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IEC 61850 Top-Down Engineering
Import from SSD/SCD file in DIGSI

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APN-093, Edition 1

Content

1   IEC 61850 Top-Down Engineering

1.1 Introduction

The IEC 61850 series standard defines not only the communication system and data model in the substation, but also the engineering process for substation automation system based on IEC 61850. This is defined in the part IEC 61850-6. A Substation Configuration Language (SCL) based on XML is defined and allows to describe the different parts of the communication system like the data modelling, communication parameters, communication exchange like GOOSE, Reports, etc. between the different devices as well as topology and functions needed in the system. According to the engineering process the SCL file can be used during the specification phase allowing a vendor independent specification of the system based on IEC 61850 in a process known as Top Down Engineering, which begins with a vendor independent specification based on the IEC 61850 and ends with the complete engineering of the system with a vendor system. During this process there are different SCL files which are used to describe the system, and which are used to exchange engineering information between the different tools involved in this process. In the first phase, the so-called System Specification Tool (SCT) is used for developing the IEC 61850 system specification. The result of this phase is a SCL file containing the requirements of the substation automation system. This file can be given to the vendors during the offer phase as part of the RFQ, so that the vendors can check if they can fulfill the requirements, or it can be used later as engineering input during the implementation phase following the engineering process as described in the IEC 61850-6.

The vendors will receive this file containing the IEC 61850 system specification requirements and will have to implement them in their systems. For doing this, the vendors tools should be able to import this file and support the engineering of the system in an automated way.

The Top Down engineering approach brings some benefits:

- Standardized system specification based on IEC 61850
- Vendor independent specification
- Faster engineering by importing the system specification file (SSD/SCD)
- Reliable engineering -> less manually entry necessary. Data model, Logical Device names, Logical Node Prefix, communication parameters are taken over from the system specification file. No need to type them manually, which decreases the chance of errors and saves time.
- Engineering cost savings
- Templates can be generated during the specification by defining the different typicals
- Speed up the engineering by fast mounting the specified templates and building the system

1.2 Top Down Engineering with DIGSI 5

DIGSI 5 supports you by creating the device data model according to the IEC 61850 system specification file (SSD/SCD) created with the System Specification Tool (SCT).

When importing an IEC 61850 system specification file into DIGSI 5, it tries automatically to match the existing data model in the chosen device with the data model specified in the SSD/SCD file. I.e., Logical Devices and Logical Nodes are mapped automatically to the correspondent ones in the device. If the proposed match doesn't fill the requirements, then it is possible to change them easily to another mapping. Furthermore, DIGSI 5 supports you with the following functionalities:

- Specified Logical Nodes and Logical Devices which are not available in the device can be created automatically. Data Objects and Data Attributes related to the Logical Nodes are also created automatically.
- Logical Node prefix and Logical Node Instances are taken over automatically from the specification.
- Logical Device Names are taken over automatically from the specification
- Logical Device Instances are renamed automatically to match the specification
- GOOSE and Report configuration are taken over from the specification by the mapped device
- The IEC 61850 IED Name is taken over from the specification by the mapped device
- Communication configuration parameters like IP Addresses are taken over from the specification by the mapped device

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DIGSI 5 supports you in automating and speeding up the IEC 61850 engineering process by importing the IEC 61850 specification file (SSD/SCD) in an automated way.

