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SIPROTEC 5 Application Note

SIP5-APN-008:
Enhanced IEC 61850 GOOSE features in SIPROTEC 5 devices

Answers for infrastructure and cities.

SIPROTEC 5 - Application: SIP5-APN-008 Enhanced IEC 61850 GOOSE features in SIPROTEC 5 devices

Content

1 Enhanced IEC 61850 GOOSE features in SIPROTEC 5 devices

1.1 Summary

This application describes enhanced IEC61850 GOOSE features available in SIPROTEC5 devices together with DIGSI 5. It intends to make Siemens users aware about new engineering and testing possibilities of their GOOSE configurations in order to use new GOOSE functionalities and speed up the project delivery with the highest project quality.

1.2 Application Introduction

GOOSE communication has been used successfully in the past years in a lot of different applications. SIPROTEC 5 devices with IEC61850 provide you not only the same GOOSE possibilities than SIPROTEC 4 devices, but also offer you additionally new features, especially helpful for testing or interoperability.

Following GOOSE applications have been field proven in the past years:

- Busbar protection schemes with overcurrent (reverse interlocking)
- Substation Interlocking
- Intertripping
- Load shedding
- ...

Besides being conform to IEC 61850 Ed1 and Ed2 and therefore interoperable with other IEDs (including SIPROTEC 4 devices), SIPROTEC 5 devices together with DIGSI 5 offer following new features:

- Flexible GOOSE engineering via the GOOSE Editor
- Advanced testing features via the support of more quality bits
- Diagnostics

1.2.1 Flexible GOOSE engineering via the GOOSE Editor

Integrated IEC61850 System Configurator

No need to jump anymore from an IED tool to a separated System Configurator. Intuitive engineering in few steps.

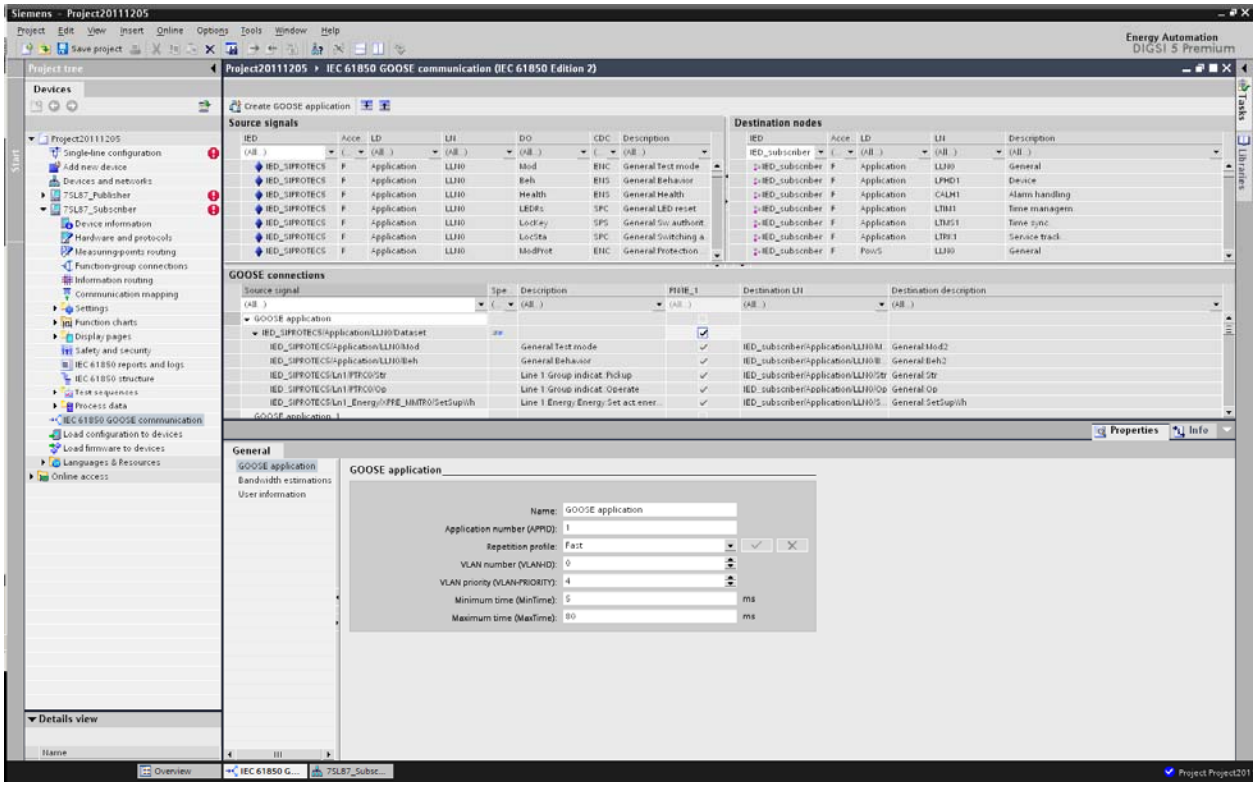


Figure 1: DIGSI 5 – Integrated GOOSE Editor

Use of different communication modules.

