

## SIPROTEC 5 News Main features from V9.20 and V9.30 and outlook

Yelitza Rojas – Product Portfolio Consultant VAR Partner Day 2022 | September 12 -14 | Zagreb, Croatia



#### Agenda





# Function Enhancement



## **Auxiliary Direct-Voltage Supervision**



#### **Auxiliary Direct-Voltage Supervision**

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** 

#### New in V9.20

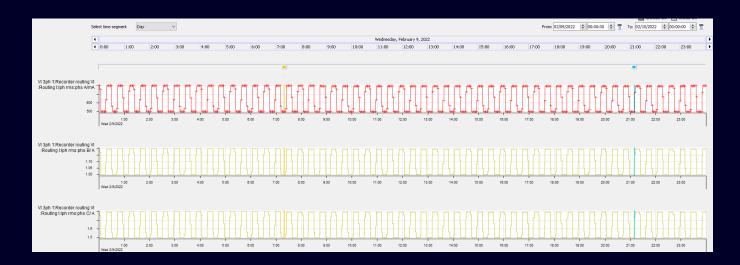
#### Highlights

- 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



## **Continuous and Trend Recorder**

#### **Continuous recorder (CR) in SIPROTEC 5**



#### Access

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



#### New in V9.20

#### 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



#### Trend Recorder (TR) in SIPROTEC 5

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

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	00 28.08.2014 0	0.07												1

## New in V9.30

#### **Benefits**

 SIPROTEC 5 platform devices support full scope of recorder

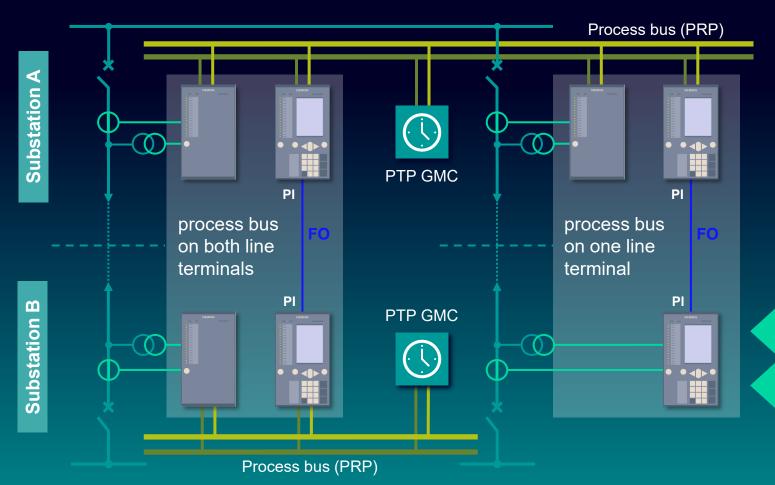
Options: Fast Scan Recorder , optional Slow Scan Recorder, Continuous Recorder and Trend Recorder

- Saving of invest by Distributed Monitoring (more functions in one device not need for additional hardware)
- Increased safety and availability by Distributed Monitoring



## **Line Differential Protection**

#### **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

SIPROTEC 4

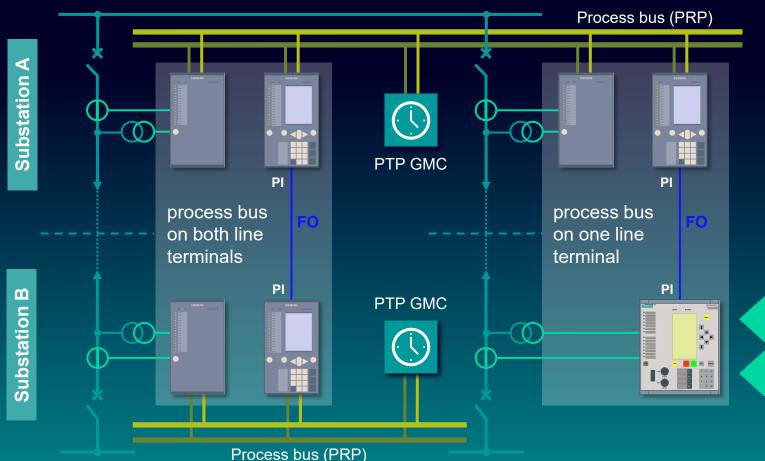
✓ C37.94 New in V9.20

No high-precision synchronization for classical connected terminals

SIPROTEC 4 or SIPROTEC 5 Line differential protection device



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SIPROTEC 4

✓ C37.94 New in V9.20

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SIPROTEC 4 or SIPROTEC 5 Line differential protection device

## Communication

#### 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



# **Device Specific**



## **SIPROTEC 5 Compact 7SX800**

## Robust metal housing 1/6 \* 19"

Graphic display (with single line)





New in V9.30

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

3 I/O options:

Interfaces

- 4 BI / 5 BO
- 14 BI / 11 BO
- 17 BI / 8 BO (IO050)