1.3 Steps for importing the IEC 61850 system specification in DIGSI 5

You start the import process by selecting "Import Specification" under the menu "IEC 61850 Stations".
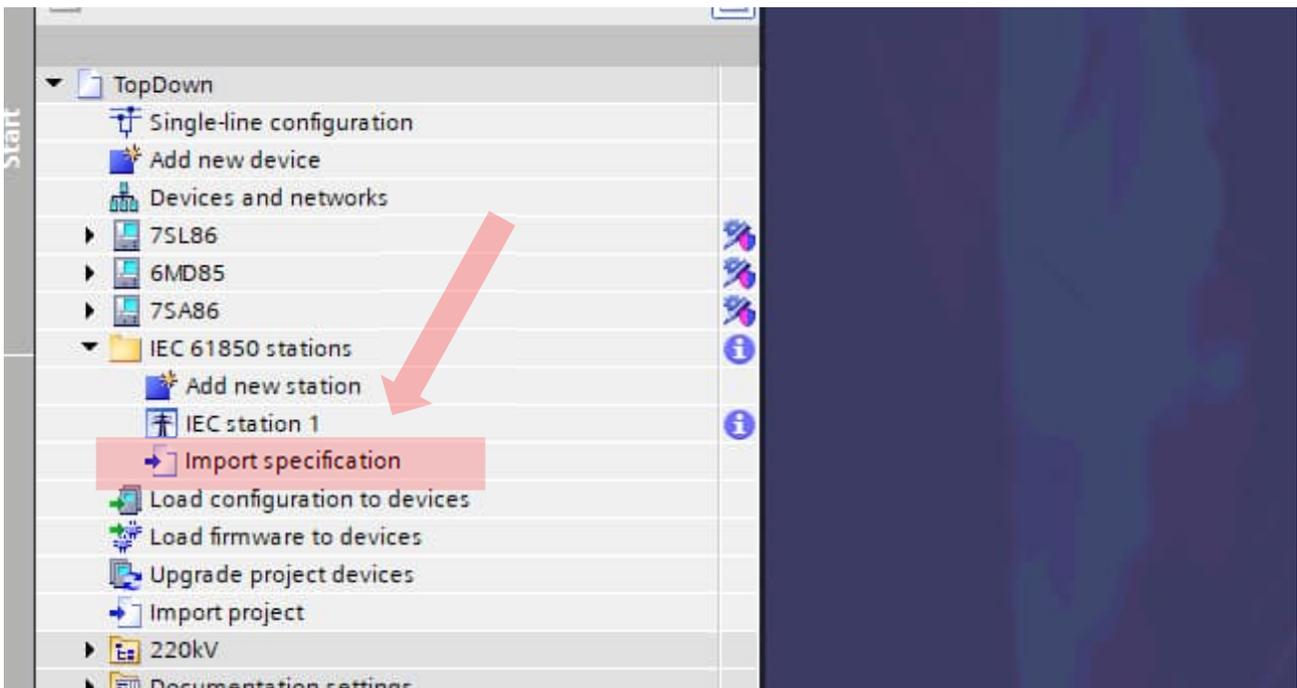

In the window "IEC 61850 Stations -> Import Specification" you can select the SSD/SCD file to be imported.
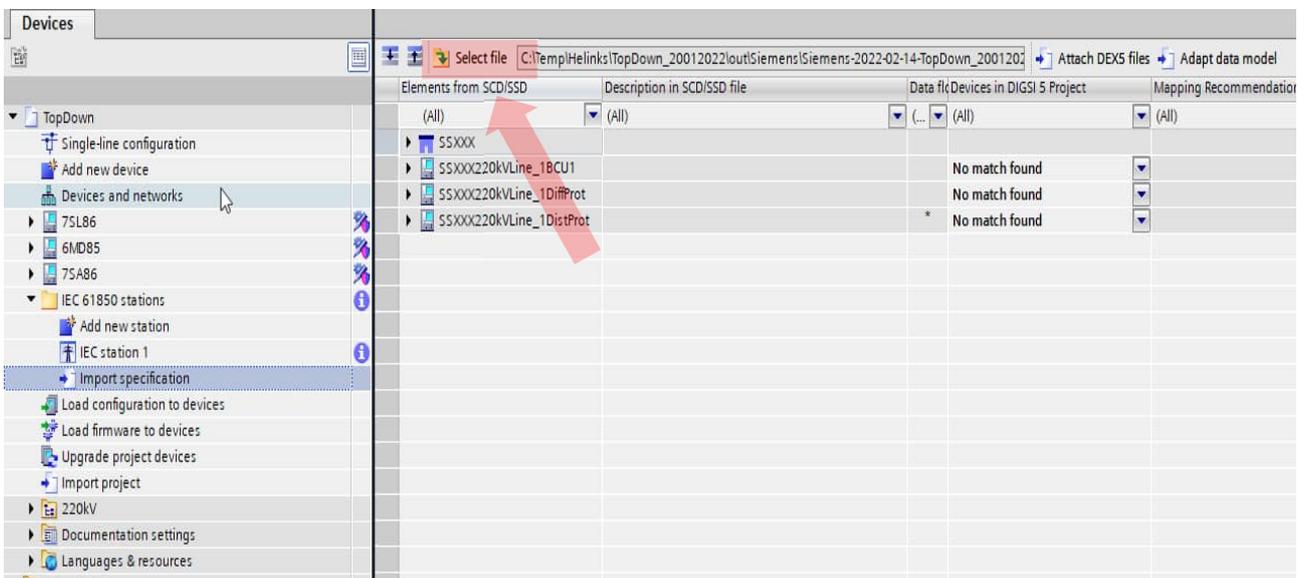
After selecting this file, you will see at the left side of the window the devices contained in the specification and their data model.

