IEC 61850 Conformance Test Service

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INFO TECH offers

- **IEC 61850 conformance testing of server IEDs**
- Full coverage for all conformance test cases of **Edition 1** and **Edition 2**
- Automated testing environment – INFO TECH **61850 Tester System**
- Detailed test report with communication log for each test case
- Test service based on our experience in:
  - implementing the IEC 61850 source code library,
  - implementing communication interfaces in over 20 devices with confirmed conformance to the standard,
  - technical assistance to deploy IEC 61850 communication in tens of substation installations.
- Over 10 devices tested during the last 2 years
- **INFO TECH certificate issued after passing the test**

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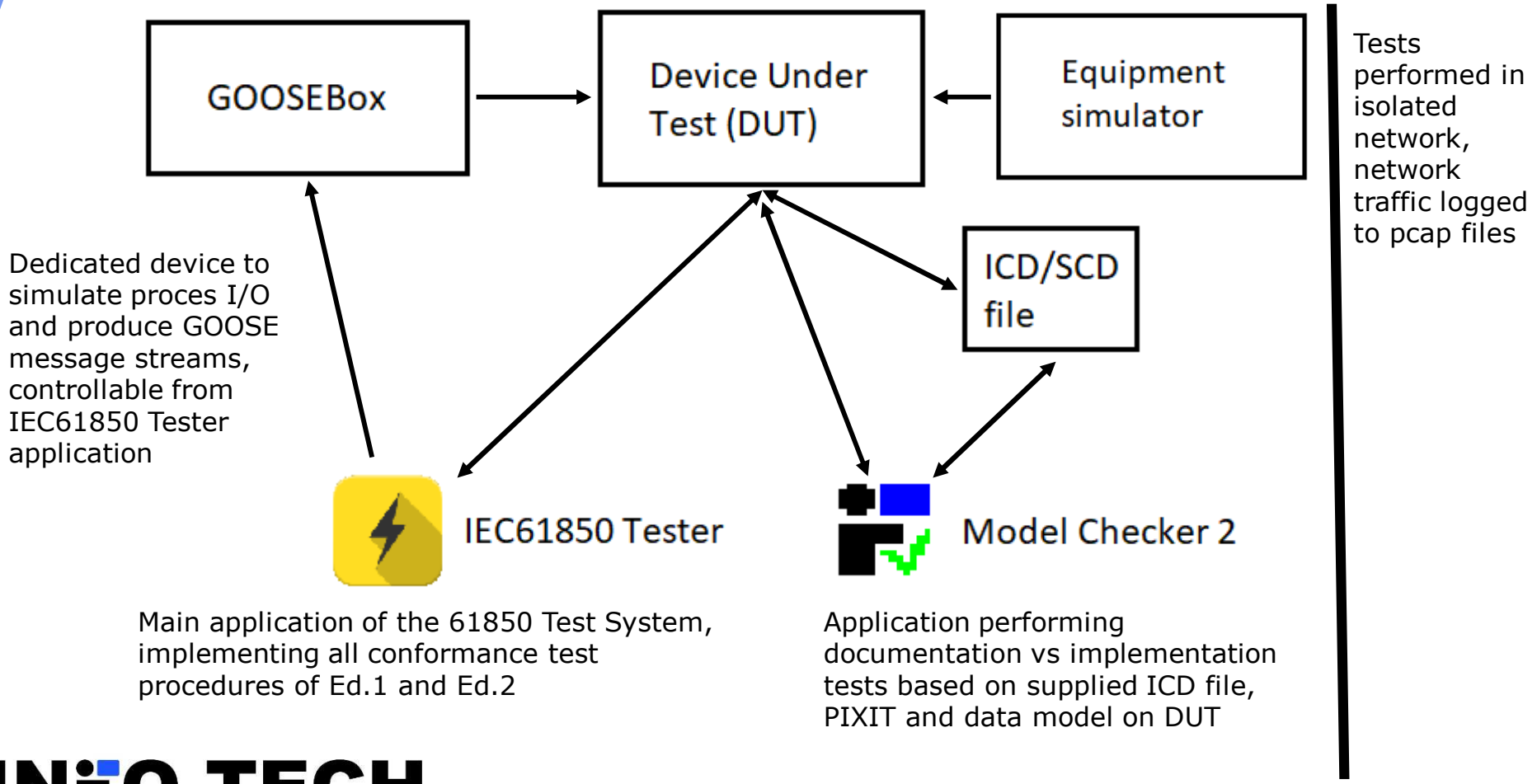
INFO TECH 61850 Tester System – testing environment



Dedicated device to simulate proces I/O and produce GOOSE message streams, controllable from IEC61850 Tester application

Tests performed in isolated network, network traffic logged to pcap files

Main application of the 61850 Test System, implementing all conformance test procedures of Ed.1 and Ed.2

Application performing documentation vs implementation tests based on supplied ICD file, PIXIT and data model on DUT

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61850 Tester – Basic features