USB interface for DIGSI and Web UI

#### **7SX800 - Communications:** All interfaces are already built in ...

#### Ethernet Interface (Port F1/F2):

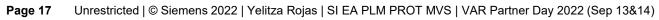
- > Optical or electrical\* interface
  - ➢ IEC 61850
  - Modbus TCP
  - ➢ IEC 104
  - > DNP3 IP
  - Profinet\*

#### Serial interface\* (Port E):

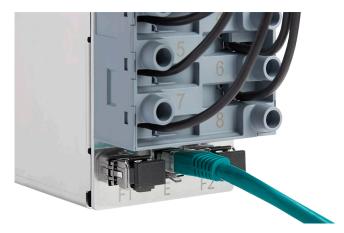
➢ RS 485 interface

#### **Ready for communication**

\*: in preparation



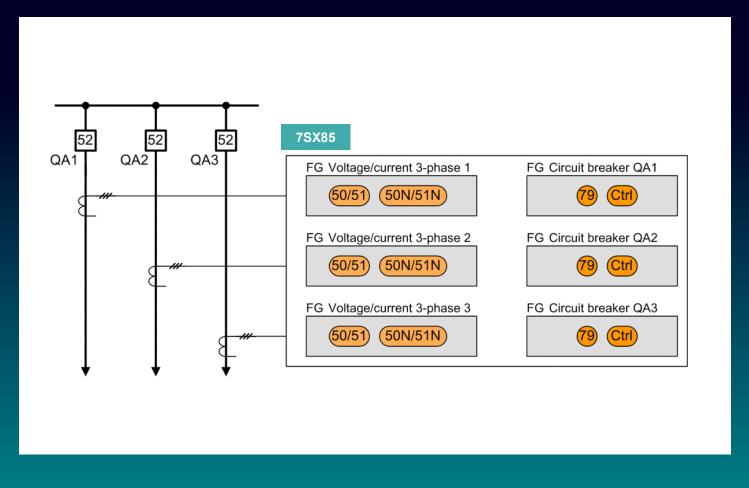




## SIPROTEC 7SS85 and 7SX85



#### **Small central protection - One device for multiple feeders**



#### Highlights 7SX85

Several protection incl.

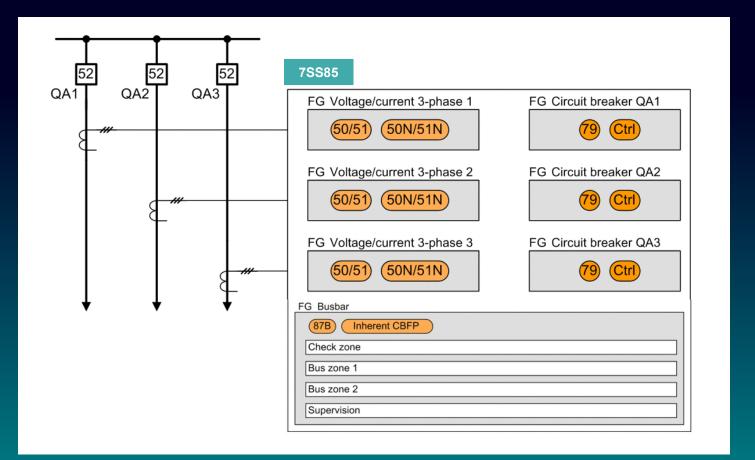
- Overcurrent protection
- Directional overcurrent protection
- Motor protection
- Capacitor protection
- Frequency protection

#### 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

....

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Busbar differential protection

#### **New in V9.30**

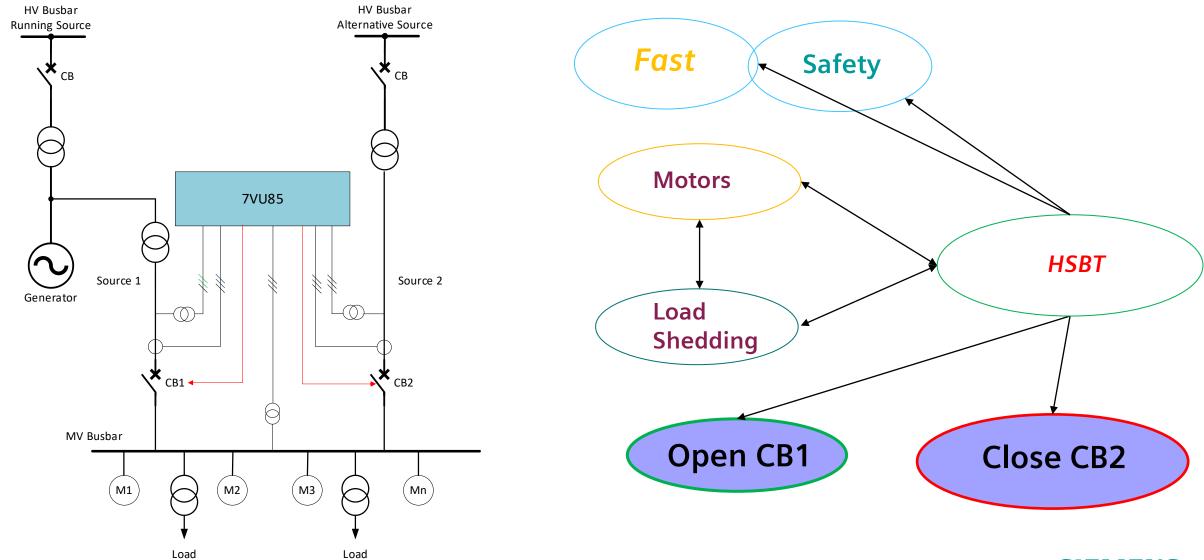
- Function Groups with underlying functions can be organized under a Bay Level
- it allows to test an individual bay, while the other bays remain into operation