For users who want to separate physically the GOOSE communication or run different communication protocols (GOOSE; MMS, DNP 3 TCP), SIPROTEC 5 support several communication modules. One module could be used e.g. exclusively for GOOSE.

During your GOOSE engineering you have the possibility to send the GOOSE in any of those subnets.

Highest flexibility at GOOSE publisher

As used in DIGSI 4, GOOSE applications remain fully configurable.

GOOSE Datasets can be now assigned to any LLN0 of the IEC61850 structure.

Any Data Attributes (including. stSeld, t) can be published if required by IED subscribers (for example if timestamp needed)

Information can even be send as complete Data Objects at the Functional Constraint level (ST or MX).

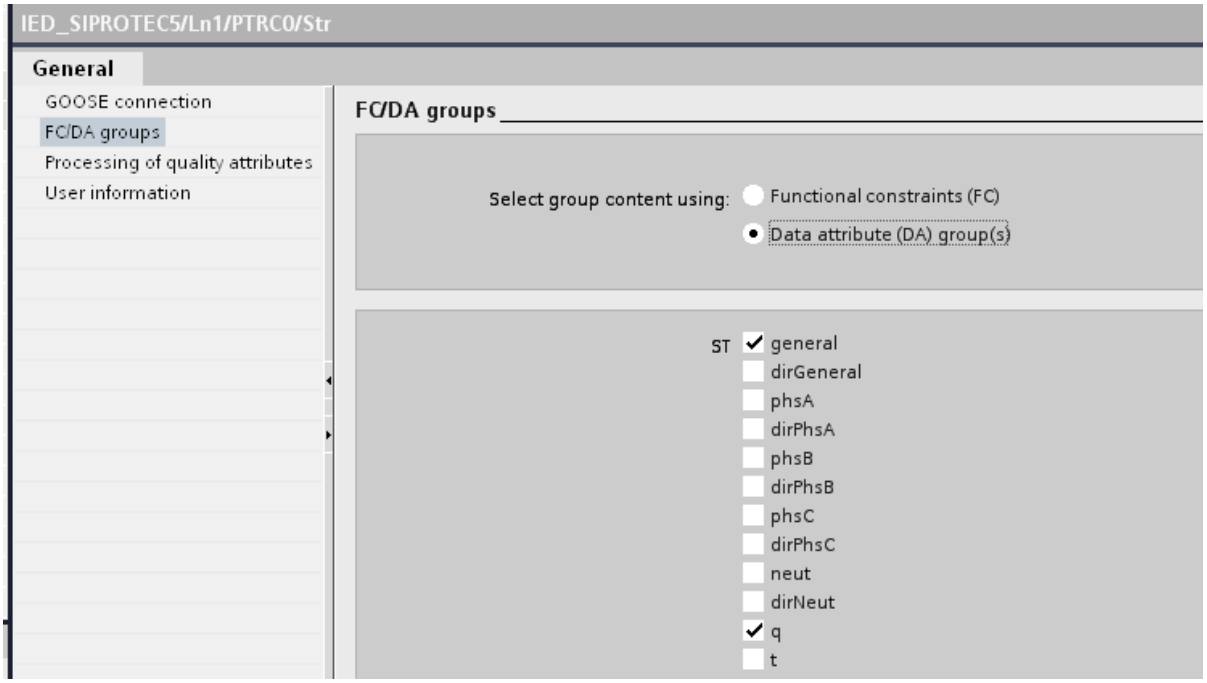


Figure 2: DIGSI 5 and SIPROTEC 5 – High flexibility for configuration of GOOSE Data Attributes

2-in-one: Edition 1 or Edition 2

SIPROTEC 5 devices can be configured in Edition 1 mode in case of extensions of existing IEC61850 substations, or support by default Edition 2.