- Automated testing
- Full coverage of IEC 61850 conformance test procedures defined for Edition 1 and for Edition 2 of the standard
- Each test case is represented by a script written in Python
- Editor for creating and modifying test scripts
- Logging of communications with DUT
  - Packet capure to .pcap file
  - Errors and warnings to text file
- Easily configurable for different DUTs

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61850 Tester – Basic features

- IEC 61850 client based on INFO TECH Library (DirectMMS part) with Python wrapper
- GOOSE communication library written in C++ with Python wrapper
- Time synchronization test cases written in Python
- The power and flexibility of Python applied to build test scripts

```
lst = list(map(list, itertools.product([0, 1], repeat=9)))
lst = [[0]+x for x in lst]
lst = list(filter(lambda x: Util_FilterSupported(x, suppLst),lst))

DirectMMSWrapper_ClearReports(1)
print('sBr2.1 Client configures an available BRCB using SetBRCBValues
```

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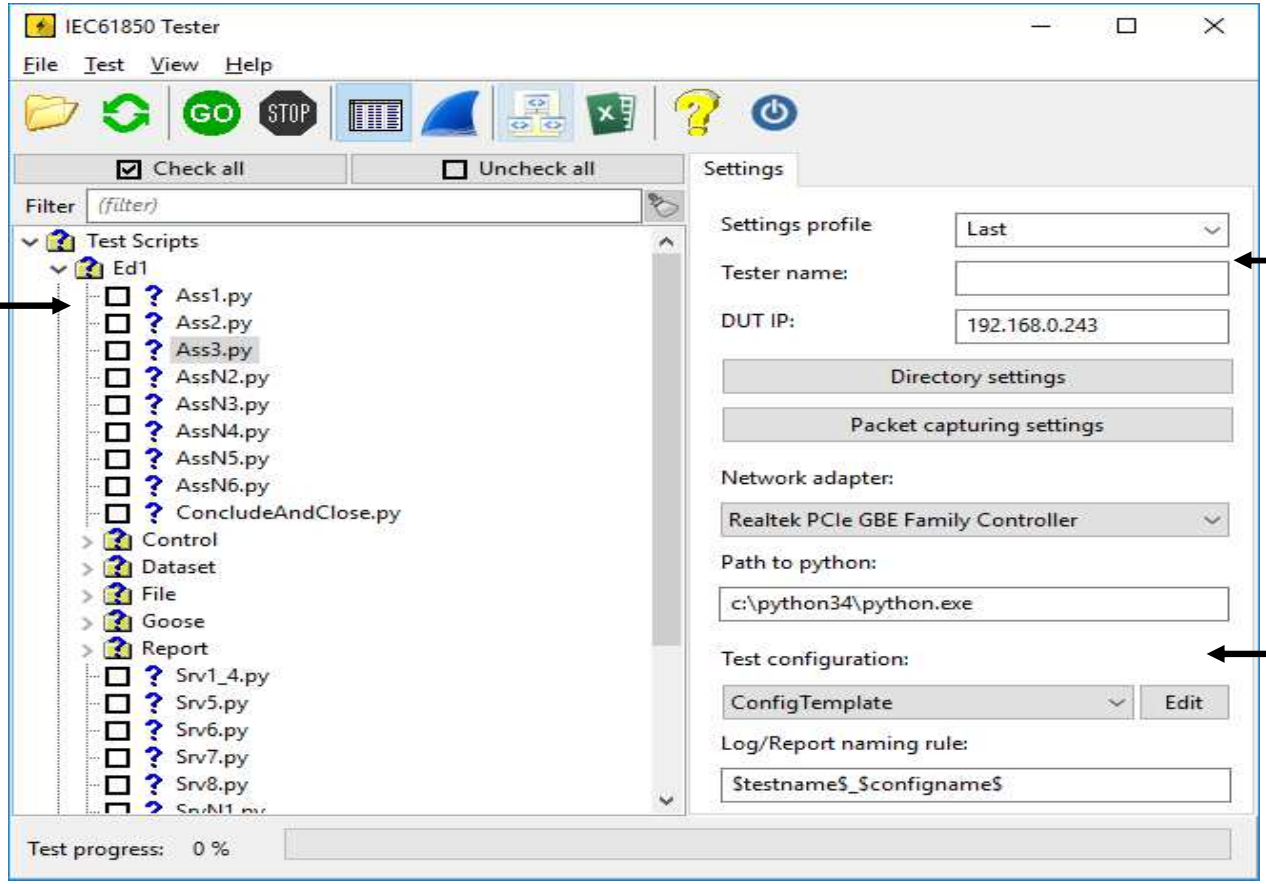
61850 Tester – Initial View



List of all test cases with clear status indication

Easily configurable main settings

Dedicated test configuration for each DUT.