## SIPROTEC 7VU85 High-Speed Busbar Transfer Device

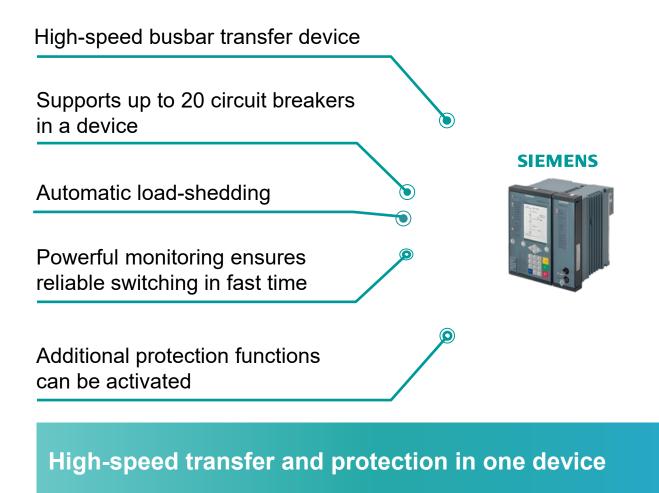


#### Main Function of a High-Speed Busbar Transfer HSBT



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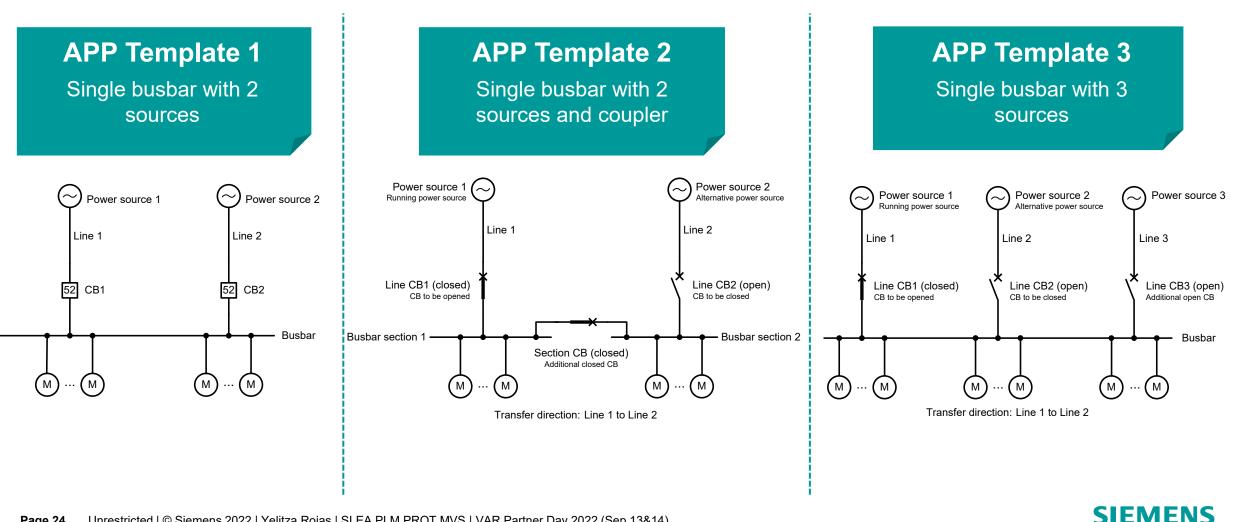
#### **SIPROTEC 5 7VU85 Overview**



#### **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

#### **SIPROTEC 7VU85 – Typical applications**



## SIPROTEC 5 Universal Device 7SX82





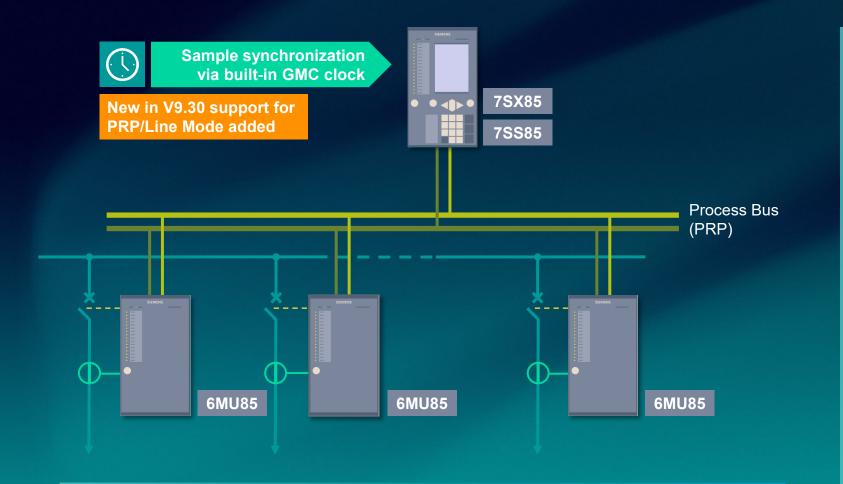


## Process Bus



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#### Built-in IEEE 1588v2/PTP Grandmaster Clock functionality



