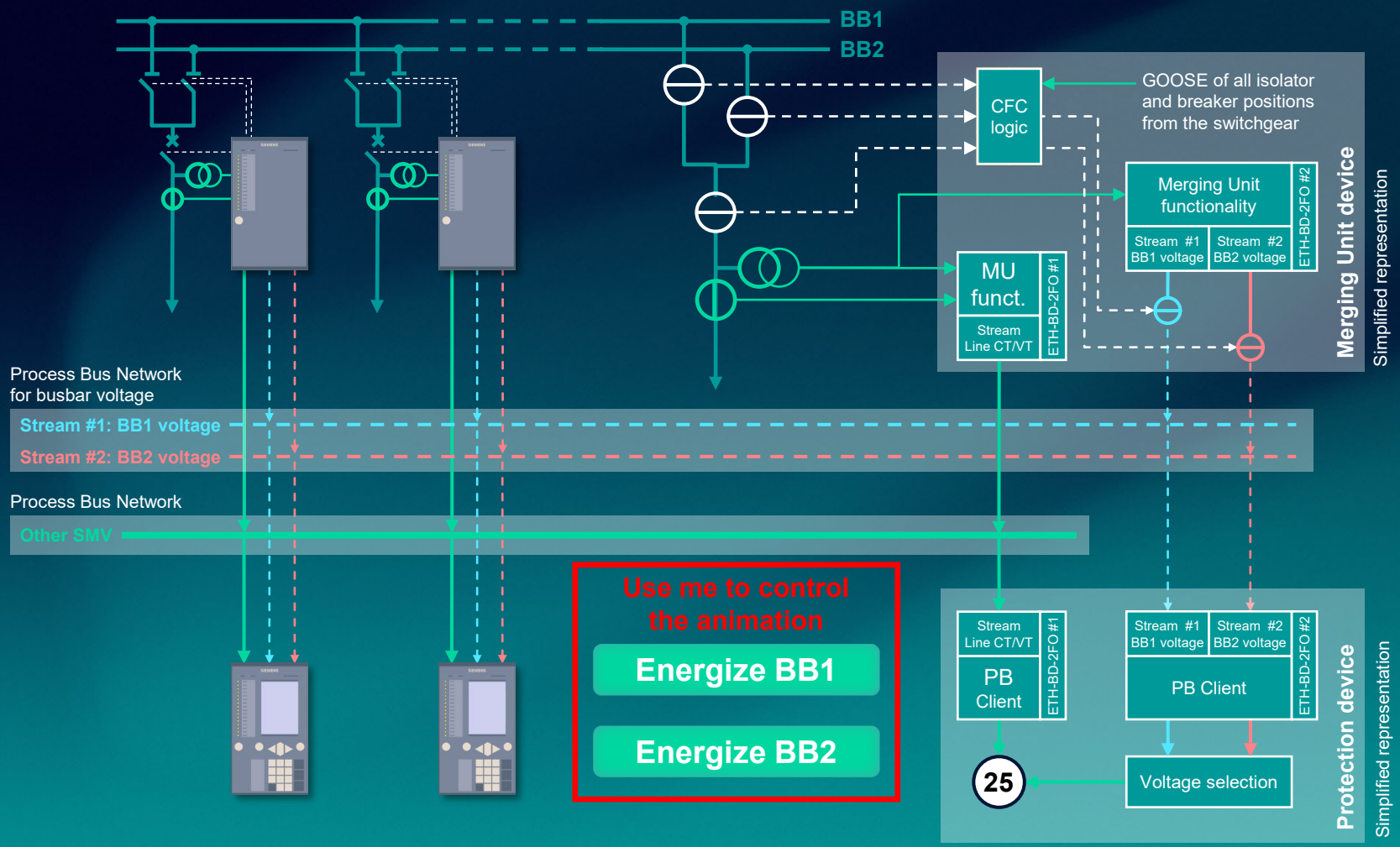
IEC 61850 busbar voltage distribution loop

Efficient and elegant distribution of voltage measurement for e.g. synchro check

From V9.30



Solution

Based on the breaker positions in the switchgear the Merging Units publishing the busbar voltage the feeder is connected to.

Sampled measured values for the busbar voltage are published depending on the isolator and breaker positions.

A user defined logic (CFC) in each Merging Unit ensures that only one Merging Unit at a time publishes the respective busbar voltage stream and secures the uniqueness of the same.

For more detailed information on the configuration, please refer to the APN-094 application note.

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IEC 61850 busbar voltage distribution loop

Efficient and elegant distribution of voltage measurement for e.g. synchro check

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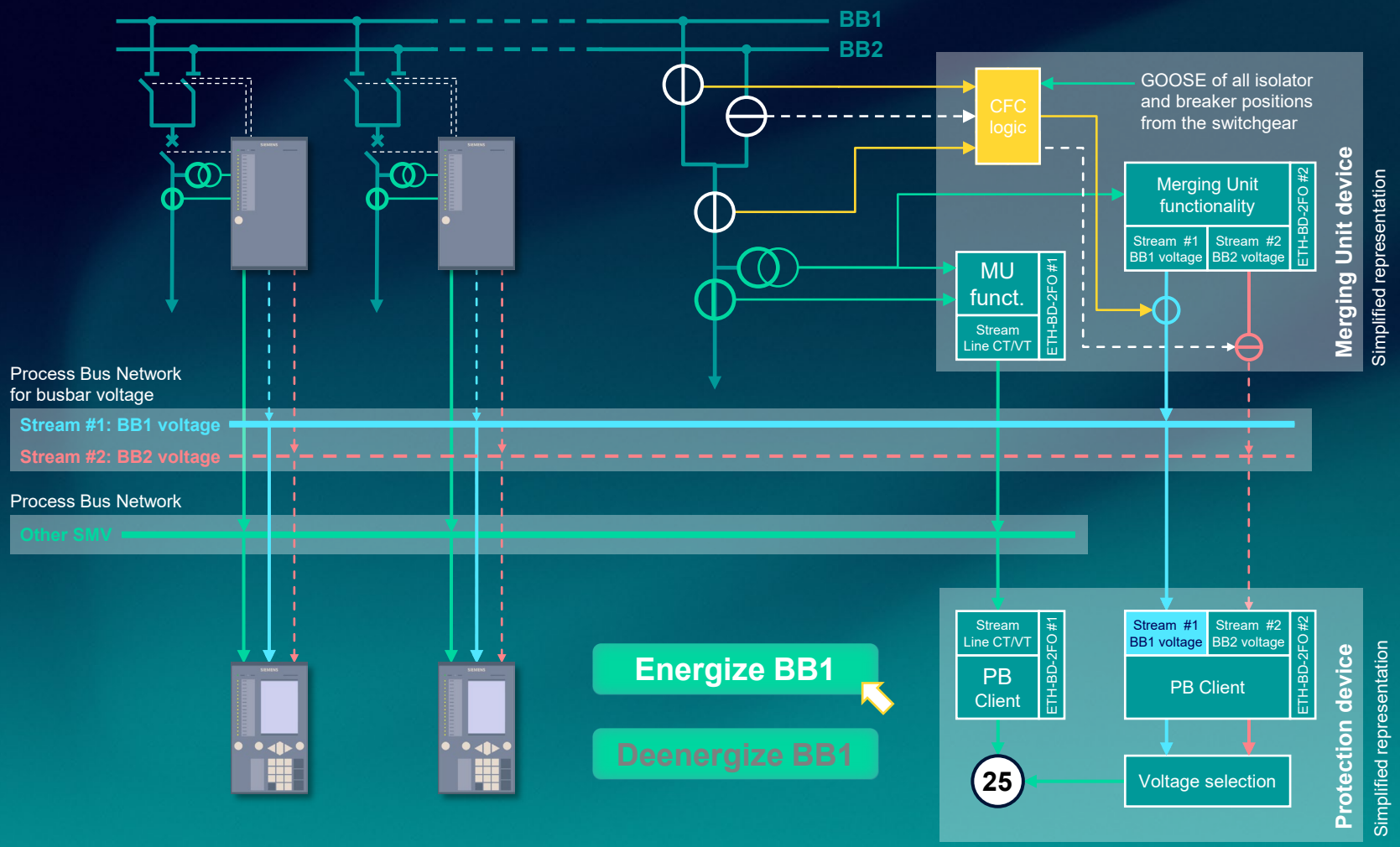