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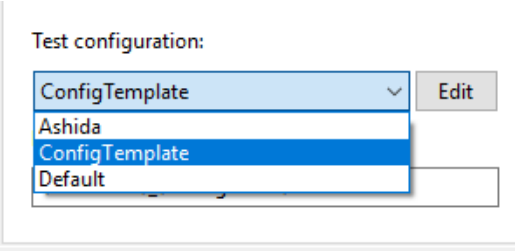
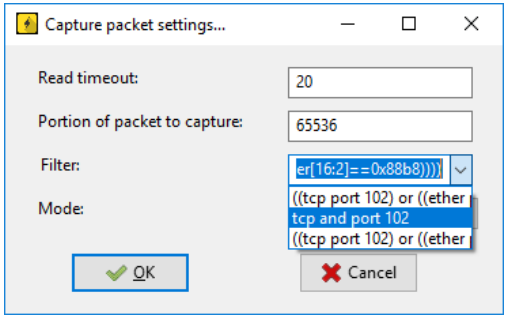
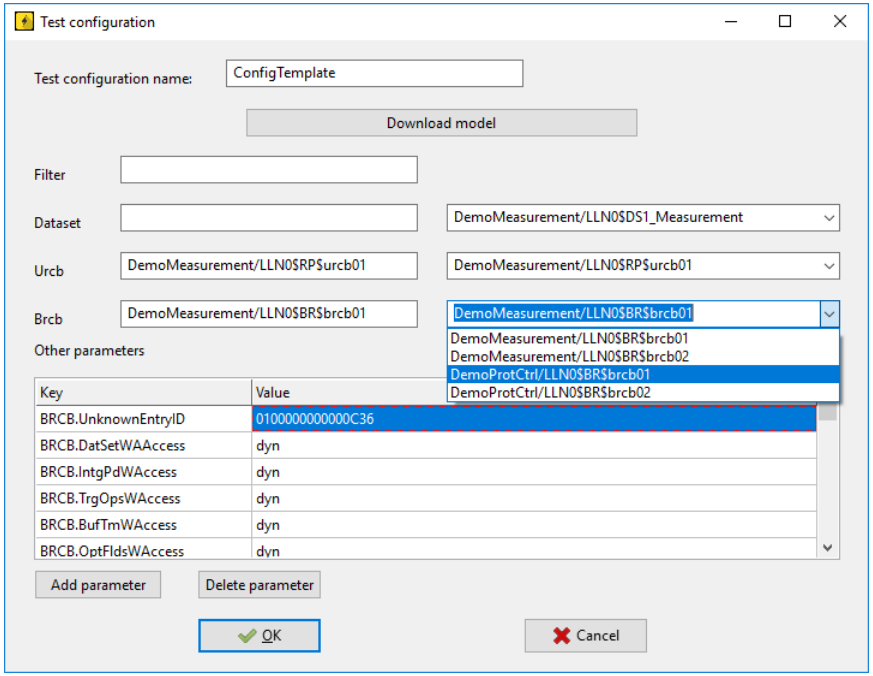
61850 Tester – Configuration

Selection of test configuration for DUT



Packet capture settings with lists of capture filters





Editable configuration files. DUT data model can be imported and used for test configuration.

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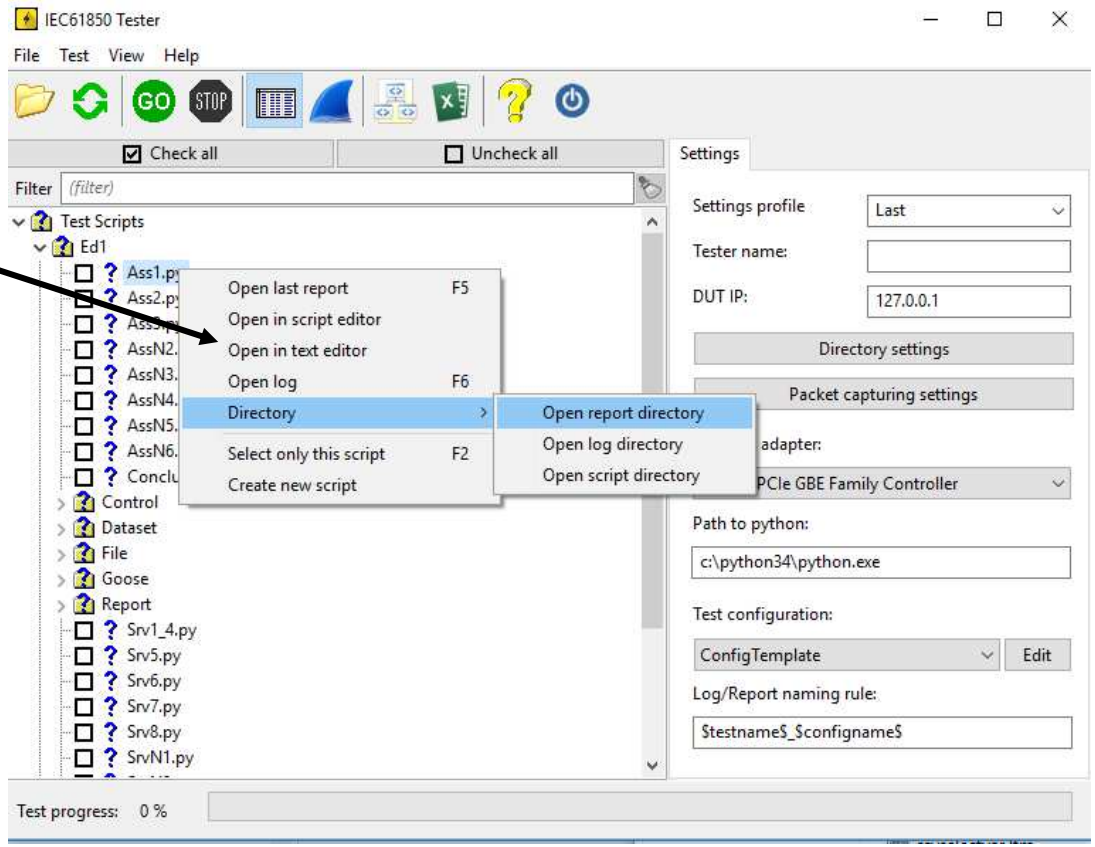
61850 Tester – Files