The use of LDname provides you further engineering flexibility and makes a step forward to the concept of interchangeability.

Automatic creation of signals on subscriber side

No need to create external signals or use virtual outputs anymore, advanced GOOSE engineering according IEC 61850-6 is now available via drag&drop of a Logical Node to the published signal.

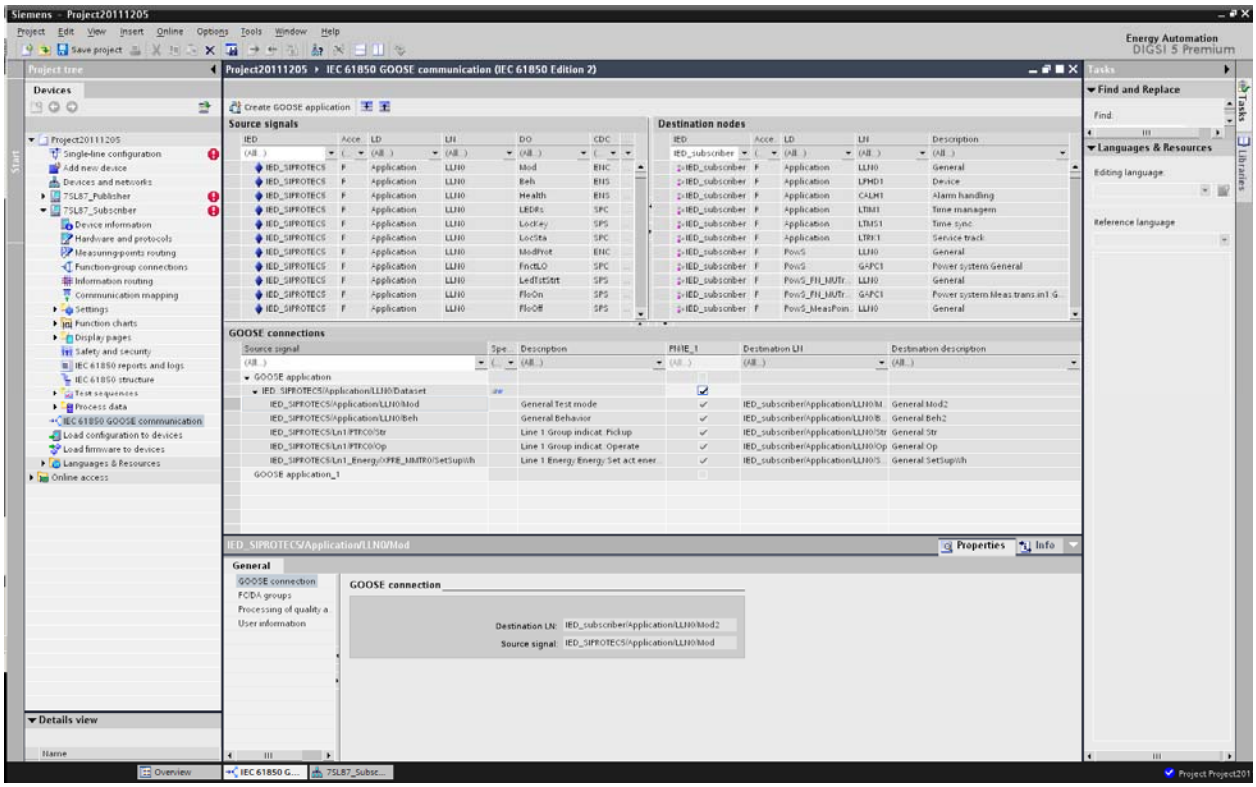


Figure 3: DIGSI 5 with full support of IEC 61850-6 for GOOSE subscription

Bandwidth estimator

In an IEC61850 system, GOOSE messages cause most of the communication traffic. DIGSI 5 provides an indicator monitoring the expected GOOSE bandwidth depending on what is configured. This makes the user easily aware of the situation to let him decide if configuration optimization or network segregation as defined in IEC 61850-90-4 should be used.