Logical Nodes available in the specification

Logical Devices available in the specification
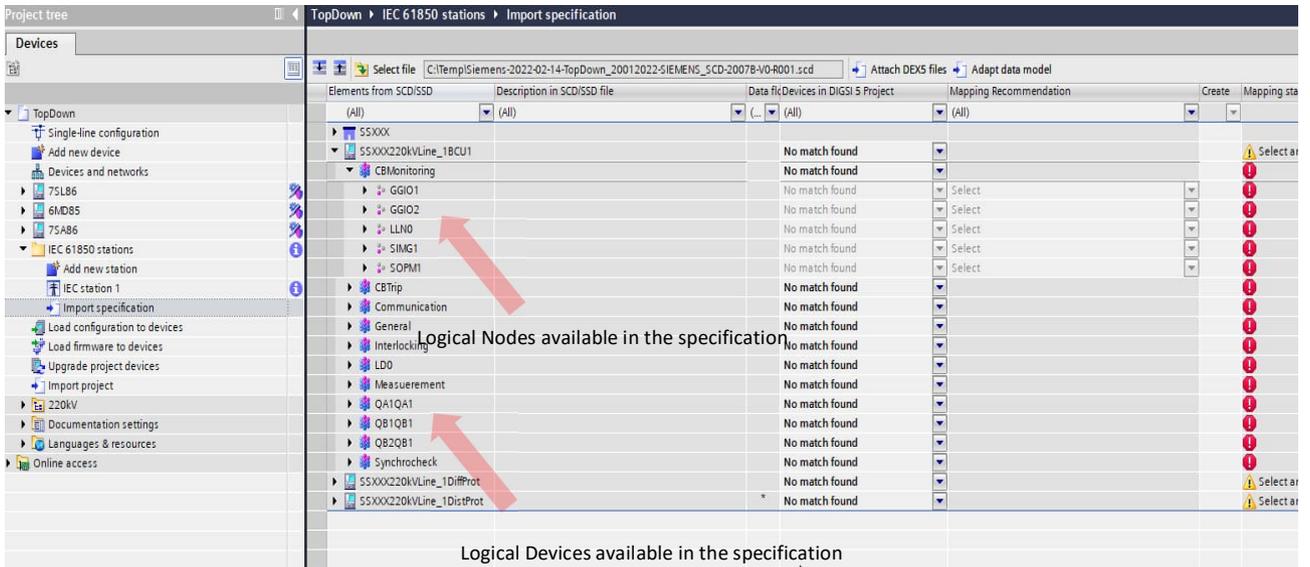
Now you can choose which device from your project corresponds to the device in the specification.