Test case implementation in script file.
Test case results in log file and report file.



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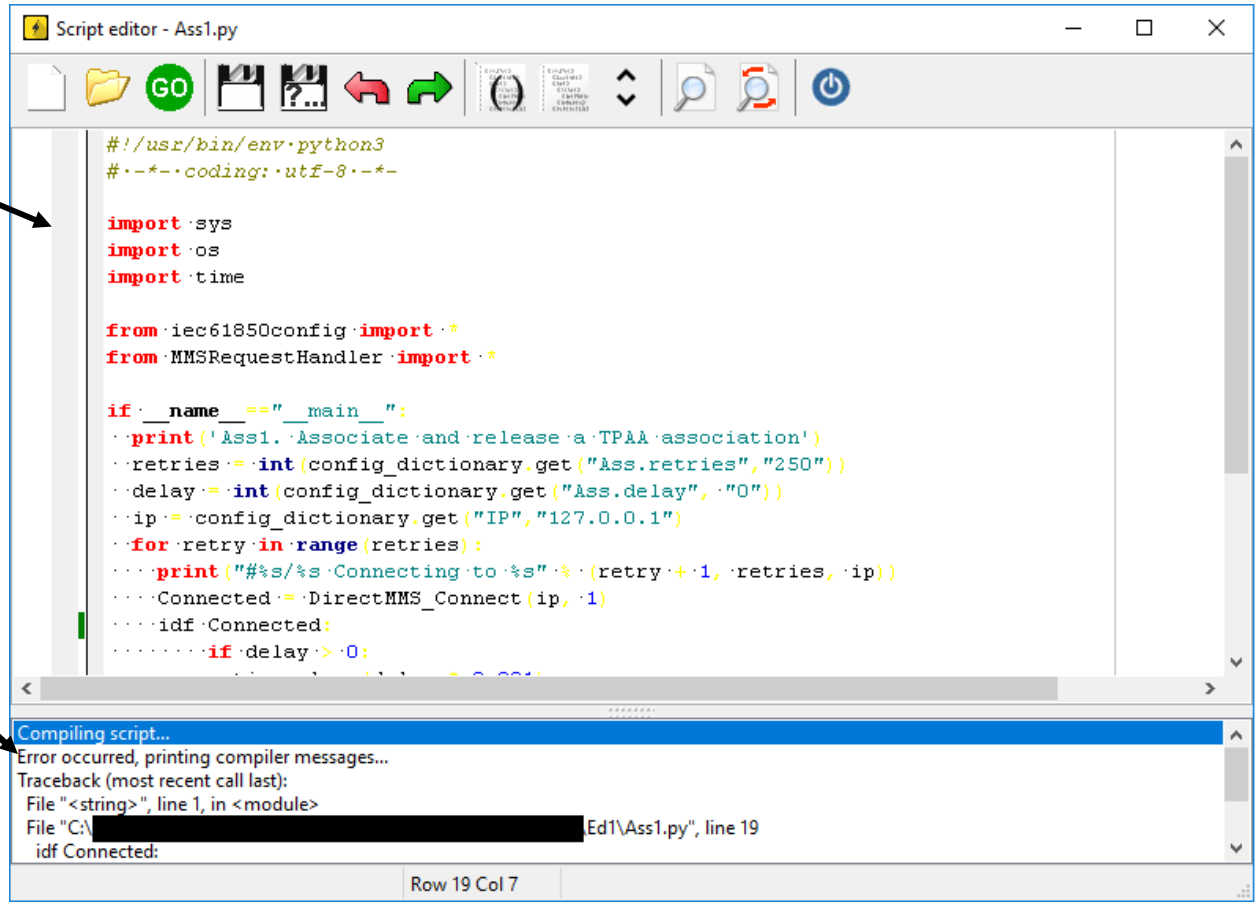
61850 Tester – Test case script editor