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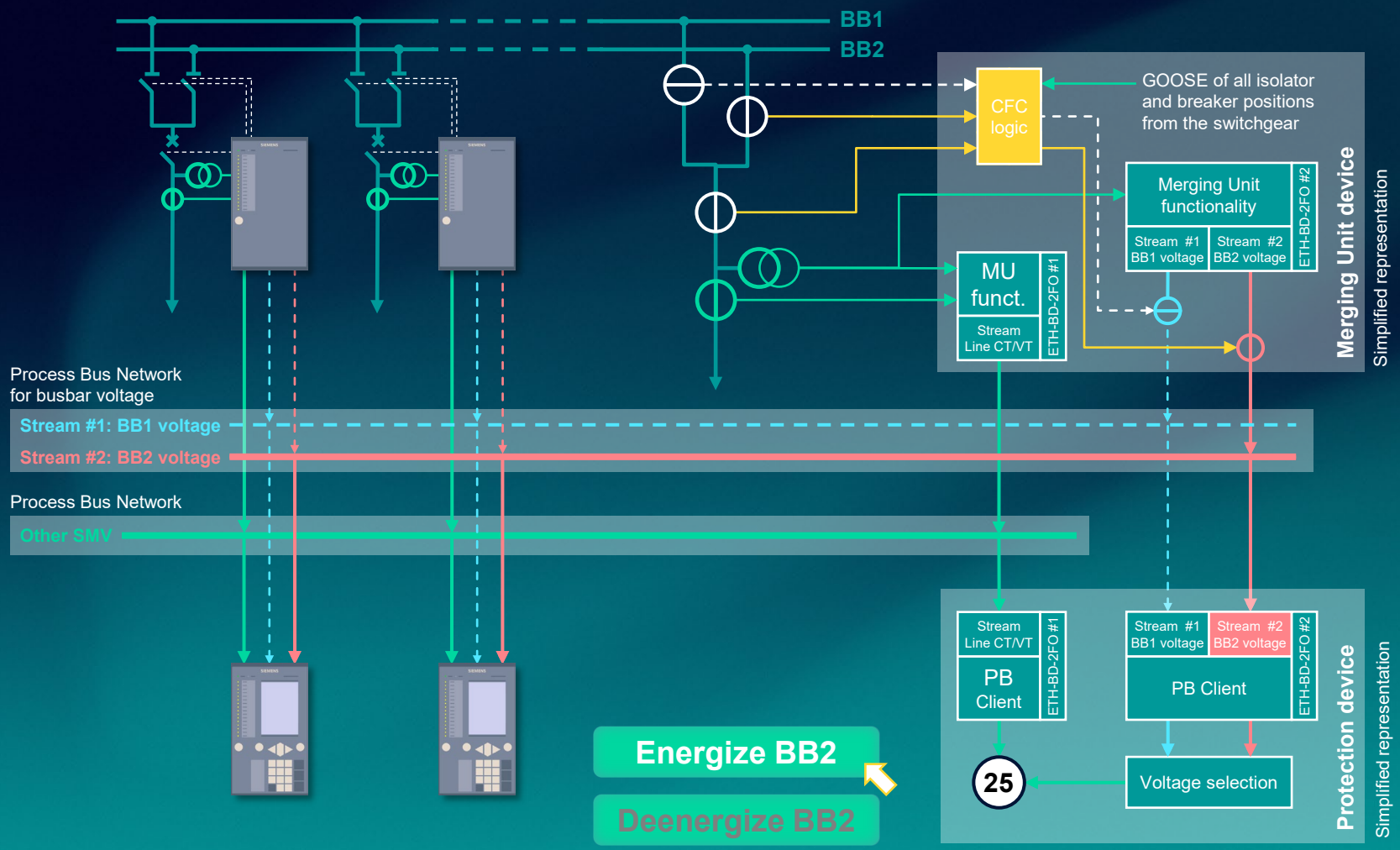

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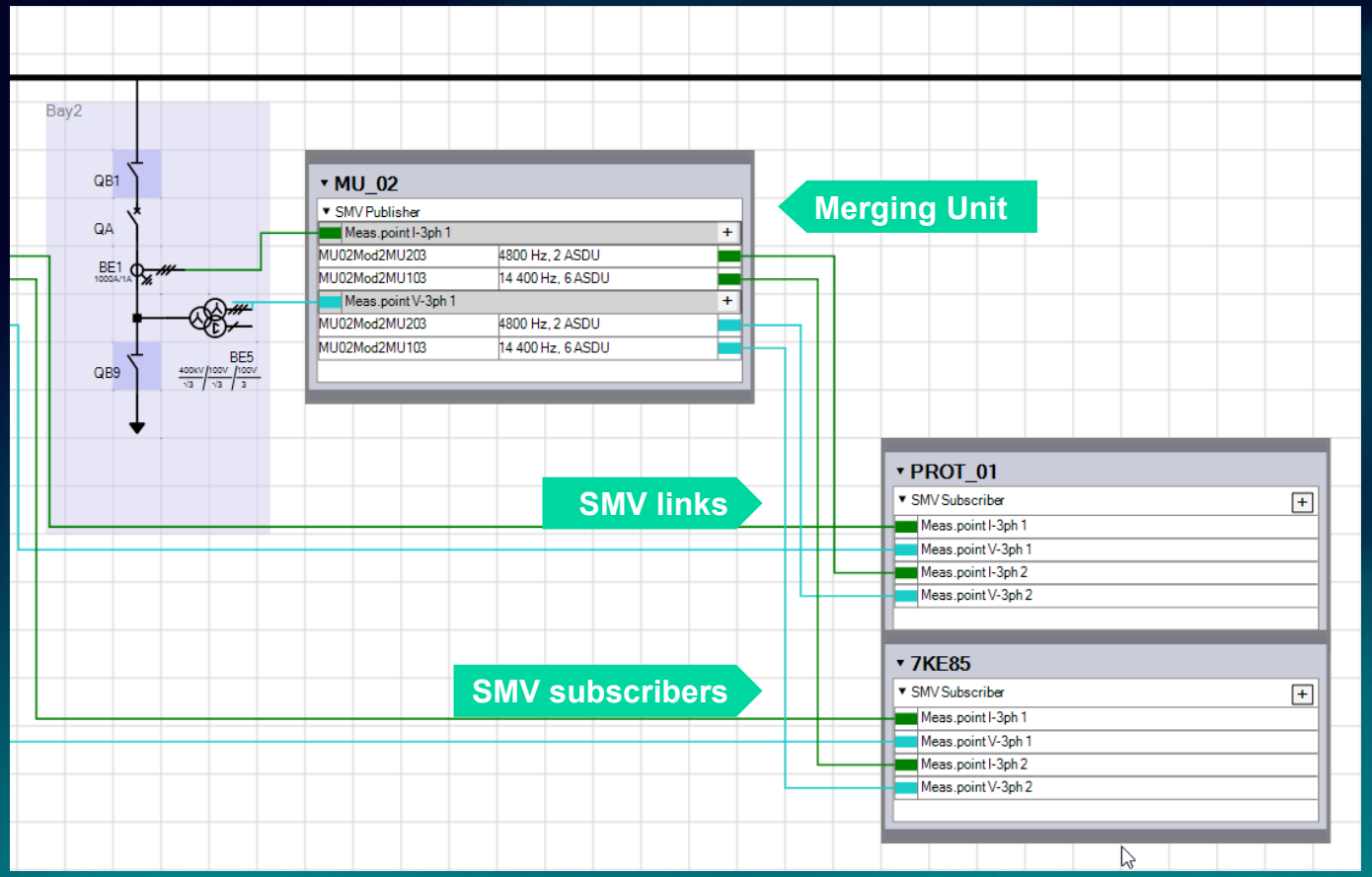
Speed up your process bus engineering
Automated mapping of sampled measured values



From V9.30

Benefits

Mapping of sampled measured values in the DIGSI 5 single line editor

- ✓ Working in a well-known representation for protection engineers
- ✓ Graphical representation of sampled value subscriptions and their relation to the primary equipment
- ✓ Reduction of the mistake rate in SMV engineering
- ✓ Faster engineering of process bus applications