Very useful for busbar and small central protection applications

#### From V9.20

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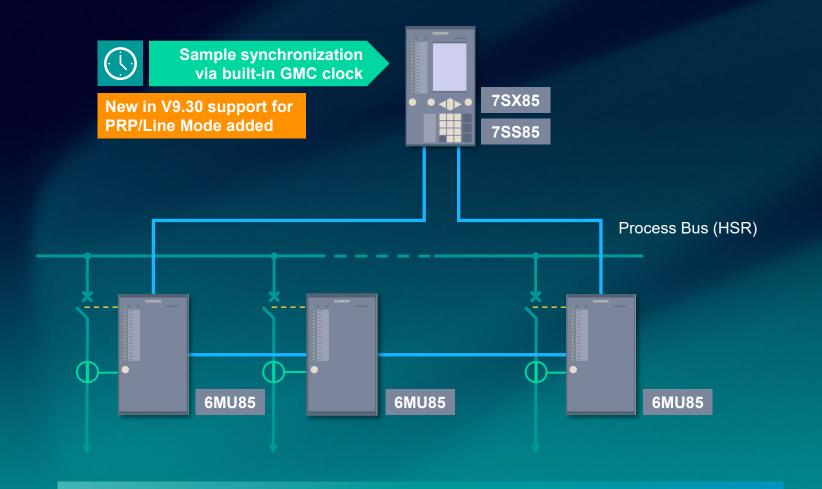
#### Highlights GMC\* functionality

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



#### Built-in IEEE 1588v2/PTP Grandmaster Clock functionality



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#### From V9.20

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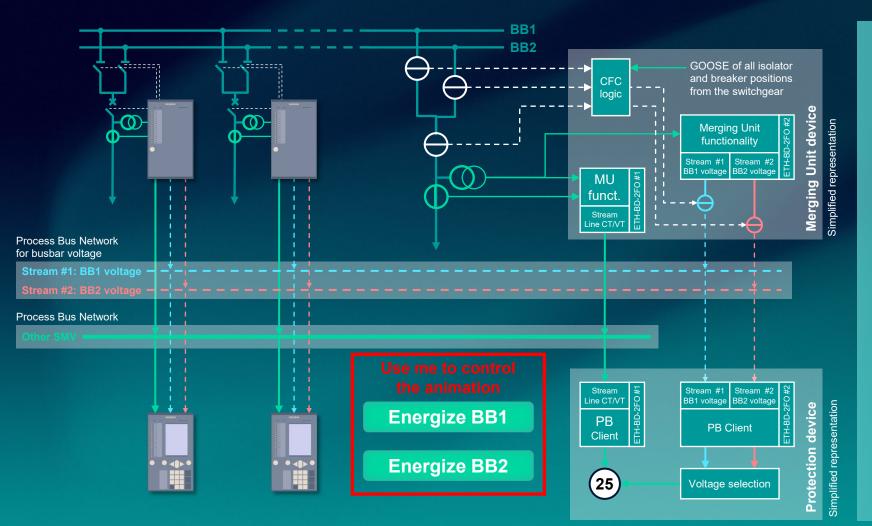
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#### IEC 61850 busbar voltage distribution loop

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.

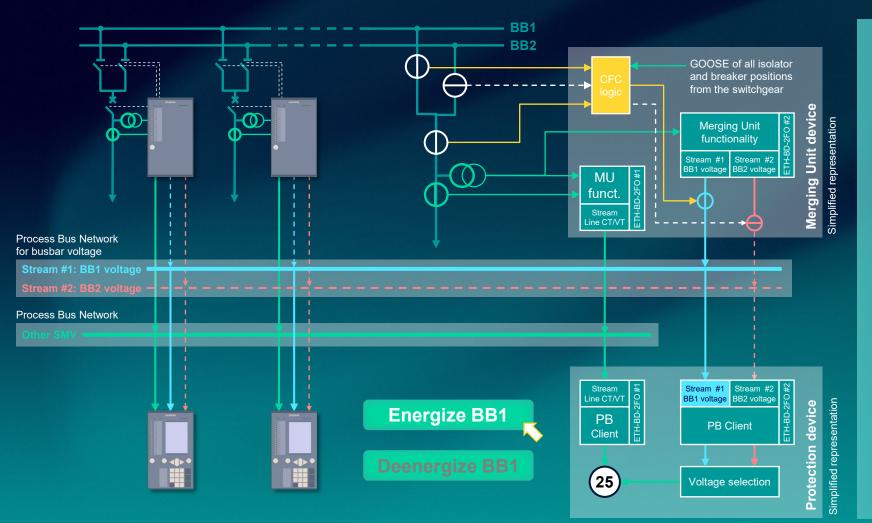
For more detailed information on the configuration, please refer to the APN-094 application note.