Built-in editor with syntax highlighting

Syntax validator and error detector



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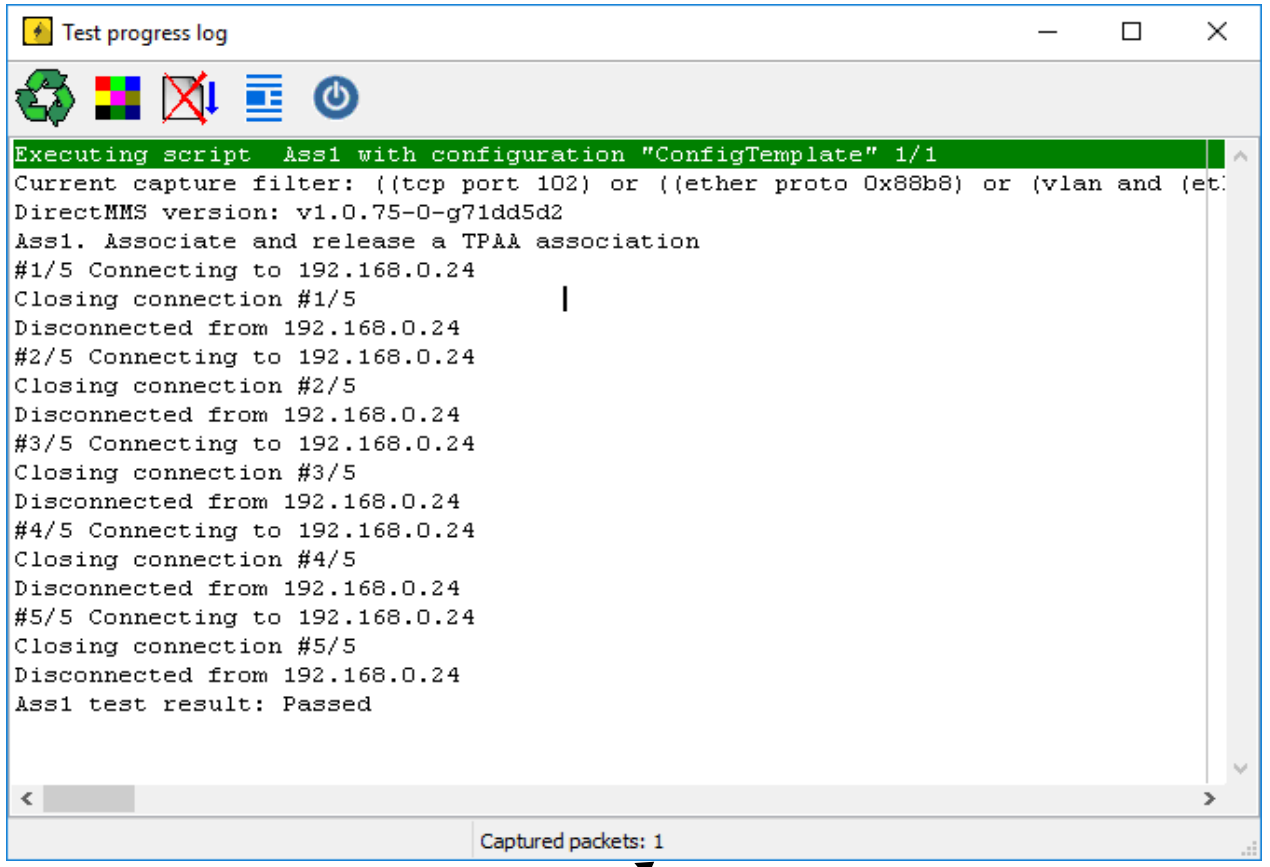
61850 Tester – Test log

All messages generated by the test script are displayed in a separate window and logged to text file