SIEMENS

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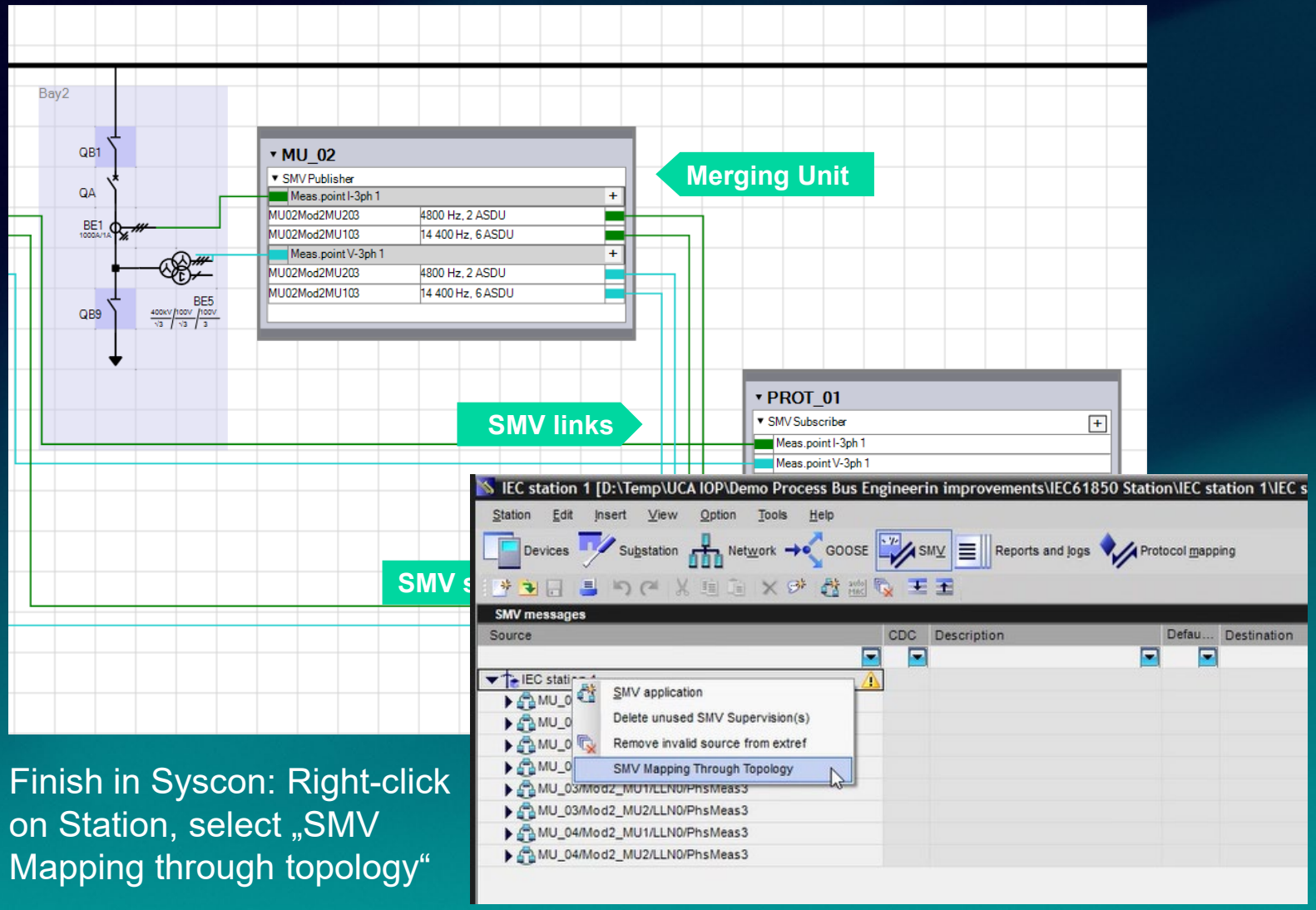
From V9.30



Finish in Syscon: Right-click on Station, select „SMV Mapping through topology“

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SIPROTEC 5
Merging Unit functionality (SMV publisher)

Extended with V9.20

Universal protection
7SX85

Bay Controller
6MD85
6MD86

Busbar protection
7SS85

Overcurrent and feeder protection
7SJ85
7SJ86

Available in every modular SIPROTEC 5 device*

Merging Unit
6MU85

Line differential protection
7SD86
7SD87

Breaker management
7VK87

Generator protection
7UM85

Line differential and distance protection
7SL86
7SL87

Distance protection
7SA86
7SA87

Motor protection
7SK85

Paralleling device
7VE85

Transformer differential protection
7UT85
7UT86
7UT87

*except 6MD89 and non-modular SIPROTEC 5 devices (7SJ81, 7Sx82)

Highlights Merging Unit functionality

- ✓ IEC 61850-9-2 LE
- ✓ IEC 61869 flexible streams
- ✓ Up to 4 access points for SMV publishing
- ✓ Simultaneous support of GOOSE, MMS, SMV publishing and subscription
- ✓ IEEE C37.118 (PMU) sourced by SMV
- ✓ Synchronization via IEEE 1588v2/PTP, IRIG-B, PPS
- ✓ Modular SIPROTEC 5 protection devices as Merging Unit
- ✓ Client and MU simultaneously

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DIGSI 5

Improvements in engineering

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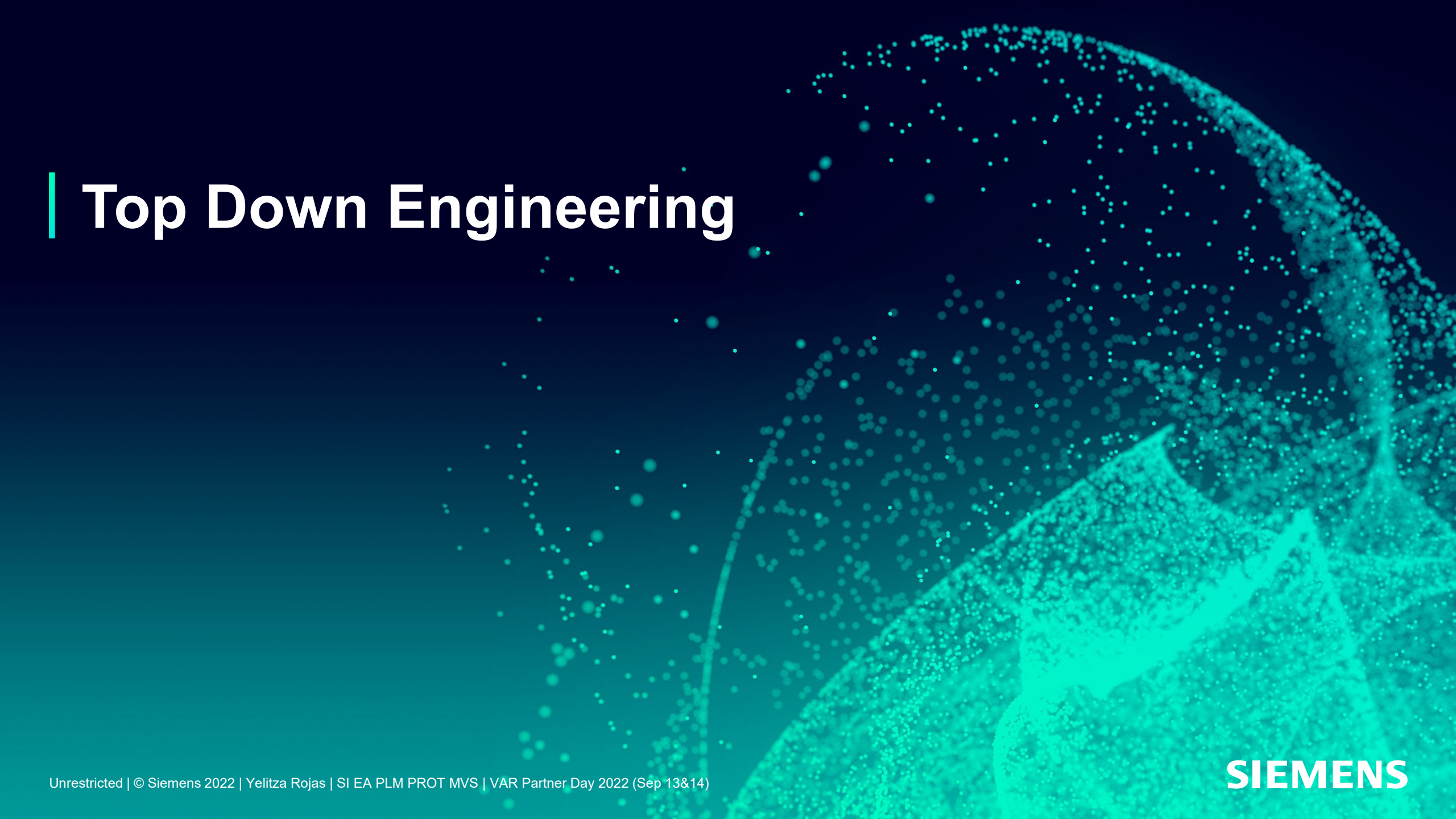
Top Down Engineering