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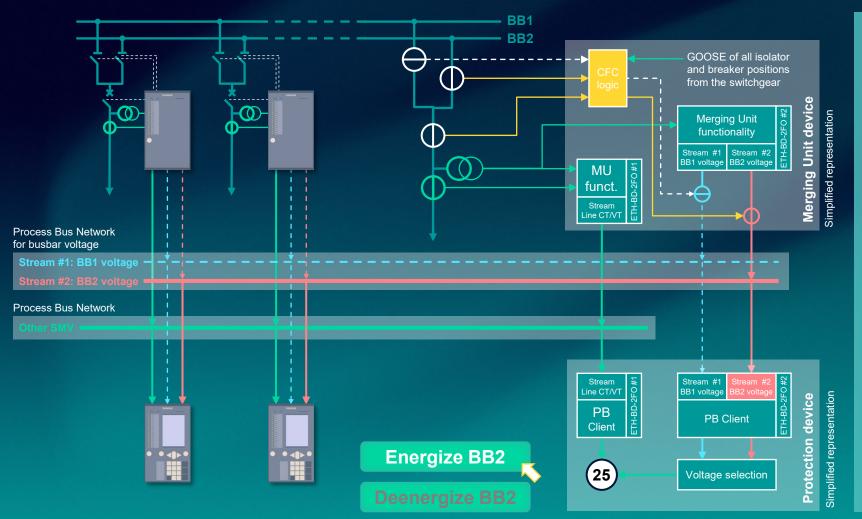
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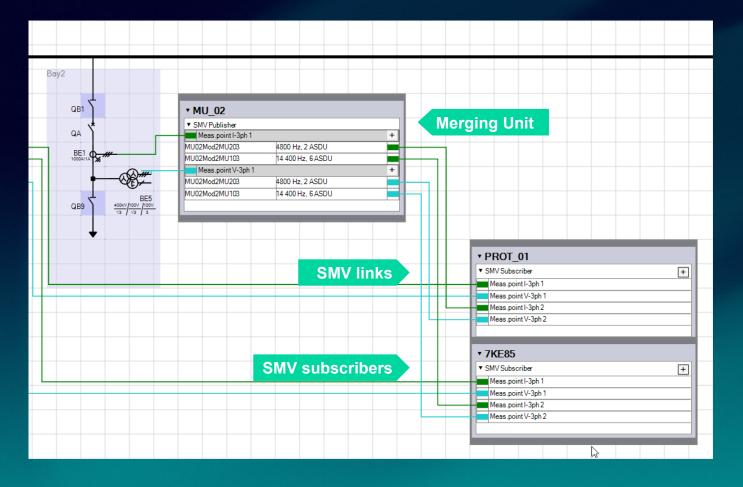
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#### **Speed up your process bus engineering** Automated mapping of sampled measured values



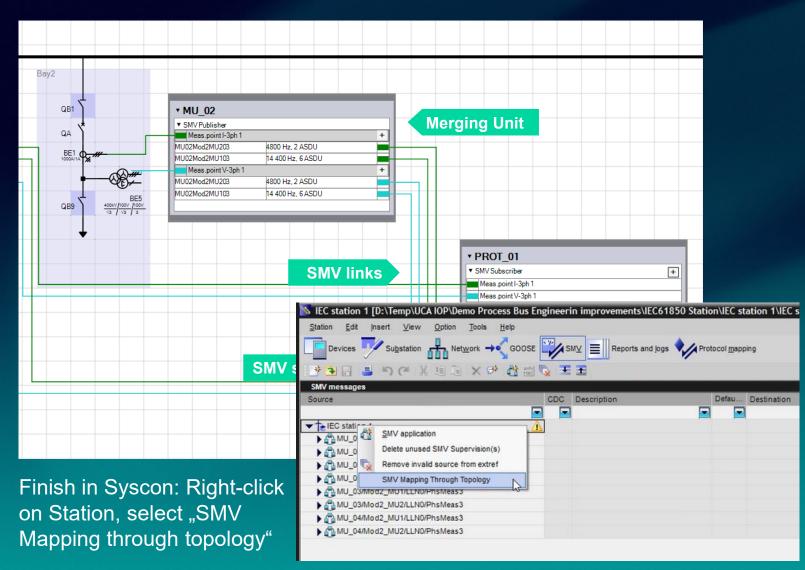
#### From V9.30

#### **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

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



#### From V9.30

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

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#### **SIPROTEC 5** Merging Unit functionality (SMV publisher)