Counter for live packet capture

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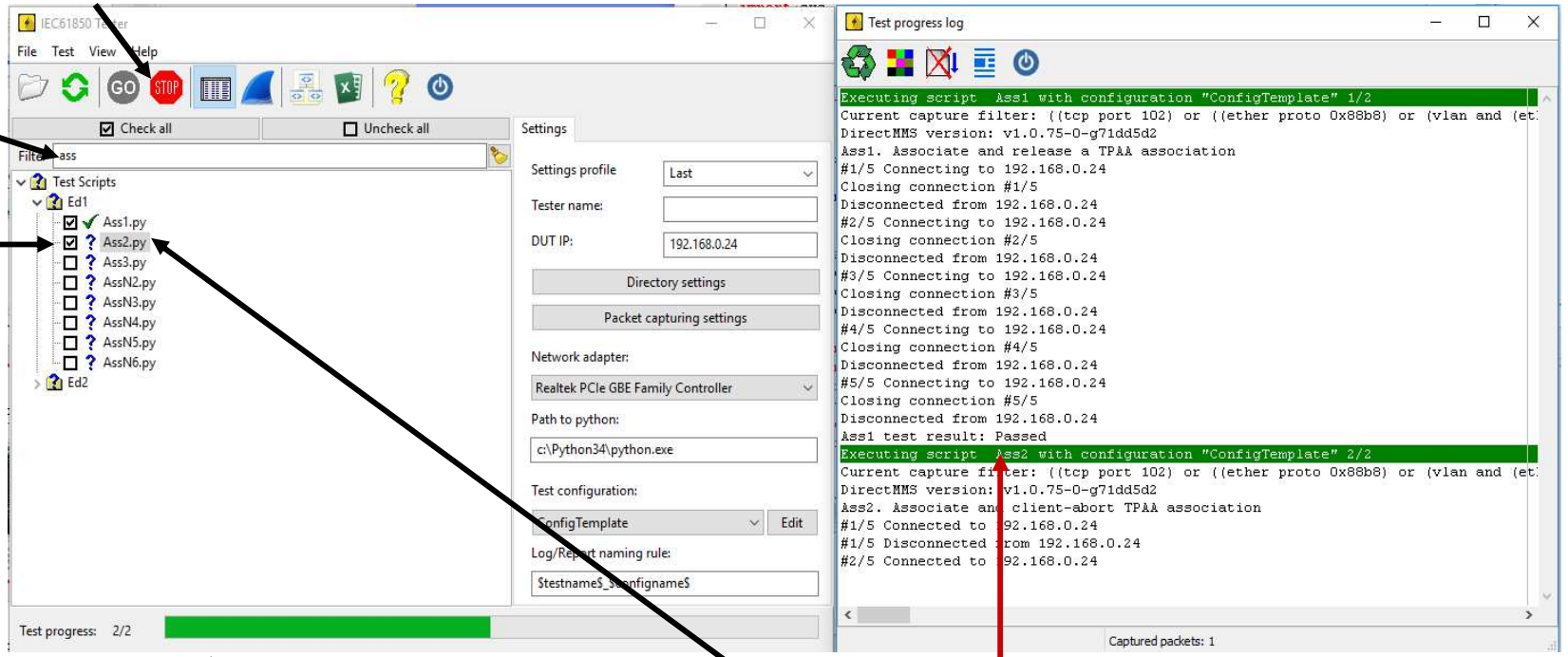
61850 Tester – Test progress

Start/stop of tests

Filter of the test case list

Selection of test cases to run



Test progress bar

Test cases results presented by icons and by conclusions in the test report view

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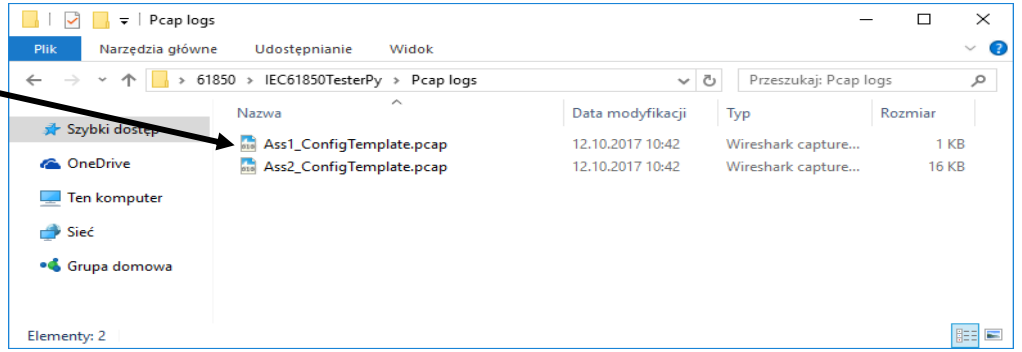
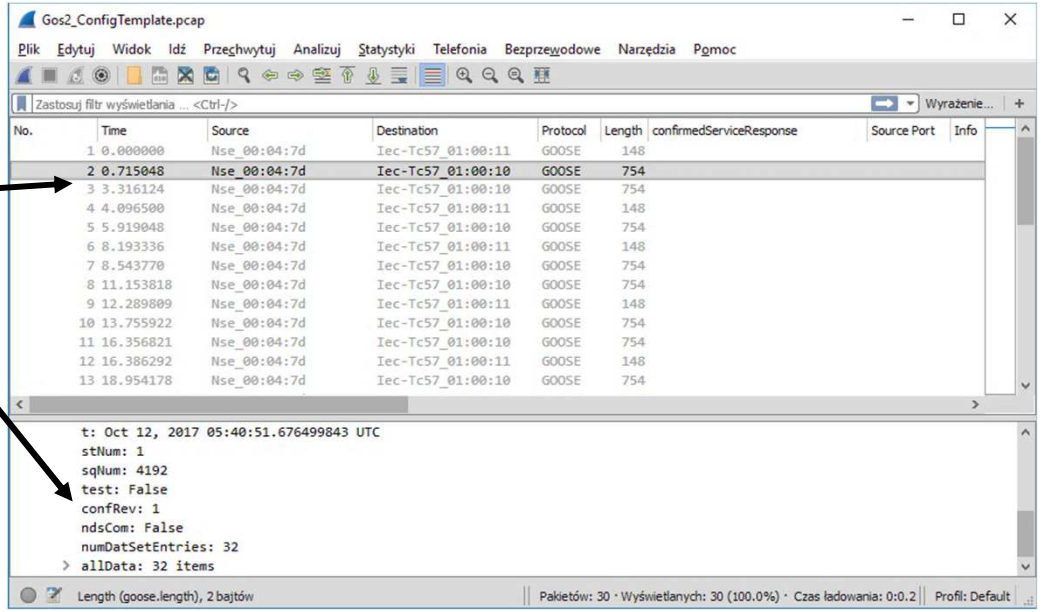
61850 Tester – Test output