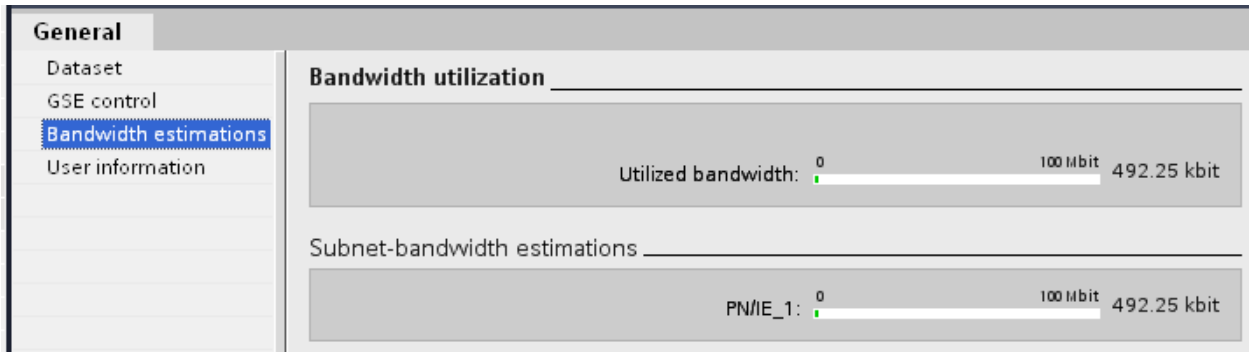


Figure 4: DIGSI 5 - Bandwidth estimation of GOOSE messages

SED – export and import for intersubstation GOOSE

IEC 61850-90-1 communication goes beyond the substation communication by supporting substation to substation communication. SCL files - called Substation Exchange Descriptions (SED) support the exchange of GOOSE – messages between substations.

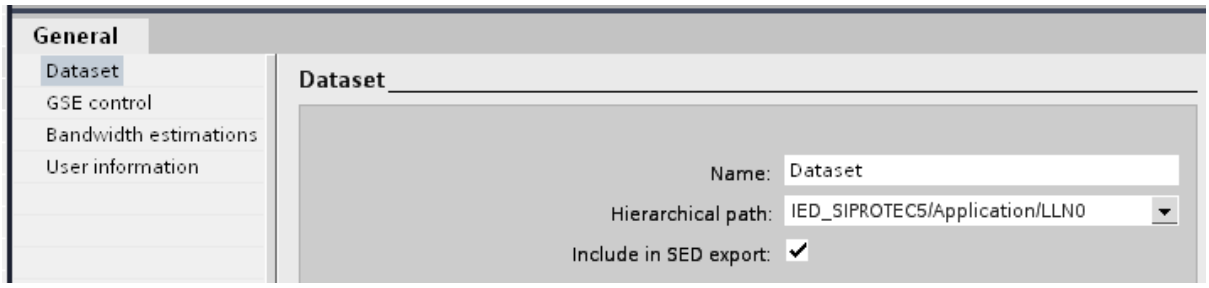


Figure 5: Support of Edition 2 SCL files for easy GOOSE exchange via SED

1.2.2 Advanced testing features

Several modes of operation

Additionally to the default standard process mode, DIGSI 5 allows you online to switch the IED to a mode which supports enhanced testing (commissioning mode and simulation mode).