#### Extended with V9.20

Universal protection 7SX85	<b>Bay Controller</b> 6MD85 6MD86	<b>Busbar</b> protection 7SS85	Overcurrent and feeder protection	<ul> <li>Highlights Merging Unit Junctionality</li> <li>IEC 61850-9-2 LE</li> <li>IEC 61869 flexible streams</li> <li>Up to 4 access points for SMV publishing</li> <li>Simultaneous support of GOOSE, MMS, SMV publishing and</li> </ul>			
Availab SIPF	le in every ROTEC 5 de	modular vice*	7SJ85 7SJ86				
Merging Unit 6MU85 Line differential	Generator protection 7UM85	Distance protection 7SA86 7SA87	Paralleling device 7VE85				
<b>protection</b> 7SD86 7SD87	Line differential and distance protection	/ 380/	Transformer differential protection	<ul> <li>subscription</li> <li>✓ IEEE C37.118 (PMU) sourced by SMV</li> <li>✓ Synchronization via IEEE</li> </ul>			
<b>Breaker</b> management 7VK87	7SL86 7SL87	Motor protection 7SK85	7UT85 7UT86 7UT87	<ul> <li>✓ Modular SIPROTEC 5 protection devices as Merging Unit</li> <li>✓ Client and MU simultaneously</li> </ul>			

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

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# DIGSI 5

### Improvements in engineering



# **Top Down Engineering**

# 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.

▼ 📙 D03BayControl1	D03BayControl1 (D03BayCont 💌	
CBR1CBR1	CBc1	
🕨 🦸 LDO	No match found	
▼ 💐 QB1QB1	Dc1	
▶ Sº CILO1	CILO1 💌	S
▶ 🐉 CSW1	CSW1	S
▶ Sº LLNO	LLNO	S
► 🖧 XSW1	XSWI1	S
▼ iii QB2DIS1	Dc2	
▶ Sº CILO1	CILO1 💌	S
▶ 🐉 CSW1	CSW1	S
▶ Sº LLNO	LLNO	S
► 🖧 XSW1	XSWI1 💌	S

# 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

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

		1	
Test V9.20 → IEC 61	1850 stations	Impor	t specification
🛨 主 主 Select file	C:\Users\nb242400	\Wache	\Temp\00_WoE_E
Elements from SCD/SS	SD		Description in S
(AII)		-	(AII)
🔻 📊 SubstationHu	mboldtstr		
🔻 💟 110kV			
🕂 Busbar	1		
🕂 Busbar	2		
🔻 🕂 D01			
▶ ф- сті			
LIN1			
🕨 🍑 Ove			
🔻 🔻 QA1			
🔻 📙 [	0010verCurrent1		
-	🙀 QA1QA1		
	QA1CILO1		
	QA1CSW1		
	QA1XCBR1		
► 🕇 QB1			
Until D	IGSI 5 \	/9.	00

Test V9.20 V2 → IEC 61850 stations	<ul> <li>Import specification</li> </ul>
ᆂ 重 達 Select file 🛛 C:\Users\nb242400	)\Wache\Temp\00_WoE_Data\2022-01-25-H
Elements from SCD/SSD	Description in SCD/SSD file
(All)	(All)
<ul> <li>SubstationHumboldtstr</li> </ul>	
- 👽 110kV	
ti Busbar 1	
t Busbar 2 ▼ t D01	
•	
Overcurrent	
✓ ∛ QA1	
▼ ☐ D010verCurrent1	
🔽 🎆 QA1QA1	
▼ 🖗 QA1CILO1	
🔷 🔶 Beh	
🔶 Bik	
🎤 BlkRef	
ClcExp	
ClcIntvPer	
✓ ClcIntvTyp	
ClcMod	
CicNith CicNitTimm	
/ ClcRfPer	15
/ ClcSrc	
🔪 ClcStr	
두 EnaCls	
🔷 EnaOpn	
🔶 Health	
🎤 InRef	
🏸 InSyn	
Mir	
Mod	
NamPlt	
🎤 NumSubin	ltv

## 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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### New in V9.30

#### Show details of "adapt data model" action; allow selection of details

**Top Down Engineering** 

Test 9.30 prelim  → IEC 61850 stations  → Import specification	
Select file C:\Users\nb242400\Wache\Temp\00_WoE_Data\2022-01-25     Elements from SCD/SSD     Description in SCD/SSD file	5-Helinks-2007B-VO-R003 modified  Attach DEX5 files Adapt data model Data flo Devices in DIGSI 5 Project Mapping Recommendation
Adapt data model Select import contents: Select all Adapt LD/LN/DO structure Import communication flow (Reports, GOOSE, SMV) Import setting values Import IED/LD/LN/DO descriptions	<ul> <li>Further Improvements:</li> <li>Improve automatic mapping of LNs and DOs</li> <li>Allow creation of DOs in Topology section</li> <li>Drag and Drop DOs to other LN in TDE Editor</li> <li>Display and create external signal Data Objects from SSD</li> </ul>
<ul> <li>✓ Mapped devices to import</li> <li>✓ Select all</li> <li>✓ D03BayControl1</li> </ul>	<ul> <li>Create user defined settings from SSD/SCD using library Functions</li> <li>More possibilities to adapt SIPROTEC device to special</li> </ul>
Import	requirements from SSD!