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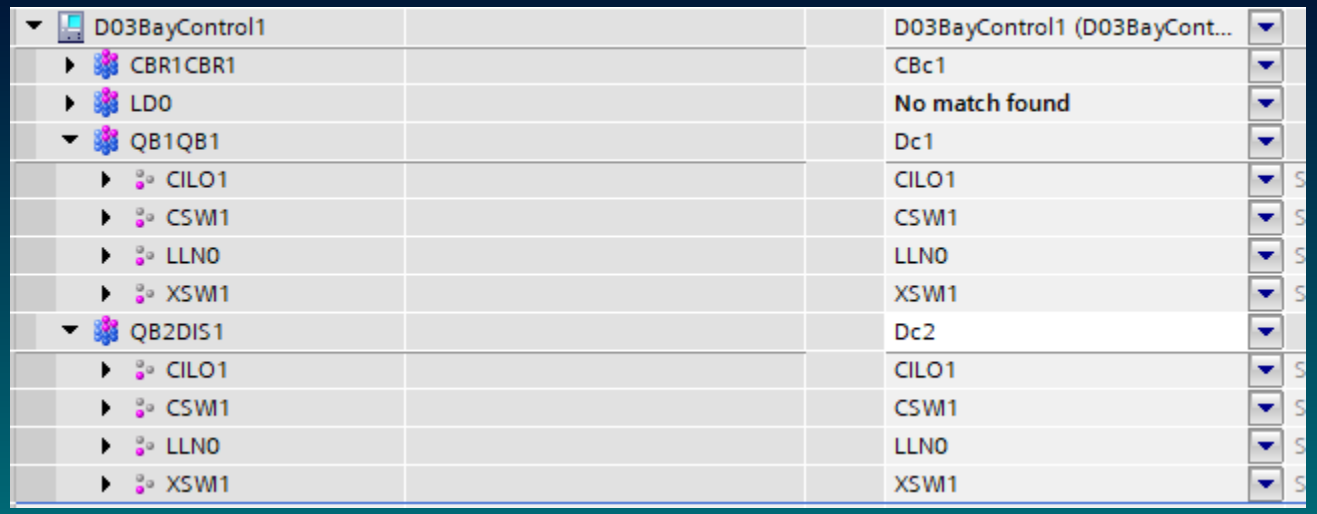
Top-Down-Engineering
Import protection settings from SSD-File (System Specification Description-File)

For matching of Logical Devices, DIGSI searches for the contained Logical Nodes for best fit, if name of Logical Device does not fit.



Highlights

Faster engineering by importing the SSD from the vendor independent specification

New in V9.20

- ✓ Import protection settings from SSD-file
- ✓ Improved Mapping algorithm

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Top-Down-Engineering
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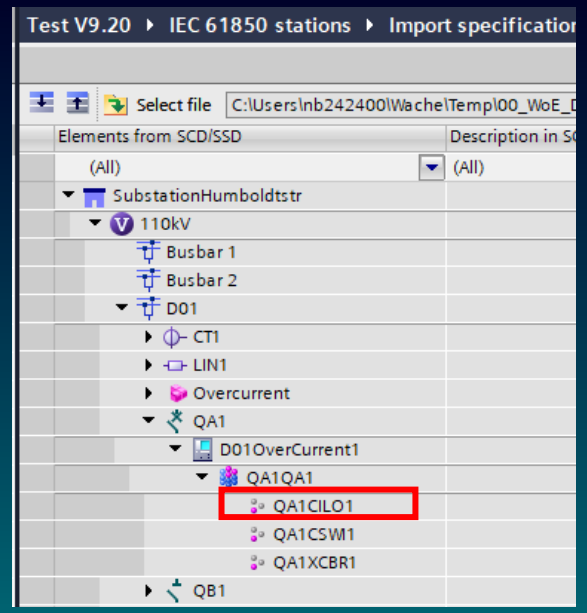
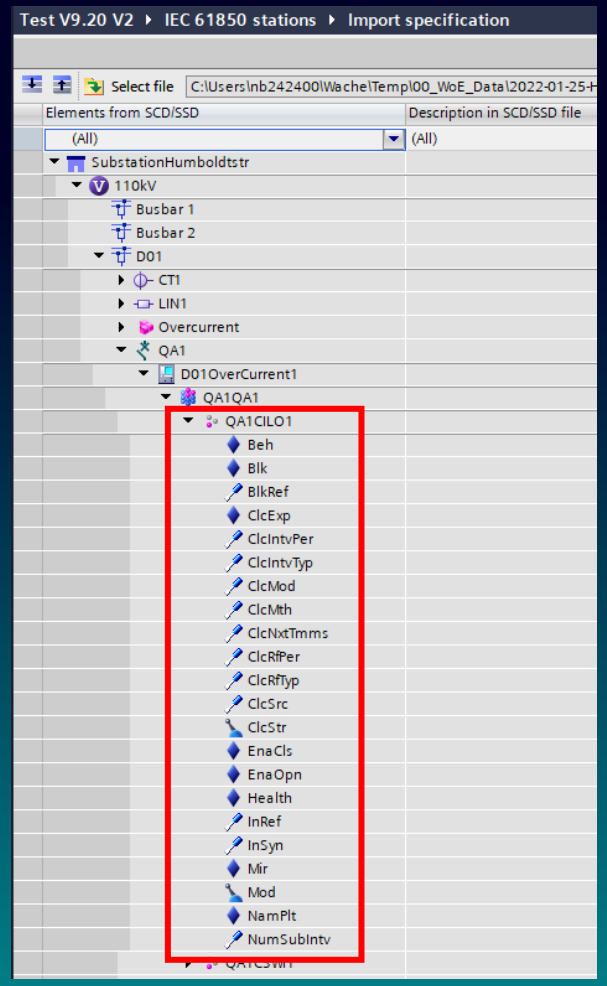


Until DIGSI 5 V9.00



From DIGSI 5 V9.20

Highlights

Faster engineering by importing the SSD from the vendor independent specification

New in V9.20

- ✓ Import protection settings from SSD-file
- ✓ Improved Mapping algorithm
- ✓ Display data objects in topology section
- ✓ Create user defined function block of any type