Devices available in the project that can be used to fulfill the specification
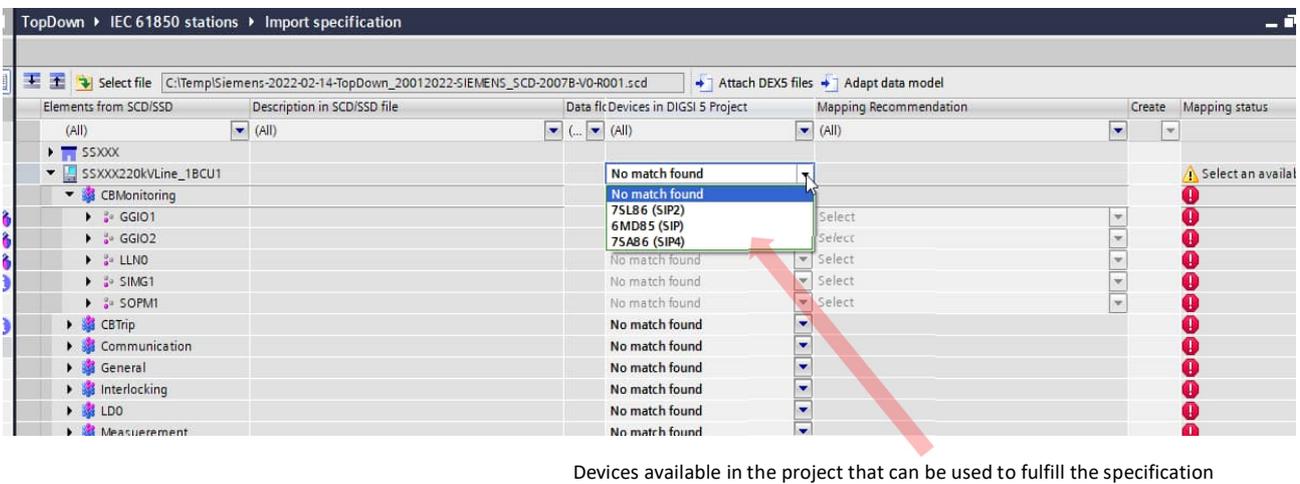
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When you have done this DIGSI 5 tries to match the Logical Devices and Logical Nodes in the specification with the ones available in the device. DIGSI 5 shows you what could be mapped.