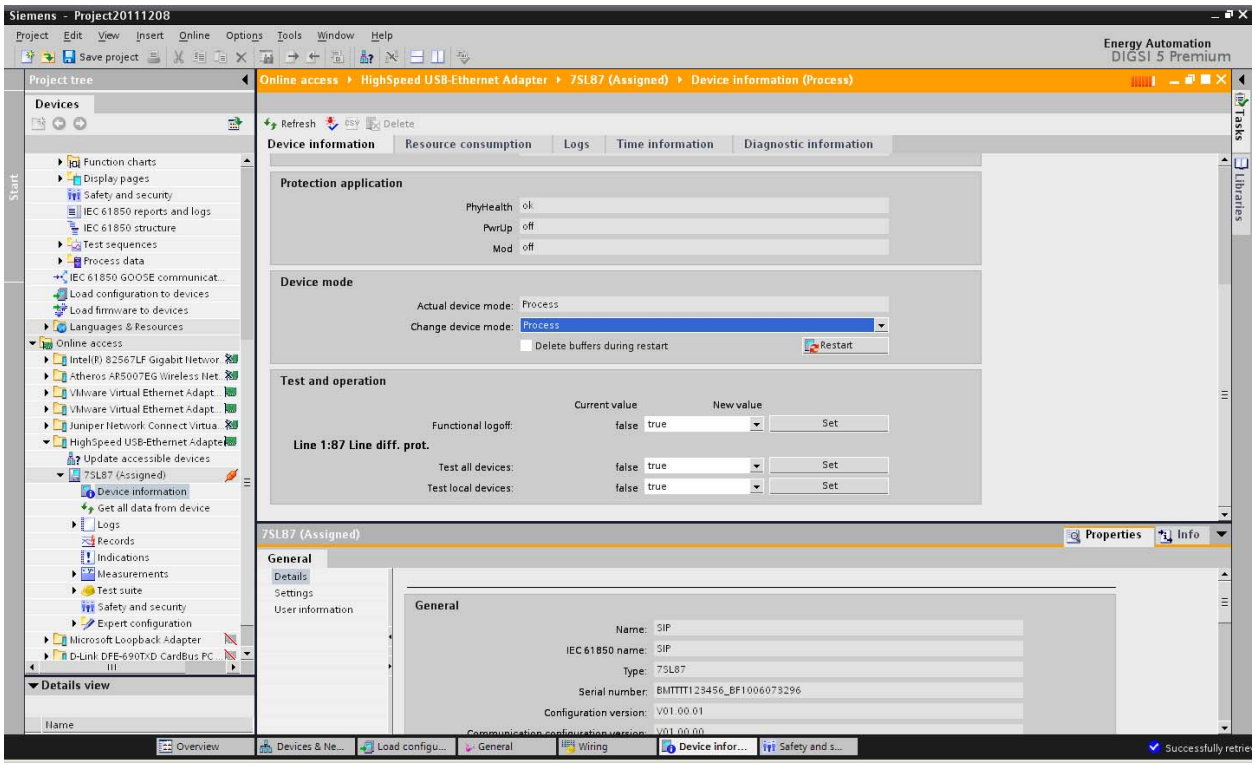


Figure 6: DIGSI 5 online – choice of operating mode for the device

In commissioning mode, values can be forced to all their states, which make a point-to-point test of signals at communication level easily possible without interacting with the process values.