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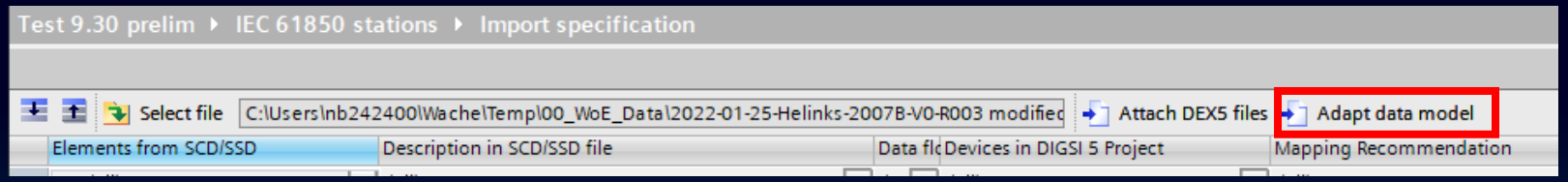
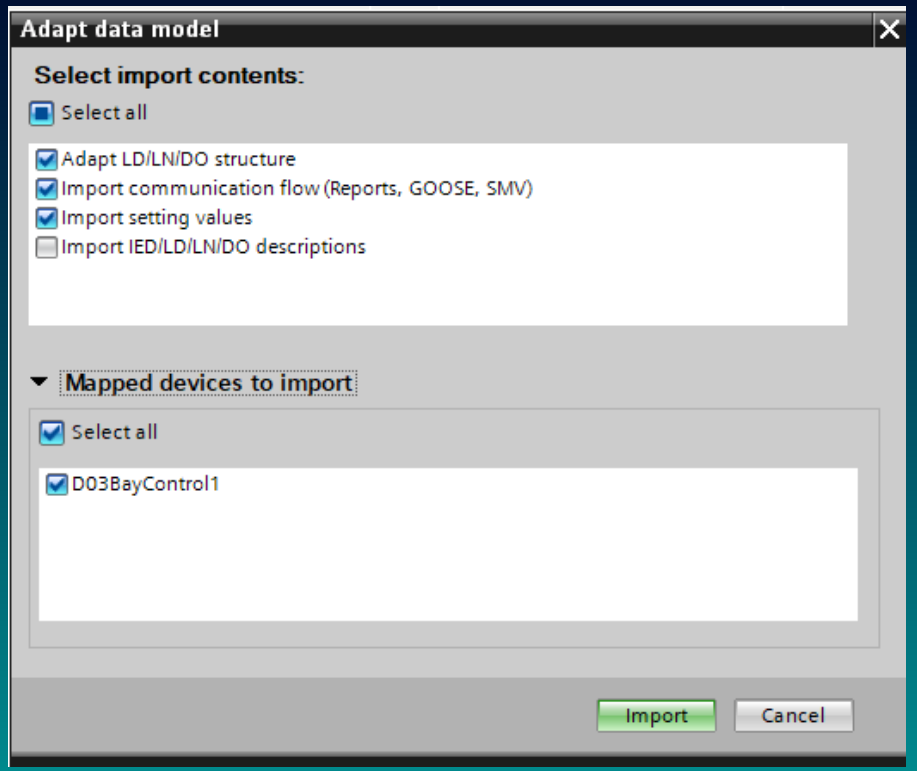
Top Down Engineering

New in V9.30

Show details of „adapt data model“ action; allow selection of details





Further Improvements:

- Improve automatic mapping of LNs and DOs
- Allow creation of DOs in Topology section
- Drag and Drop DOs to other LN in TDE Editor
- Display and create external signal Data Objects from SSD
- Create user defined settings from SSD/SCD using library Functions

→ More possibilities to adapt SIPROTEC device to special requirements from SSD!

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Usability

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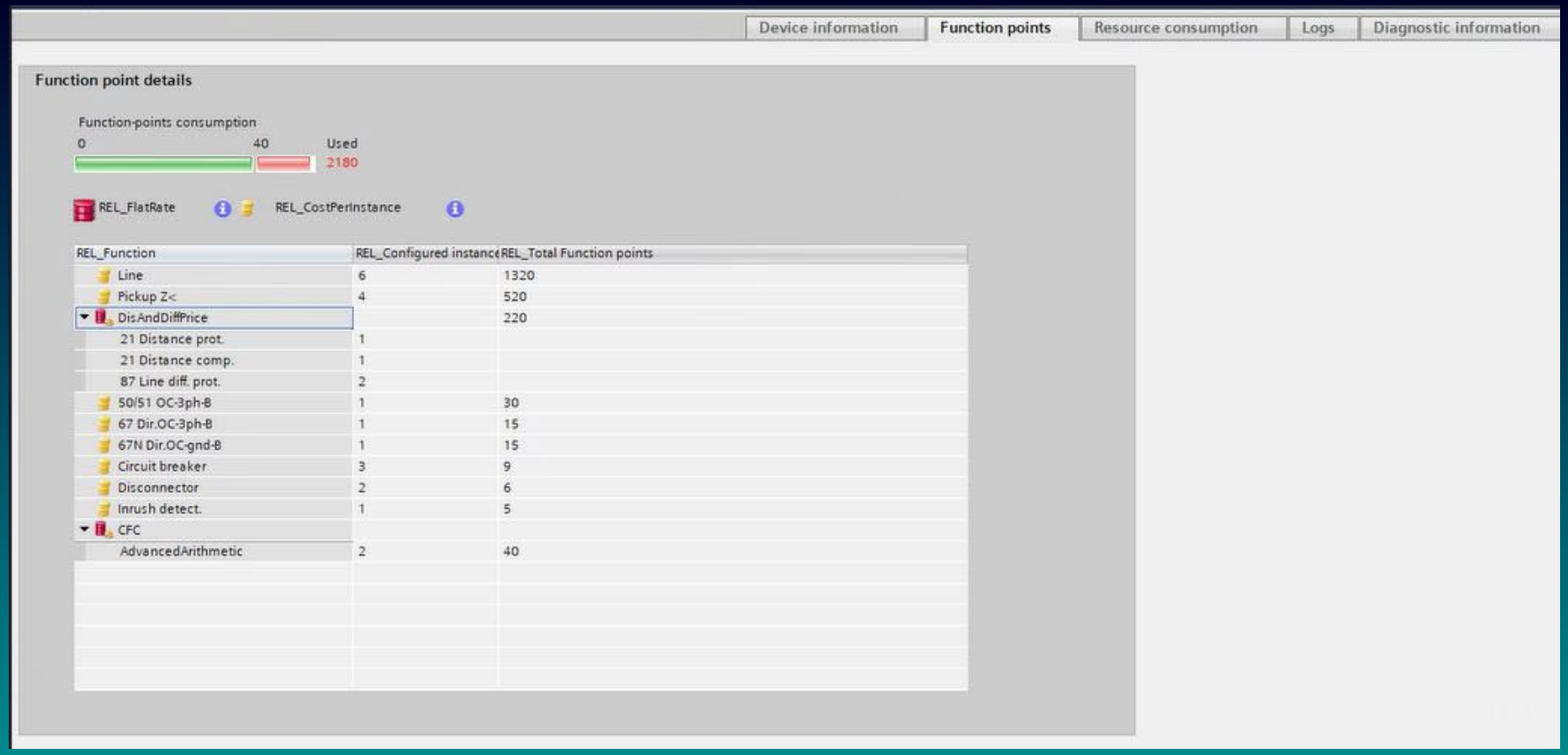
Usability
Show how sum of function points is calculated

New in V9.30

DIGSI 5 can now show how the function points of a device are calculated

- New Tab “function points” in Device Information
- List of all functions which consume function points



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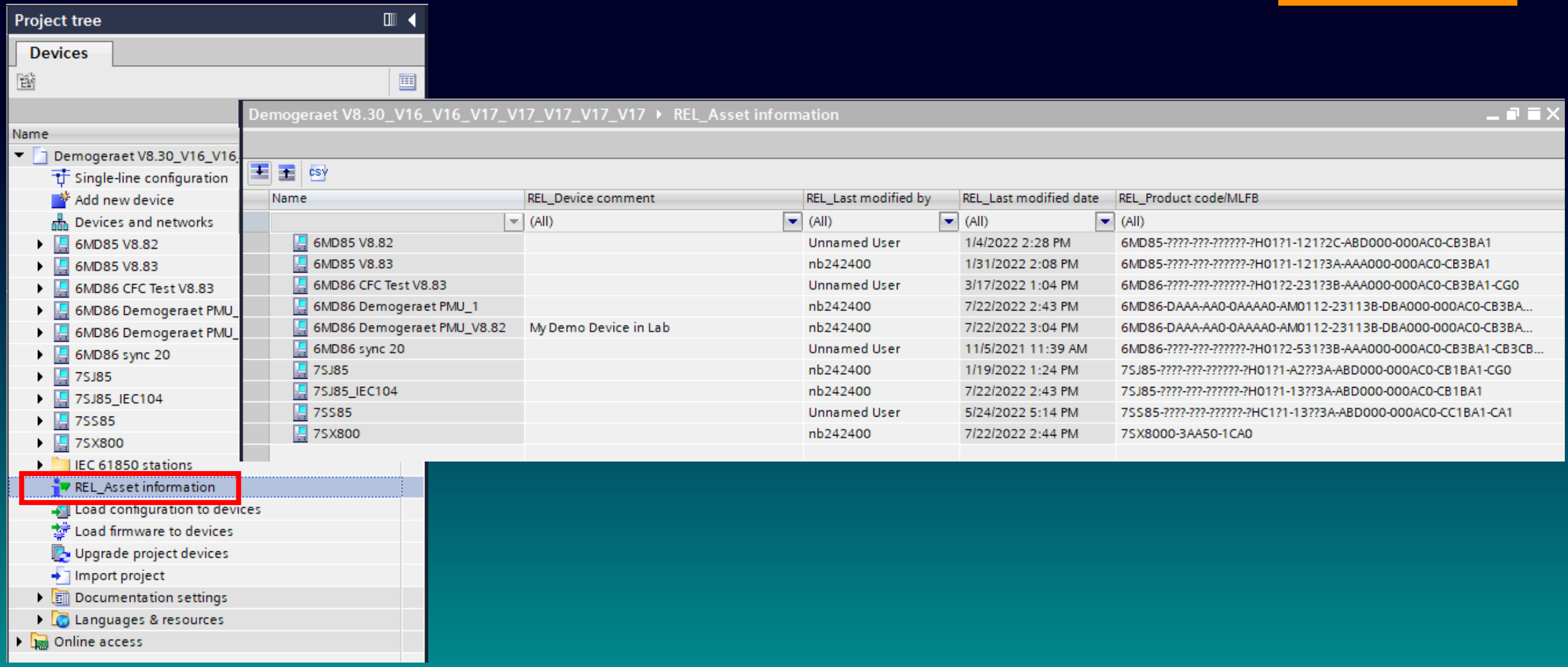
Support Asset Management:
Provide List of devices with comments