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# Usability

# Usability Show how sum of function points is calculated

#### **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

			Device information	Function points	Resource consumption	Logs	Diagnostic information
on point details							
on point details							
Function-points consumption							
0 40	Used						
نسور ا	2180						
🖥 REL_FlatRate 🛛 🚺 🍺 REL_G	CostPerinstance	0					
REL_Function	REL_Configured	d instanceREL_Total Function points					
🧃 Line	6	1320					
🧃 Pickup Z<	4	520					
🕶 🎚 Dis And DiffPrice		220					
21 Distance prot.	1						
21 Distance comp.	1						
87 Line diff. prot.	2						
🝯 50/51 OC-3ph-8	1	30					
🧃 67 Dir.OC-3ph-B	1	15					
67N Dir.OC-gnd-B	1	15					
🧃 Circuit breaker	3	9					
Disconnector	2	6					
🧃 Inrush detect.	1	5					
🕶 🗓 CFC							
AdvancedArithmetic	2	40					





## Support Asset Management: Provide List of devices with comments

	In	<b>V9.30</b>
Evv		V 3.30

Project tree					
Devices					
- 2					
	Demogeraet V8.30_V16_V16_V17_V	17_V17_V17_V17  ▶ REL_Asset inform	ation		_ # = ×
Name					
<ul> <li>Demogeraet V8.30_V16_V16.</li> </ul>					
🕂 Single-line configuration	<b>王 E S</b>				
📑 Add new device	Name	—	REL_Last modified by		REL_Product code/MLFB
🛗 Devices and networks		· (All)	(All)	(AII)	(All)
6MD85 V8.82	6MD85 V8.82		Unnamed User	1/4/2022 2:28 PM	6MD85-????-????????H01?1-121?2C-ABD000-000AC0-CB3BA1
6MD85 V8.83	6MD85 V8.83		nb242400	1/31/2022 2:08 PM	6MD85-????-????????H01?1-121?3A-AAA000-000AC0-CB3BA1
6MD86 CFC Test V8.83	6MD86 CFC Test V8.83		Unnamed User	3/17/2022 1:04 PM	6MD86-????-?????????H01?2-231?3B-AAA000-000AC0-CB3BA1-CG0
6MD86 Demogeraet PMU_	6MD86 Demogeraet PMU_1		nb242400	7/22/2022 2:43 PM	6MD86-DAAA-AA0-0AAAA0-AM0112-23113B-DBA000-000AC0-CB3BA
6MD86 Demogeraet PMU_	6MD86 Demogeraet PMU_V8.82	My Demo Device in Lab	nb242400	7/22/2022 3:04 PM	6MD86-DAAA-AA0-0AAAA0-AM0112-23113B-DBA000-000AC0-CB3BA
6MD86 sync 20	6MD86 sync 20		Unnamed User	11/5/2021 11:39 AM	6MD86-????-?????????H01?2-531?3B-AAA000-000AC0-CB3BA1-CB3CB
75J85	7SJ85		nb242400	1/19/2022 1:24 PM	7SJ85-????-??????H01?1-A2??3A-ABD000-000AC0-CB1BA1-CG0
75J85_IEC104	75J85_IEC104		nb242400	7/22/2022 2:43 PM	7SJ85-????-???????H01?1-13??3A-ABD000-000AC0-CB1BA1
75585_120101	75585		Unnamed User	5/24/2022 5:14 PM	7SS85-????-???-?HC1?1-13??3A-ABD000-000AC0-CC1BA1-CA1
<ul> <li>75383</li> <li>75X800</li> </ul>	5X800		nb242400	7/22/2022 2:44 PM	7SX8000-3AA50-1CA0
<ul> <li>IEC 61850 stations</li> </ul>					
REL_Asset information					
····					
Load configuration to devi	ces				
Load firmware to devices					
🔁 Upgrade project devices					
Import project					
Documentation settings					
Languages & resources					
🕨 🔚 Online access					



# Link to SIPROTEC Tools

Export TCF for download of configuration with SIPROTEC Tools

Use case for TCF (Total Configuration File) export



### New in V9.20

# Highlights

Load configuration to device independent from DIGSI

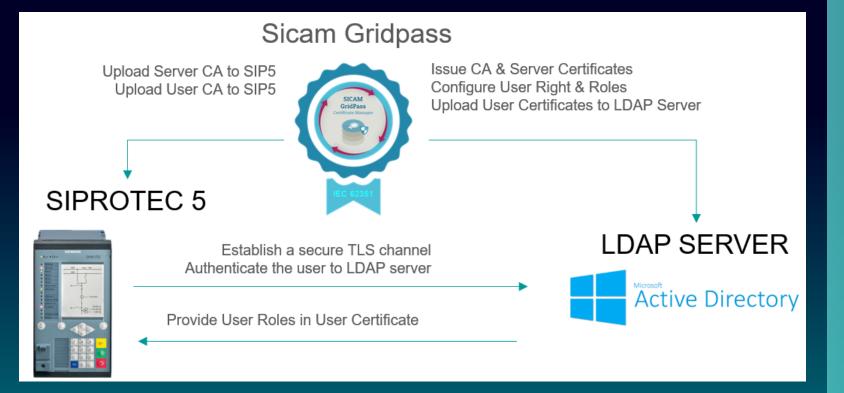
- Field engineer does not need DIGSI installation, just SIPROTEC Tools
- SIPROTEC Tools can handle different configuration versions without upgrade (TCF download to device available from SIPROTEC Tools V1.30)
- ✓ TCF file is signed