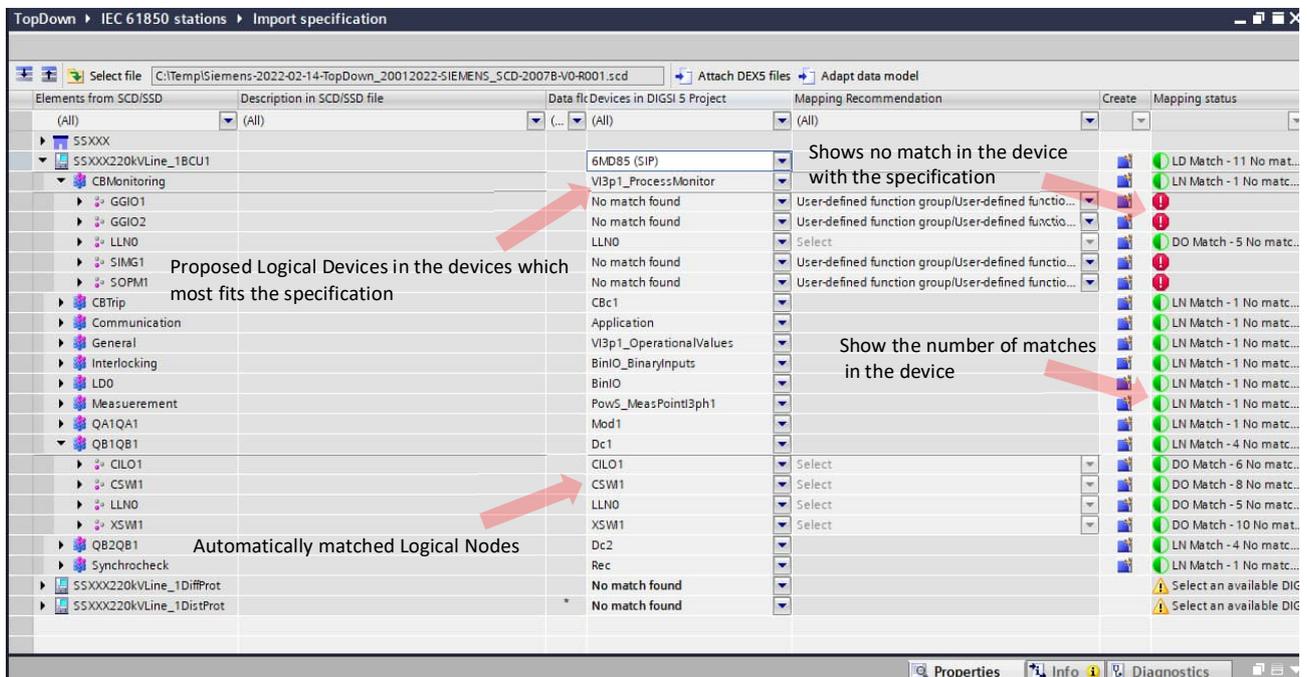
If the proposed mapping doesn't fit to your specification, you can change it easily through the drop out menu.
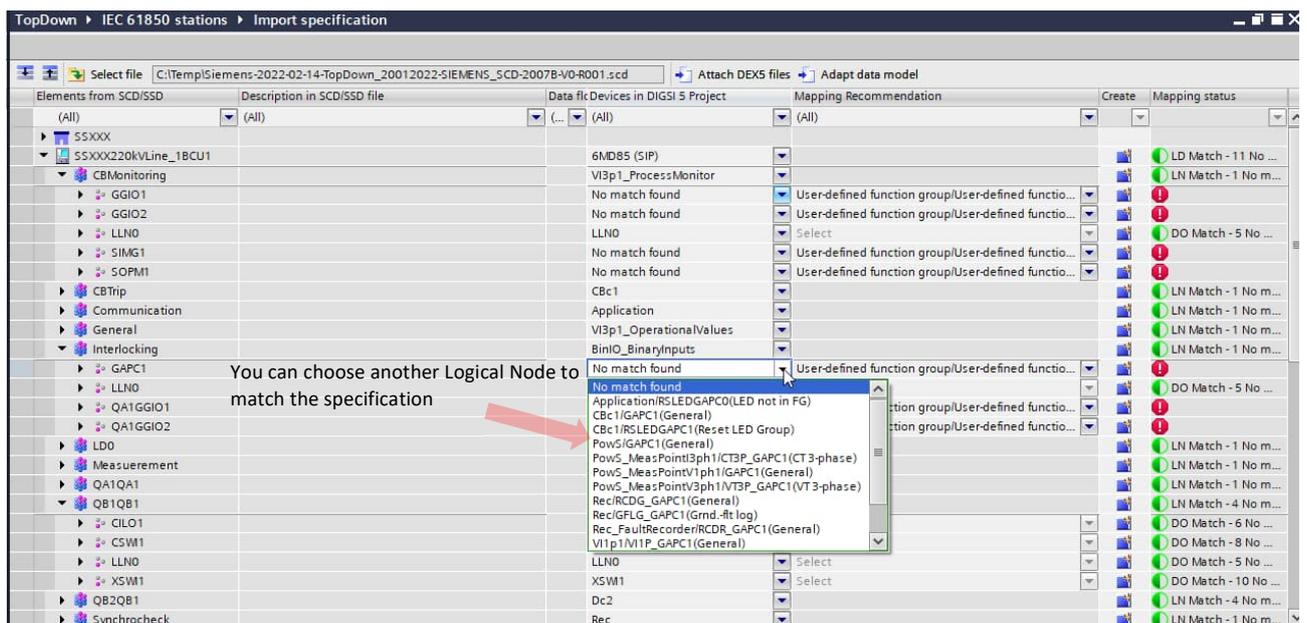
Logical Devices and Logical Nodes in the specification which could not be mapped in the device can be created automatically, either individually or together with a button click.