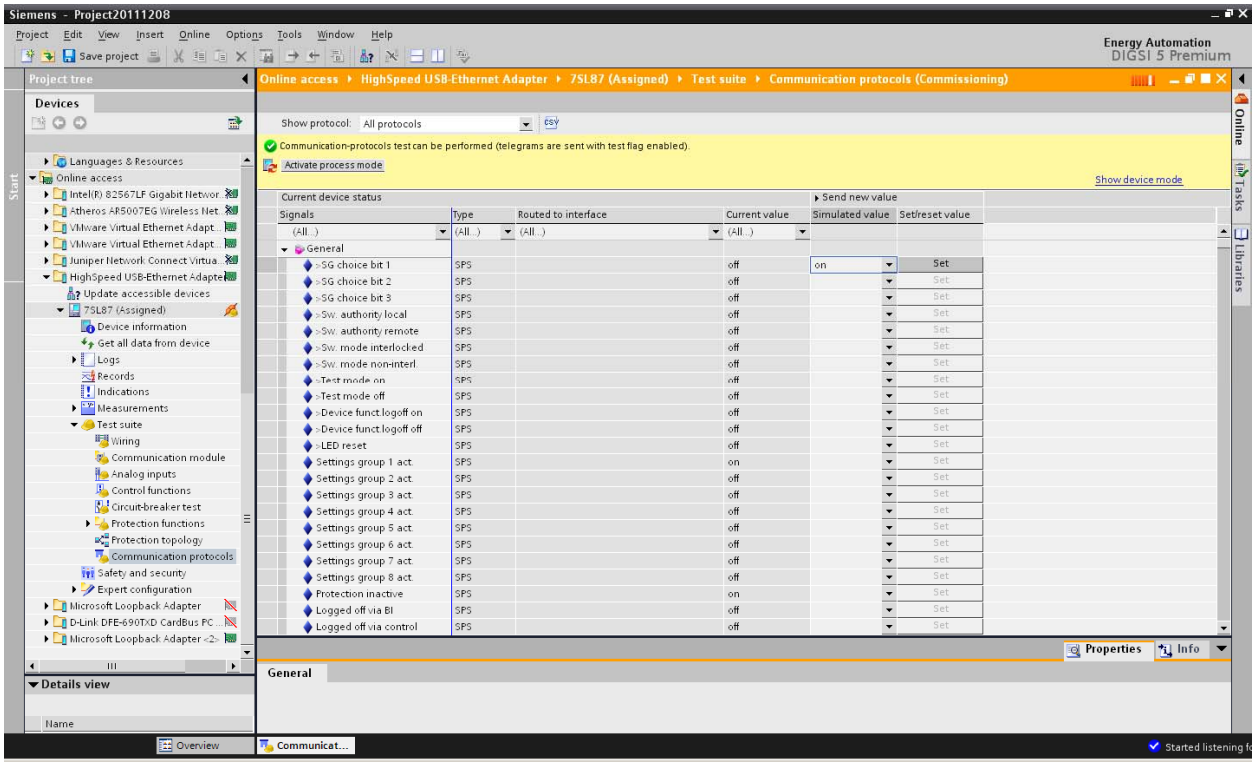


Figure 7: Commissioning mode for point to point communication test

The simulation mode allows you to test real conditions without changing the process values neither binary inputs nor analog measurements. The values are generated by the simulation unit which simulates analogue input value and binary input values. Also CFC input signals can be simulated.

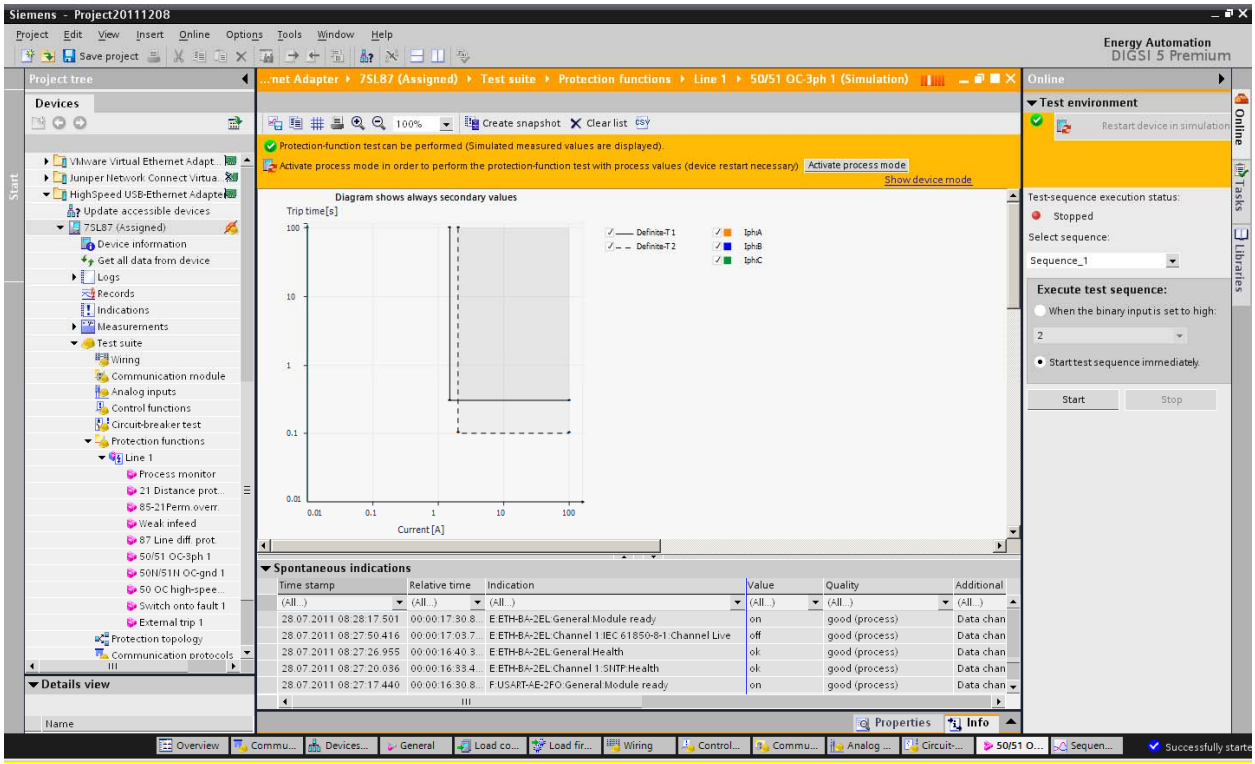


Figure 8: Simulation mode for sequence testing during maintenance

Functional Logout

Before going to maintenance, a SIPROTEC 5 can be set in functional logout state via binary input to alert its neighbours.