New in V9.30



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Link to SIPROTEC Tools

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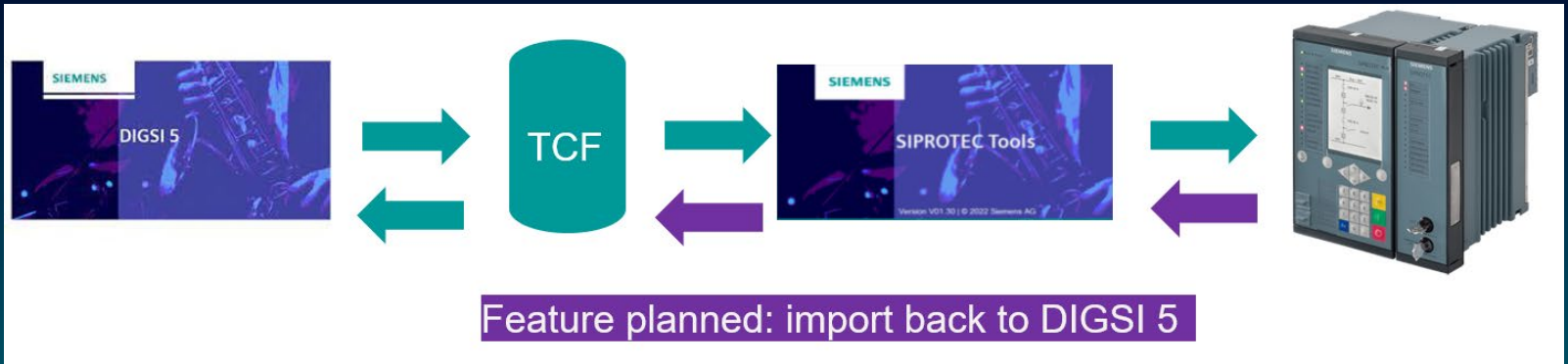
Export TCF
for download of configuration with SIPROTEC Tools

New in V9.20

Use case for TCF (Total Configuration File) export



Highlights

Load configuration to device independent from DIGSI

- ✓ Field engineer does not need DIGSI installation, just SIPROTEC Tools
- ✓ SIPROTEC Tools can handle different configuration versions without upgrade (TCF download to device available from SIPROTEC Tools V1.30)
- ✓ TCF file is signed

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Cybersecurity

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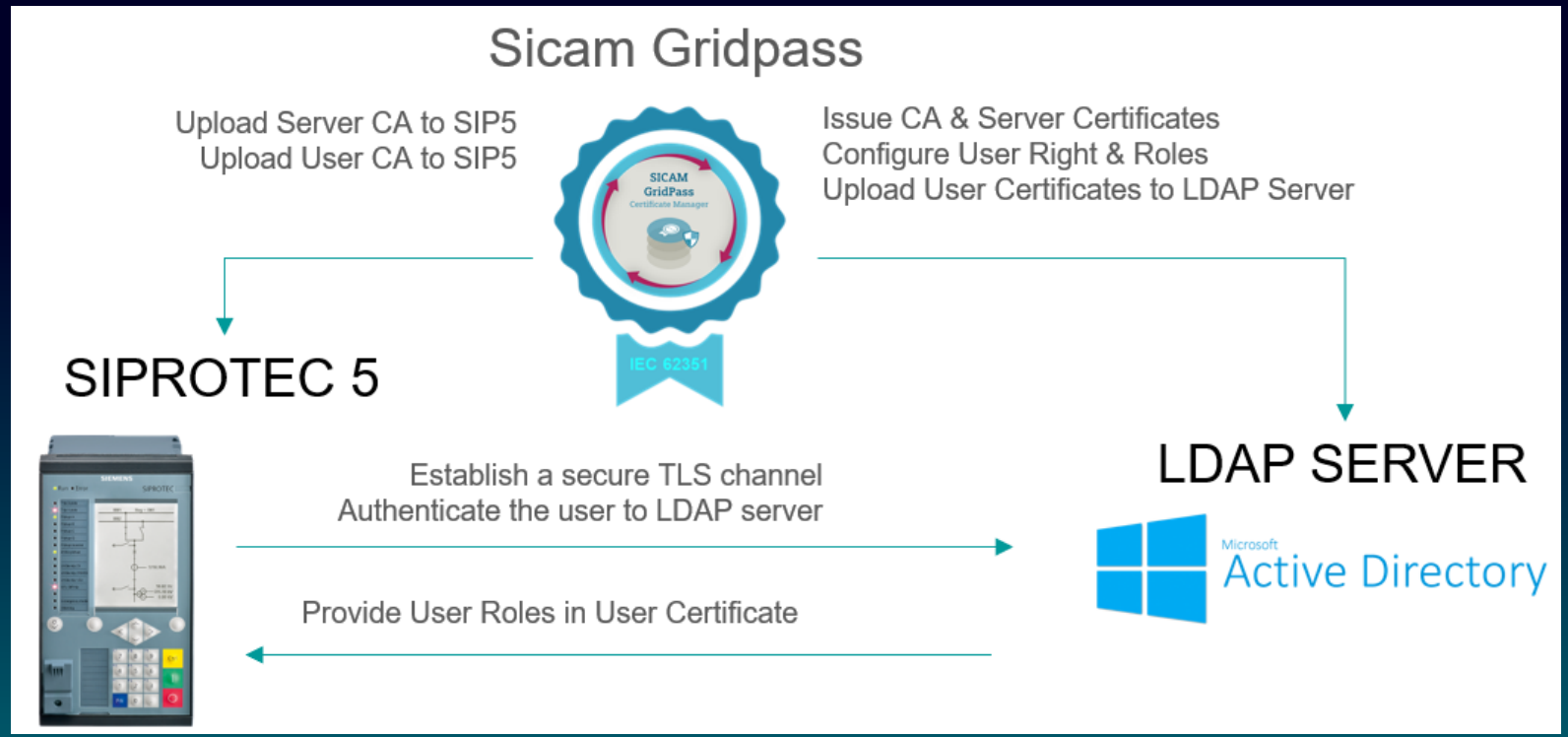
Overview of LDAP functionality (Lightweight directory access protocol)

New in V9.20



Siprotec 5's LDAP implementation is based on the IEC 62351-8 Profile-A where the individual users are managed in a certain directory of remote LDAP server, and their Role / AoR / Validity triplet is stored in the user certificate attribute with a signature from the CA that the organization trusts.

TLS Transport layer security
CA certificate authority.
PKI Public Key Infrastructure.

Highlights

LDAP is most common & widely accepted way of accessing to a remote user repository in todays IT infrastructure.