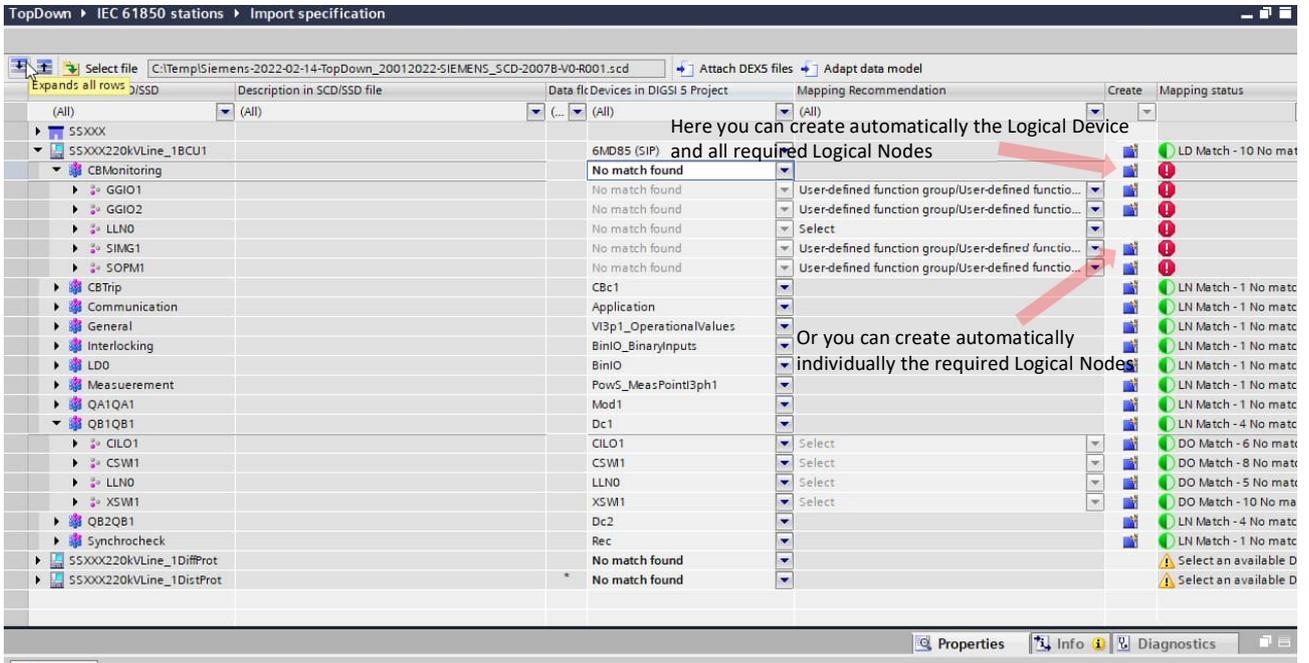
After creating the Logical Nodes and Logical Devices you can see the mapping in the window.
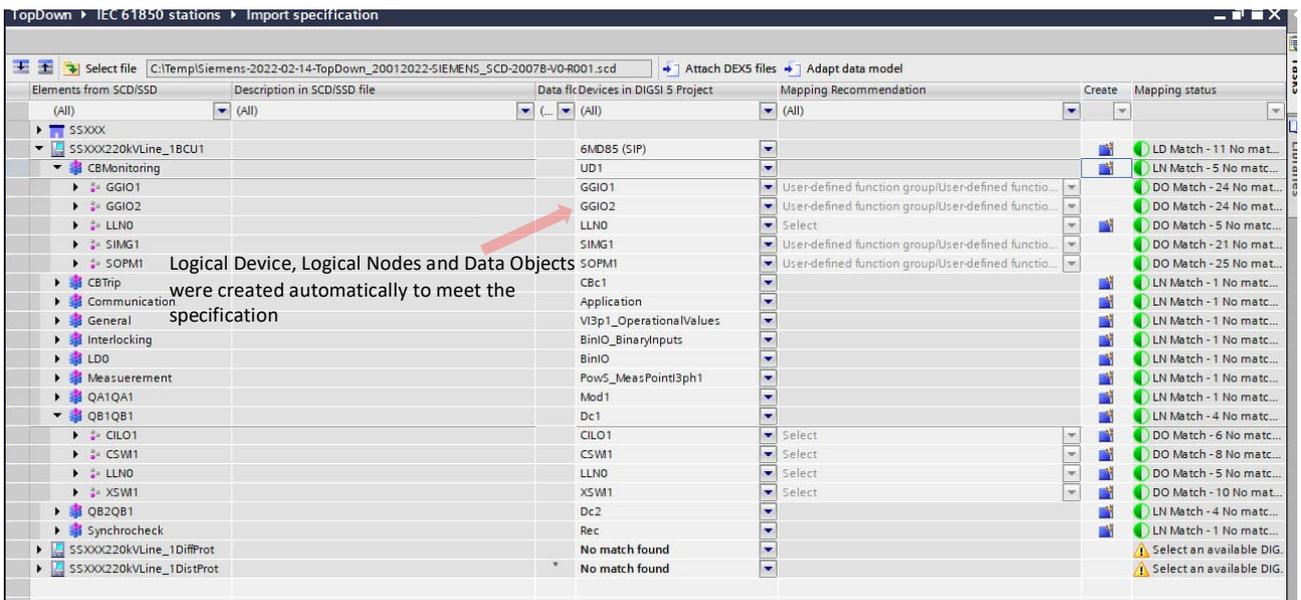
After you have finished to all your mapping you can adapt the device model according to this map by clicking in the button "Adapt Data Model".