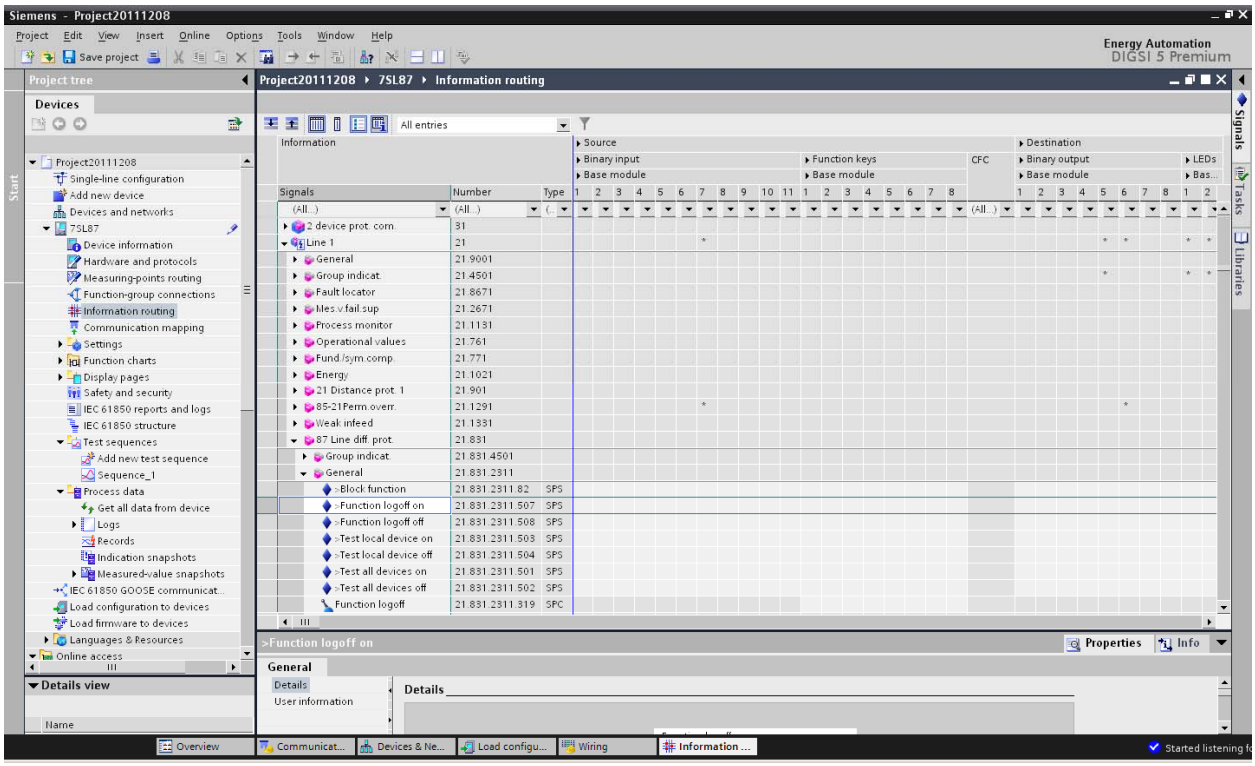


Figure 9: Activation of the Functional Logout state via binary input

GOOSE messages are then send with the quality bit operator Blocked. IED subscribers – which are alerted – can process the quality bits accordingly.

Quality processing for GOOSE subscriber

SIPROTEC 5 provides an advanced testing feature to allow the use to substitute values when the signal quality at GOOSE subscriber is invalid or operator blocked.