- ✓ Siprotec 5's LDAP implementation is based on the IEC 62351-8 Profile-A
- ✓ The privileges are received as a token from the user certificate..
- ✓ Available for all ethernet modules
- ✓ It is necessary to have a PKI available in the organization to use LDAP and authorize the user access

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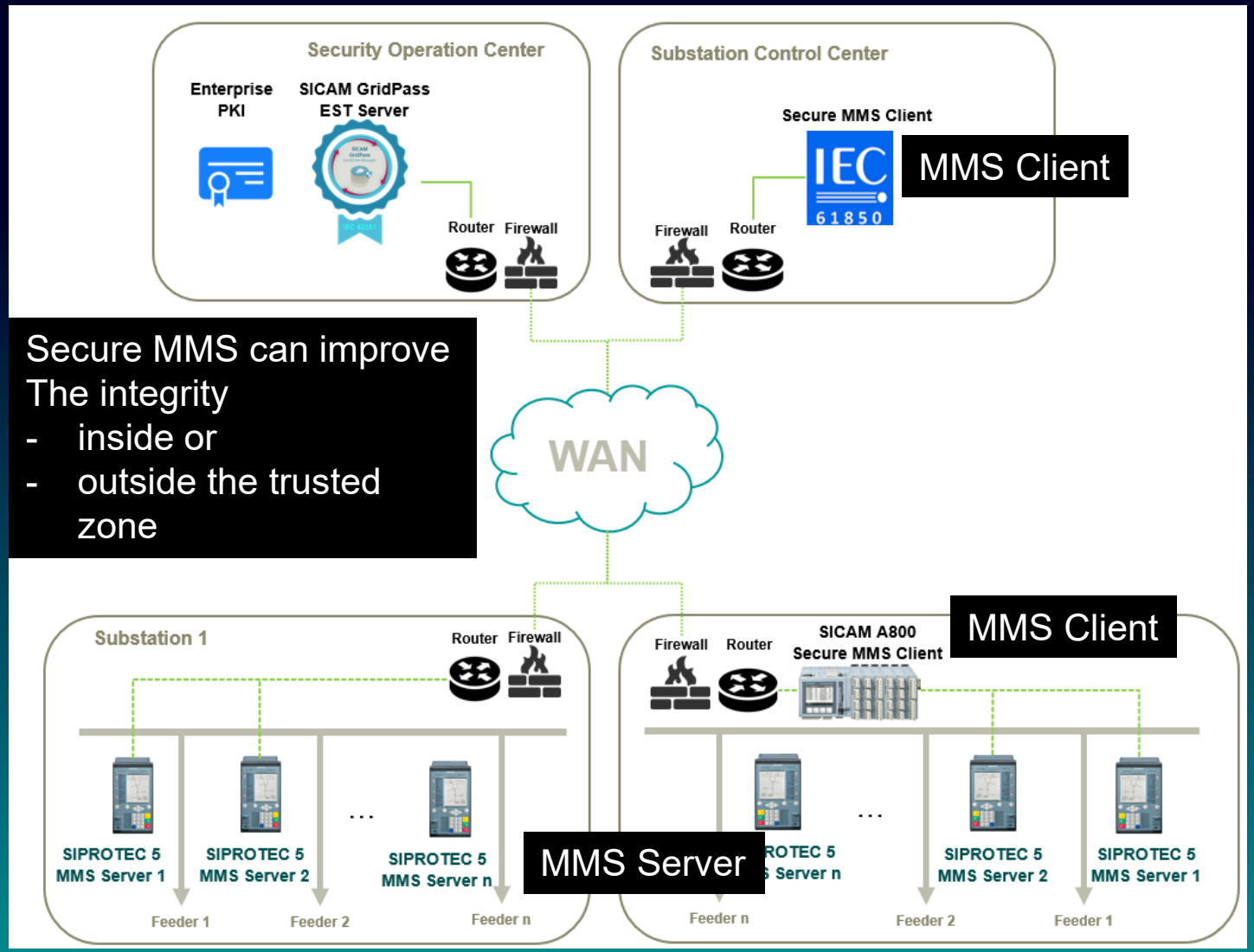
Secure MMS Transport Profile in SIPROTEC 5
Overview of Secure MMS T-Profile

New in V9.20



Highlights

- ✓ Communication between client and server with 61850 MMS is encrypted and cryptographically authenticated
- ✓ SIPROTEC 5 implementation of Secure MMS T-Profile is compliant with the IEC 62351(-3 for TLS, -9 for EST)
- ✓ Either in an indirect connection to a remote MMS Client which support T-Profile outside the secure zone, or direct connection inside a secure zone to a SICAM
- ✓ Fully automated creation / distribution / management of X509 certificates that are used for MMS TLS communication (via EST) i.e with SICAM GridPass.

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Classless Function Points

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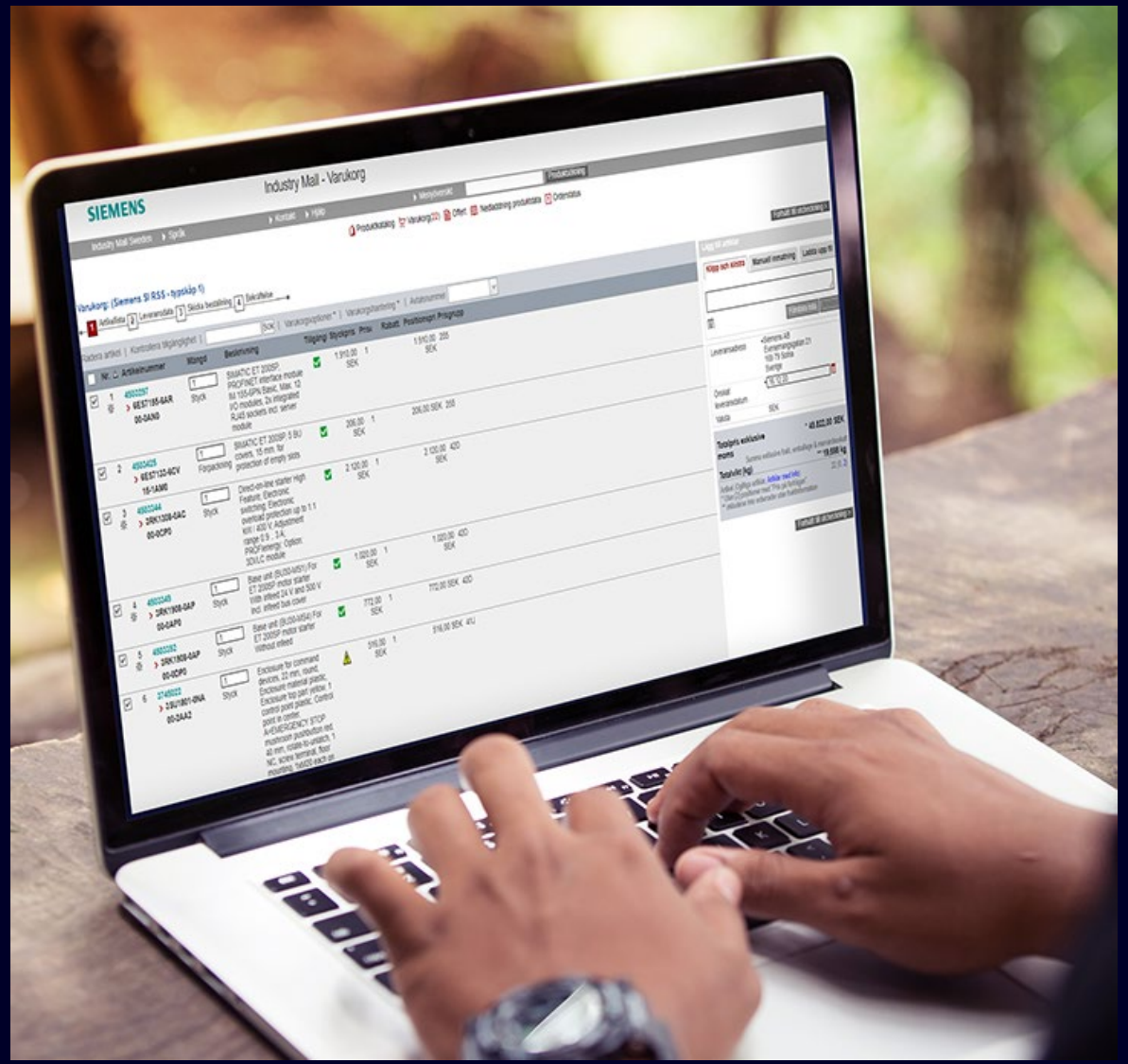
SIPROTEC 5 Function Point Manager
Classless Function Points

New in V9.20



Highlights

- ✓ The exact function point number required can be loaded into the device.
- ✓ It is no longer necessary to comply with function point classes.
- ✓ The user decides with each DAF generation to keep the class-bound license or to migrate to classless function points or vice versa.
- ✓ Devices can be ordered classless with 0 function points or still class-bound with a function point class.