With the button „Adapt Data Model" the data model in the device will be adapted to the data model in the specification
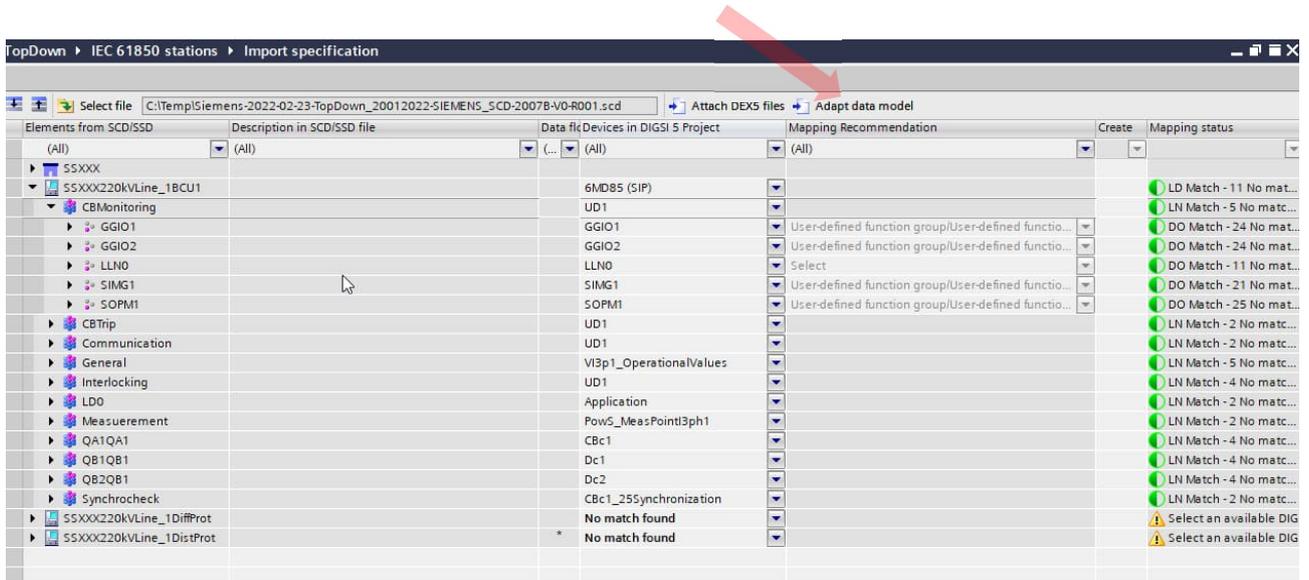
Logical Device in the device has been renamed according to the specification.