Packet capture file (communication log) for each test case



Detailed analysis of DUT behavior possible using e.g. WireShark analyzer



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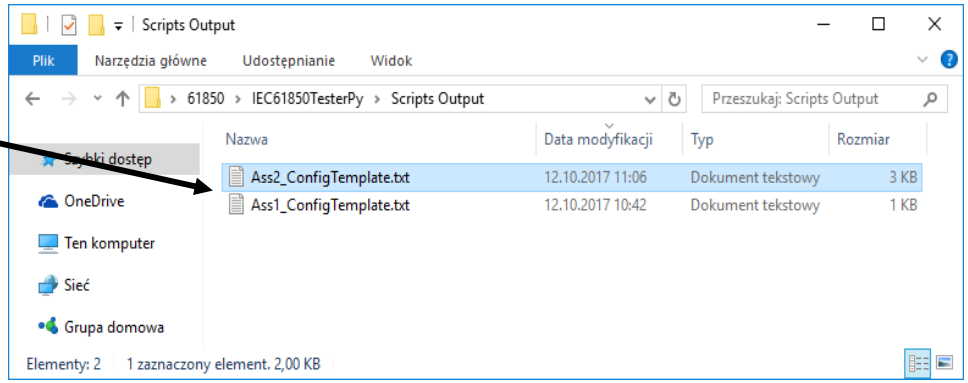
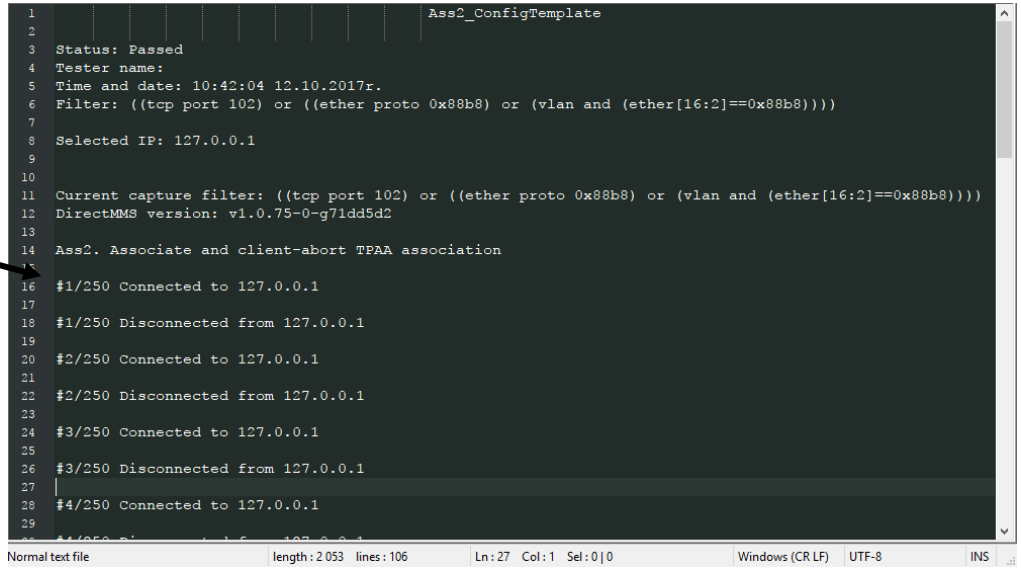
61850 Tester – Test output

Test report file for each test case



Test case conduct is tracable step by step



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61850 Tester - GOOSEBox

- **Process end simulator for DUT**
- Equipped with 4 controllable output relays to operate on DUT inputs
- Runs IEC 61850 server
- Outputs controllable through MMS or GOOSE communication
- **Support for automated testing**

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61850 Model Checker 2

- **ICD file check against SCL scheme**
- **Verification of ICD file against on-line exploration**
- Info Tech DirectMMS library used for communication with DUT
- Documentation tests include:
  - Comparing ICD with actual data names, data types, data-sets, pre-defined values exposed by DUT in the network,
  - Verification of proper initialization of control models,
  - Verification of presence of mandatory and conditional objects (true cases),
  - Verification of non-presence of conditional objects (false cases),
  - Verification of data model mapping according to applicable SCSM,
  - Verification of value ranges,
  - Verification of order of data objects,
  - Verification of data model extensions and compliance with the rules.