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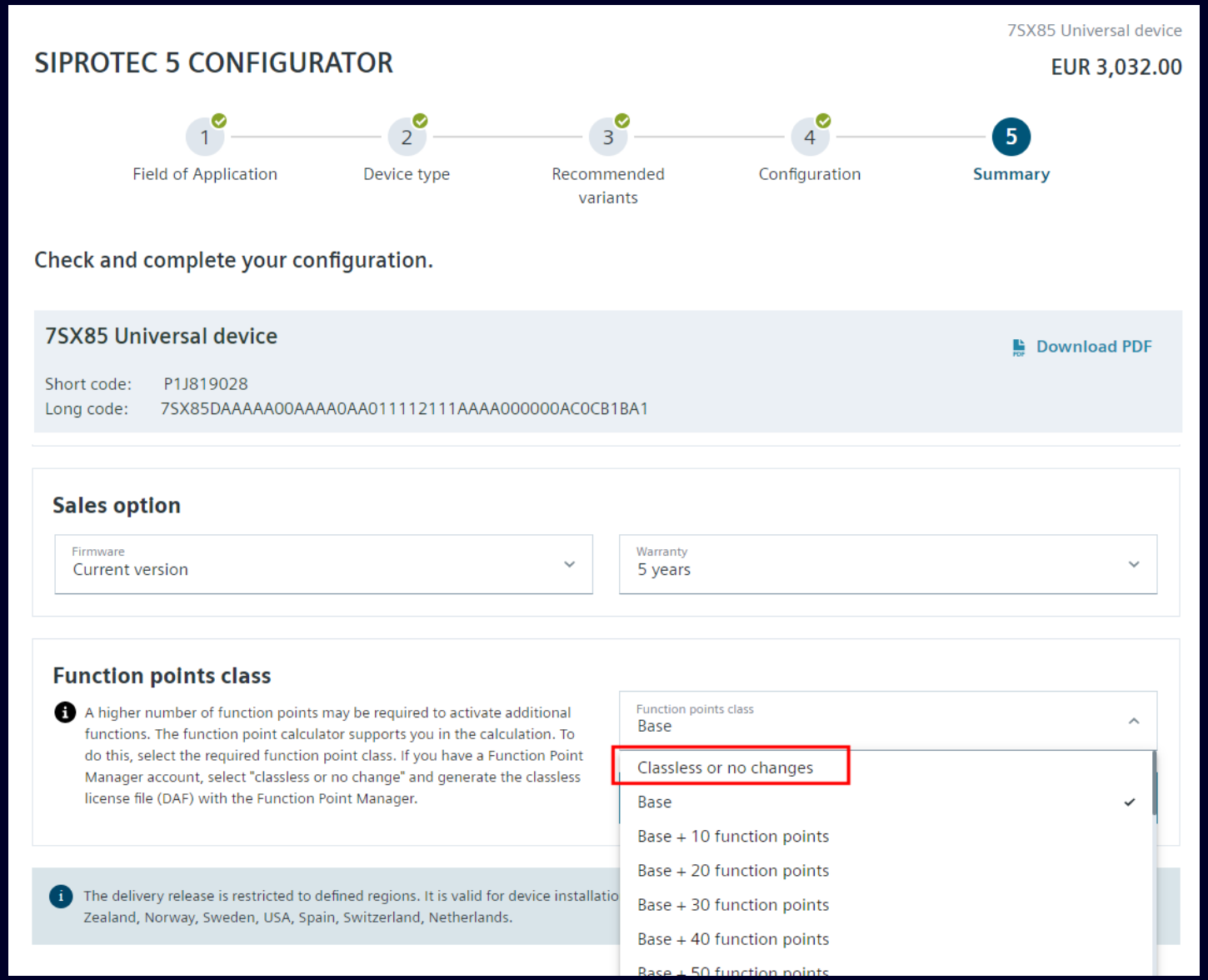
Ordering – Enhancement in SIPROTEC 5 Configurator



If you want to use the Function Point Manager (FPM) to create the needed license file later, select “classless or no changes” to order a device with 0 function points. In this case the device will have a fix product code which doesn’t change when you create new license files with the FPM.

You can still decide to order the device with a function point class (e.g. “Base”) and enhance FPs later with the Function Point Manager or conventional by ordering a functional extension. In this case the product code changes with every new DAF.

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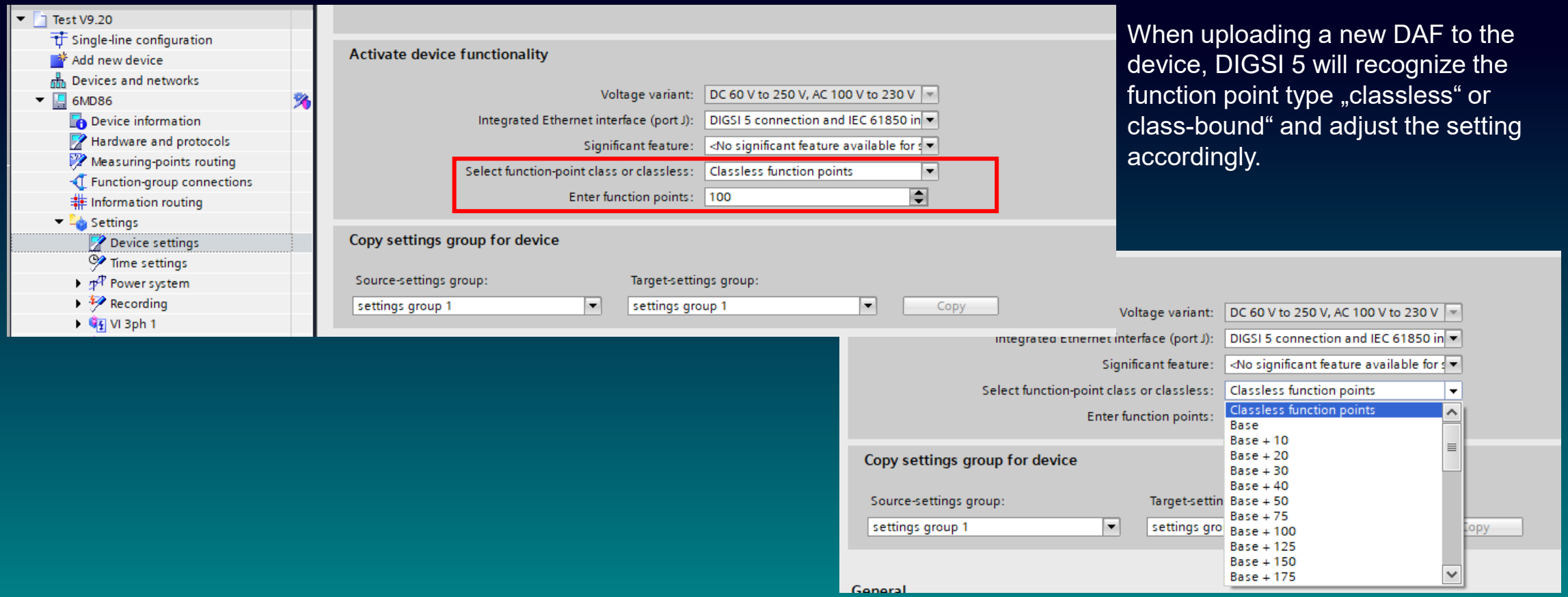
Support for classless function points in DIGSI

When creating a device in DIGSI 5,select „classless function points“ or the desired function point class.

When uploading a new DAF to the device, DIGSI 5 will recognize the function point type „classless“ or class-bound“ and adjust the setting accordingly.



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Disclaimer

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

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