Logical Device name in the SIPROTEC 5 device was renamed to the Logical Device Name in the specification
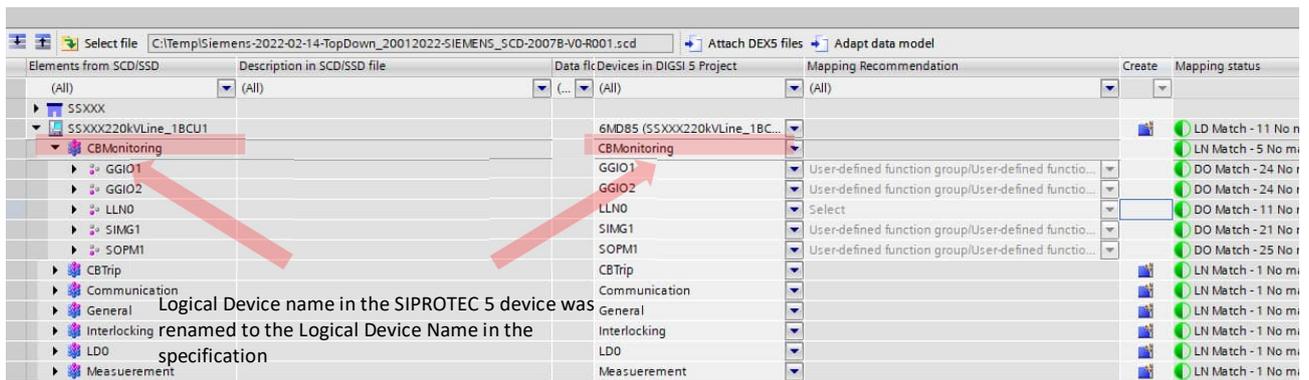
Other parameters have been taken over automatically from the specification.
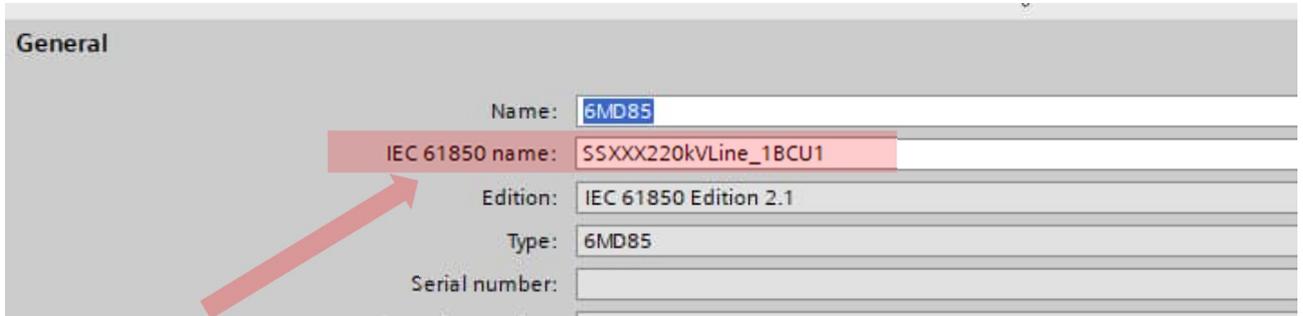
IEDName has been taken over automatically from the specification
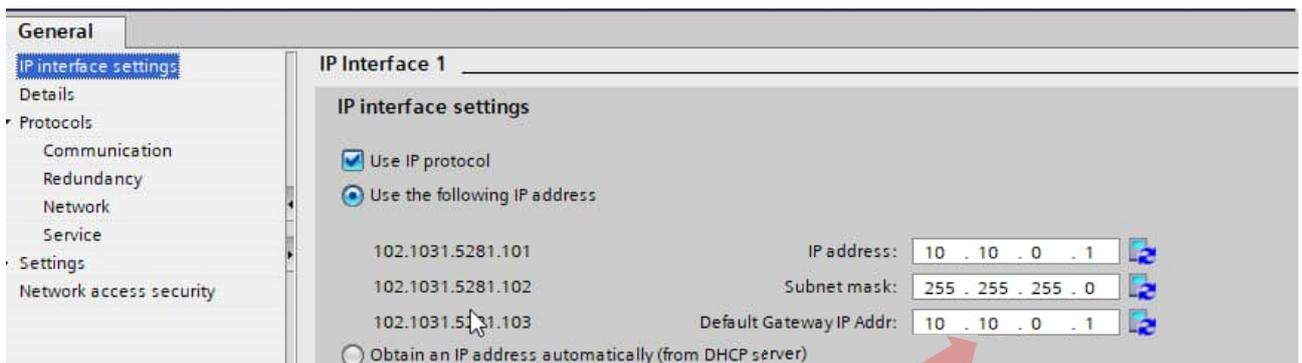
Communication parameters are taken over automatically
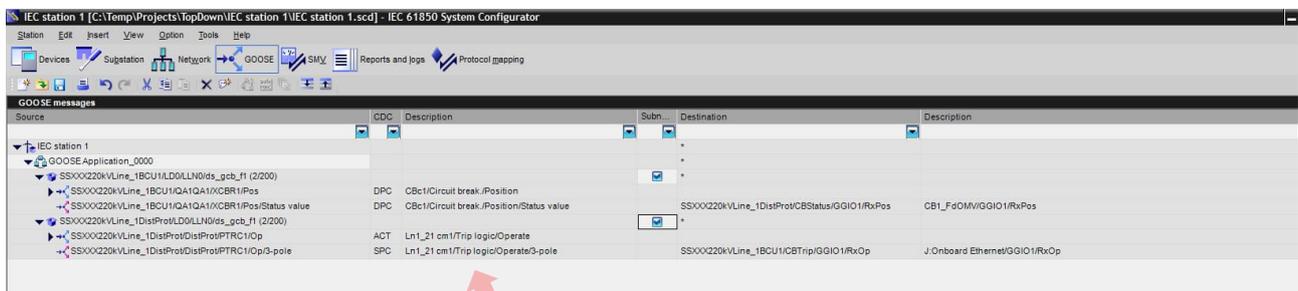
GOOSE exchange in the specification is taken over during the import.

2 Summary

DIGSI 5 support you by importing your IEC 61850 system specification file created with the system specification tool, providing you a quick and reliable engineering of your substation automation system based on IEC 61850 and saving engineering costs.

For all products using security features of OpenSSL, the
following shall apply:
This product includes software developed by the OpenSSL
Project for use in the OpenSSL Toolkit.
(http://www.openssl.org/)
This product includes cryptographic software written by
Eric Young (eay@cryptsoft.com)
This product includes software developed by Bodo Moeller.