Study Committee B3

Substations and Electrical Installations

Paper PS3_10917_2022

Application of IEC61850 – a DNO approach

Zigor Ojinaga i-DE Spain

Maria Anzola i-DE Spain

David Macdonald i-DE Spain

How can we industrialize the engineering process of a SAS system

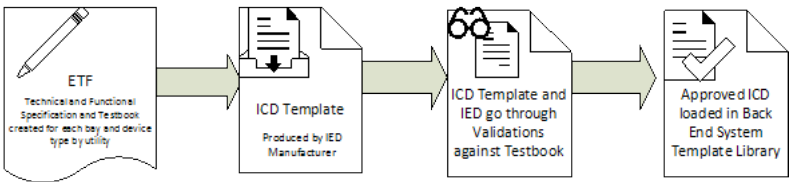
- Standardise Input data
- Optimised Production Tools
- An Error Control System
- Minimal human intervention – "one click configuration"

The Standardised Input Data: Pre-Engineering Work

ICD template contains info. per manufacturer IED and bay type. It needs a definition of:

- Standard primary equipment and busbar topologies
- Protection and control criteria
- Substation and HMI criteria

Functional specification and testbook per IED and bay type



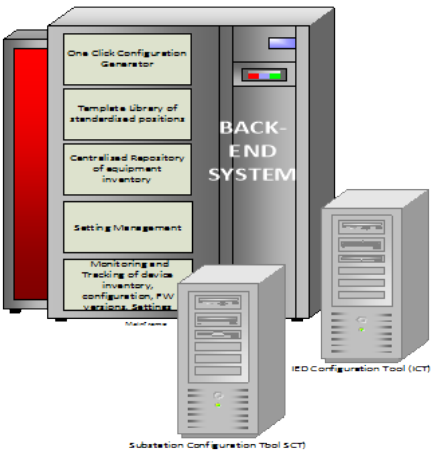
Optimized Production Tools: The Back End System

The back-end system produces the Project Information File (CNF) as input for the SCT. It needs:

- The standardised bay types and single diagram (SSD)
- Server section: ICDs to be imported and IED names
- Networking section: comm. parameters (MMS/IP and Goose interfaces)
- Goose matrix section
- Report Control Block section

The back-end receives the initial scope of the project and coordinates the communication with other systems

Only one data source guarantees consistency and no errors



Study Committee B3

Substations and Electrical Installations

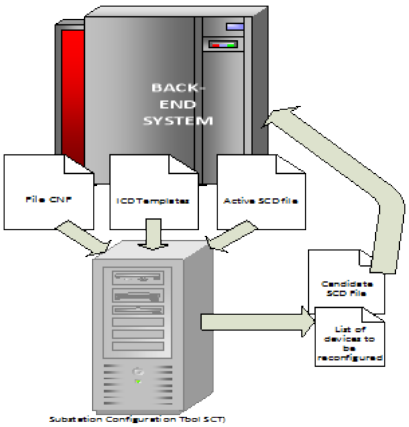
Paper PS3_10917_2022

Application of IEC61850 – a DNO approach

Optimized Production Tools: Creation of a SCD file

The SCT receives a command line call to produce the SCD without any human intervention:

- Reads and checks the CNF file
- Imports and validates the ICDs
- Instantiates the IEDs, assigns IED names and sets the comm. parameters
- Assigns the RCB to clients
- Subscribes Goose messages according to the matrixes

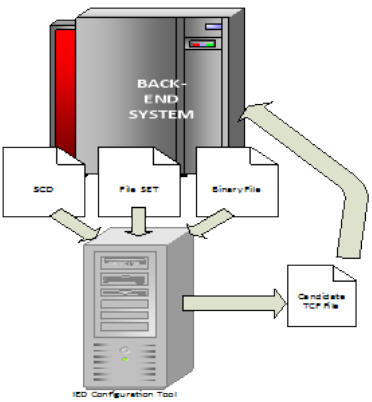


Optimized Production Tools: Creation of Automated IED Configuration

The IED Configuration Tool (ICT) creates the Total Configuration File (TCF):

- Imports the SCD file and extracts the CID for the device
- Imports the particular Setting File (settings can be 61850 modelled or not)
- Imports a specific Binary File (optional template)

The ICT connects to IED in order to load the TCF, upgrade the firmware and check inventory info. and versioning



Study Committee B3

Substations and Electrical Installations

Paper PS3_10917_2022

Application of IEC61850 – a DNO approach

Error control systems

SCT

- Comparison with active SCD
- Validates ICD templates and Input File CNF

ICT

- Validates Settings File
- Validates SCD from SCT

Factory Acceptance test

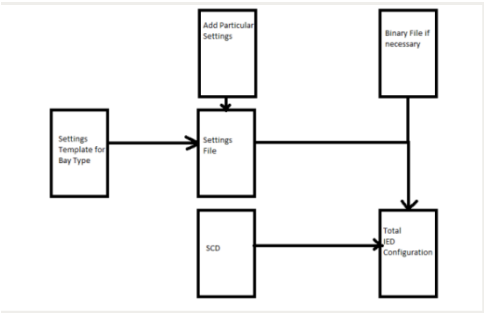
- Definite Device Configuration
- IP address comparison

Back-end System Database

- Track and Trace
- Configuration Hash
- Timestamps
- Configuration Comparison

Minimal human intervention Settings Process

- Separate particular Settings File
- XML
- Editable from our Back End System
- Templates created for Manufacturer, IED and Bay Type with 90% settings pre-defined
- Back End System tracks the Who and When of settings changes
- SCD does not become obsolete after setting change



Results

- Automated Engineering for the configuration of the IED, GTW and HMI
- SCD in minutes not hours!
- 50% reduction in engineering costs and testing time with a high quality
- Standardised configuration process, 61850 file types (SCL) and a standard bay type engineering make it possible
- Remote automated process. E. g., Firmware upgrades can be remotely batch processed
- Utility has taken control of the engineering process. No longer dependent on manufacturers for re-engineering of Gateway or HMI
- Efficiencies also achieved for the complete lifecycle of the SAS (operation, maintenance, retrofit,..)