# Cybersecurity

# **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.

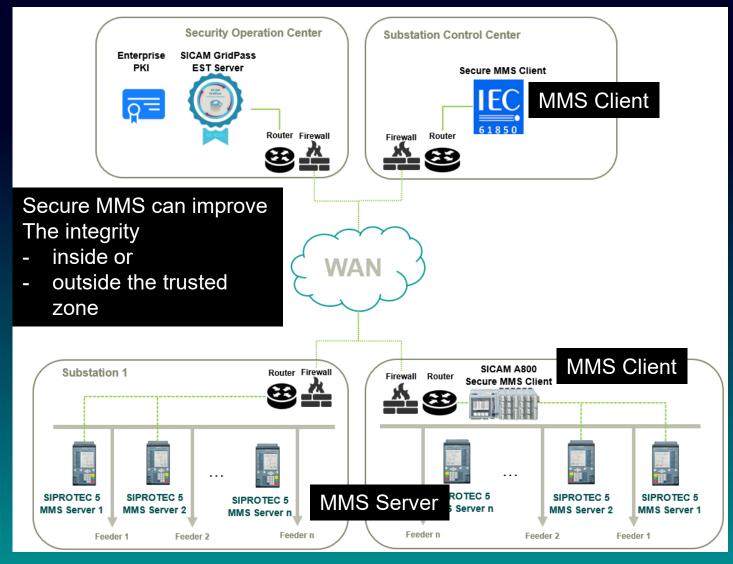
# Highlights

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



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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**New in V9.20** 

# Classless Function Points



# **SIPROTEC 5** Function Point Manager Classless Function Points



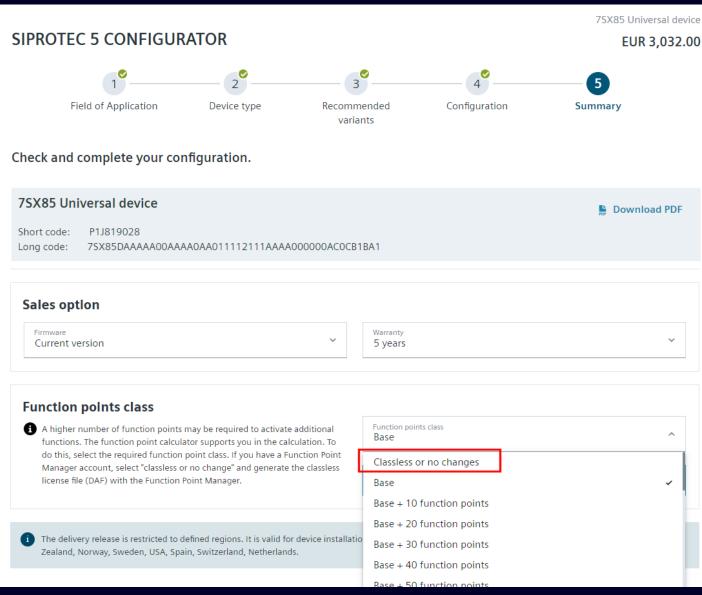
### New in V9.20

# 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.



# **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.



# Support for classless function points in DIGSI

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

• lest v9.20			1 4 /1		
🕂 Single-line configuration			When u	ploading a new DA	F to the
💕 Add new device		Activate device functionality	device	<b>DIGSI 5 will recogn</b>	ize the
🛗 Devices and networks				0	
▼ 📙 6MD86	2	Voltage variant: DC 60 V to 250 V, AC 100 V to 230 V	function	point type "classles	ss" or
둼 Device information		Integrated Ethernet interface (port J): DIGSI 5 connection and IEC 61850 in 🔻	class-bo	ound" and adjust the	e settina
📝 Hardware and protocols		Significant feature: <->No significant feature available for s -		,	sootting
💯 Measuring-points routing		Select function-point class or classless: Classless function points	accordi	ngly.	
Function-group connections					
🗰 Information routing		Enter function points: 100			
🔻 👆 Settings					
📝 Device settings		Copy settings group for device			
🎐 Time settings					
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🕨 💐 VI 3ph 1					
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			Significant feature:	<no available="" feature="" fo<="" significant="" td=""><td>or s ▼</td></no>	or s ▼
		Select function-po	oint class or classless:	Classless function points	<b>•</b>
			Enter function points:	Classless function points	
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				Base + 125	
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		Constal		0030 - 175	



### **Disclaimer**

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# Contact

Published by Siemens AG

Yelitza Rojas

Product Portfolio Consultant Smart Infrastructure Electrification and Automation Humboldtstr. 59 90459 Nuernberg Germany Mobil +49 15221847859 E-Mail yelitza.rojas@siemens.com LinkedIn-linkedin.com/in/yelitza-rojas

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