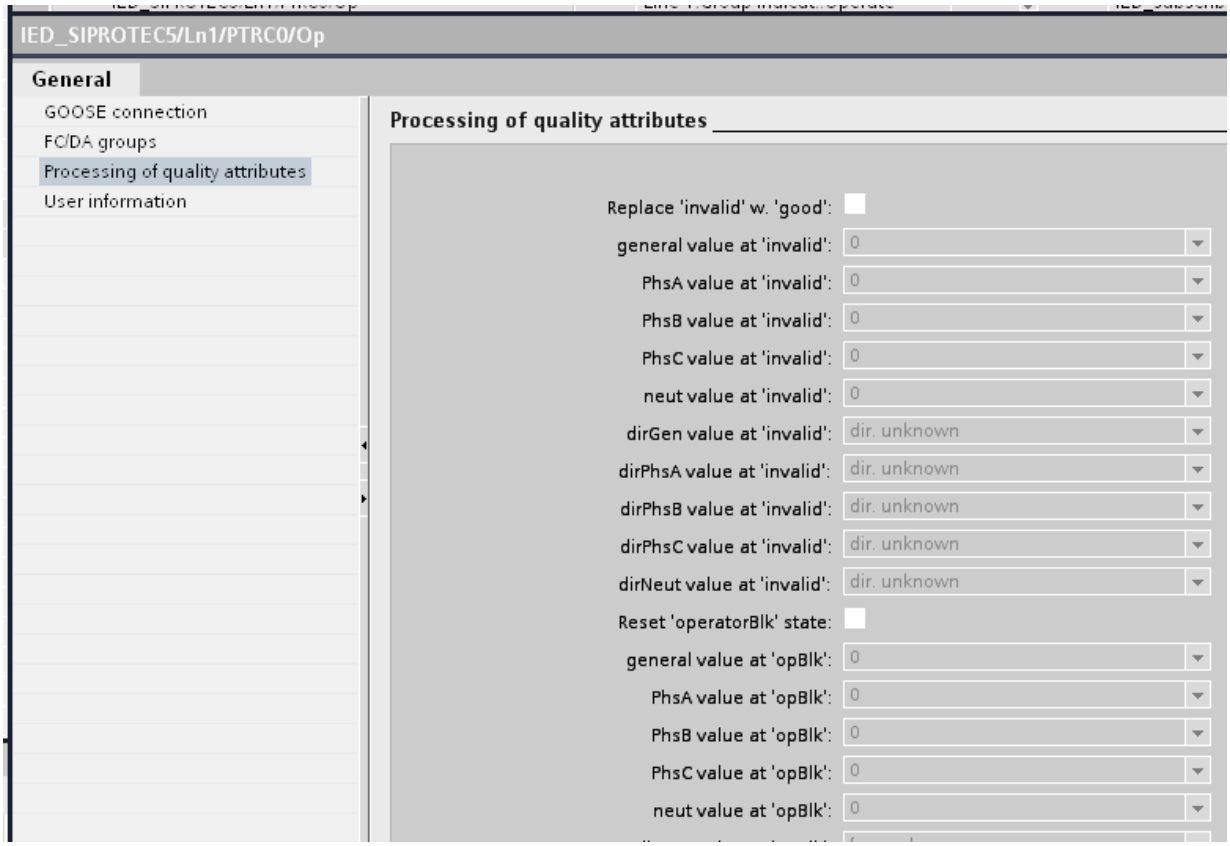


Figure 10: Setting of substitution values for Quality ´Invalid or ´Operator blocked´

1.2.3 Diagnostics feature

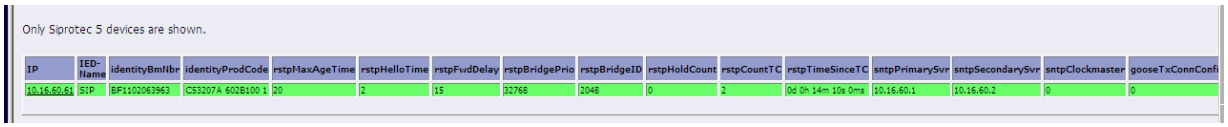
GOOSE Monitoring

GOOSE Inspector provides you not only with SIPROTEC 4 but also with SIPROTEC 5 the analysis about the GOOSE traffic based on the SCL files. Actually it will decode Ed1 GOOSE messages. A further version will support the monitoring of Ed. 2 of IEC 61850 GOOSE – messages.

Simple Network Monitoring Protocol

DIGSI 5 allows you to activate SNMPv3 in SIPROTEC5 relays for an optimal network monitoring with a secure standard.

Used with Netview, you can easily monitor over SNMP the relevant SIPROTEC 5settings (e.g. RSTP or GOOSE mismatch). Additionally, firmware version, product code or fabrication number is available to support you while doing your asset management.


Only Siprotec 5 devices are shown.

IP	IED-Name	identityBmNbr	identityProdCode	rstpMaxAgeTime	rstpHelloTime	rstpFwdDelay	rstpBridgePrio	rstpBridgeID	rstpHoldCount	rstpCountTC	rstpTimeSinceTC	sntpPrimarySvr	sntpSecondarySvr	sntpClockmaster	gooseTxConnConfi
10.16.60.61	SIP	BF1102063963	C53207A 602B100 1	20	2	15	32768	2048	0	2	0d 0h 14m 10s 0ms	10.16.60.1	10.16.60.2	0	0

Figure 11: Monitoring of SIPROTEC 5 devices with Netview over SNMP V3 protocol

1.3 Conclusion

Advanced features in SIPROTEC 5 and DIGSI 5 support users efficiently with the GOOSE handling over the lifecycle of the system from the GOOSE communication possibilities and engineering to the testing.

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