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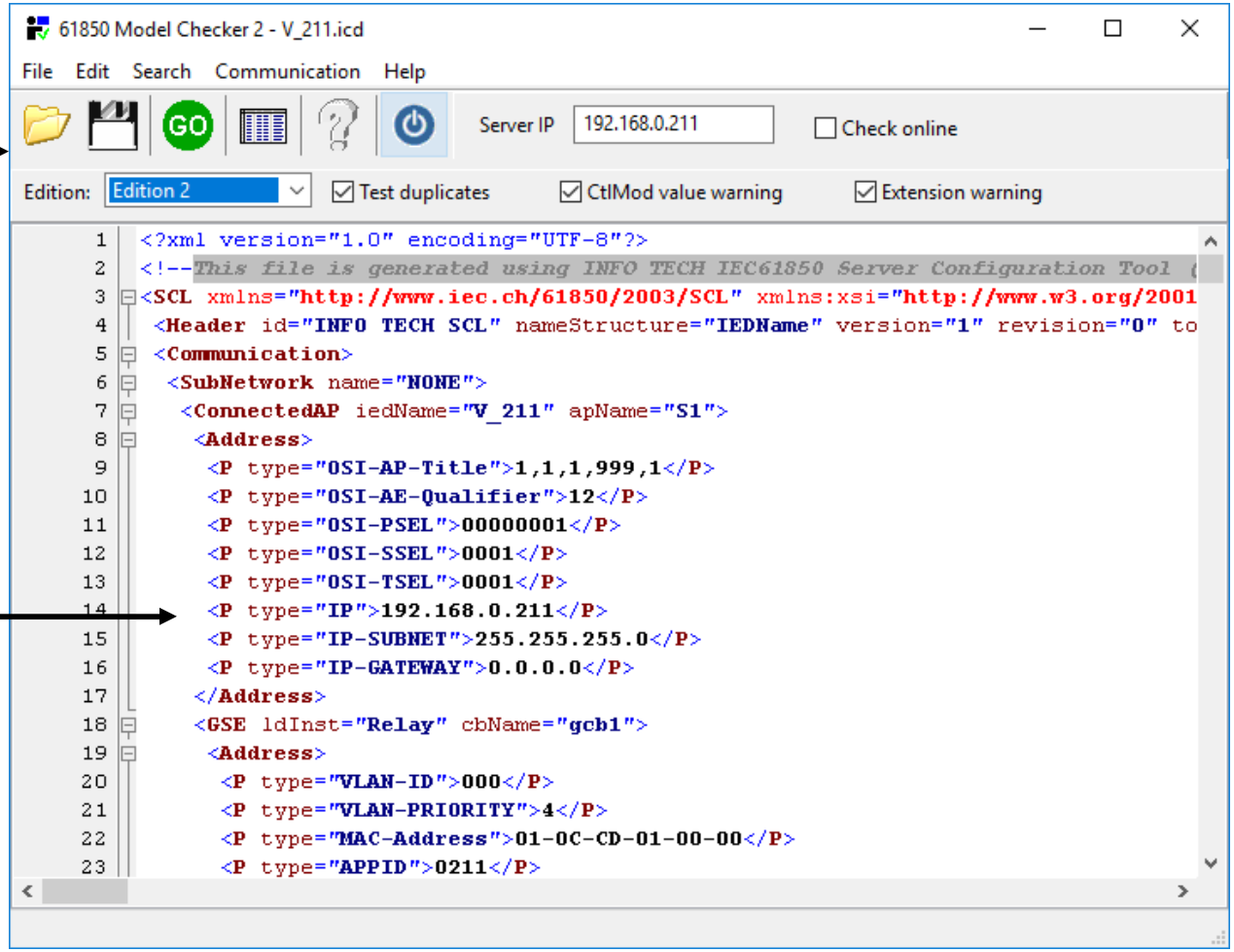
61850 Model Checker 2 – Initial View

Simple test configuration

ICD viewer and editor



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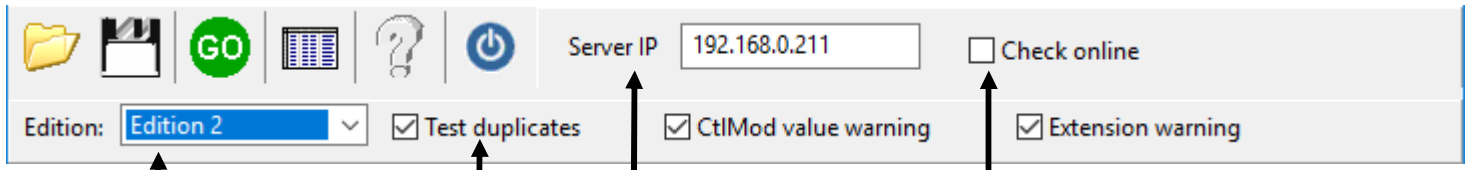
61850 Model Checker 2 – Configuration



Standard edition is read from ICD file but another edition can be enforced if needed

Non-critical warnings can be supressed

Device IP address read from ICD file

Several test cases done with ICD file without connecting to DUT

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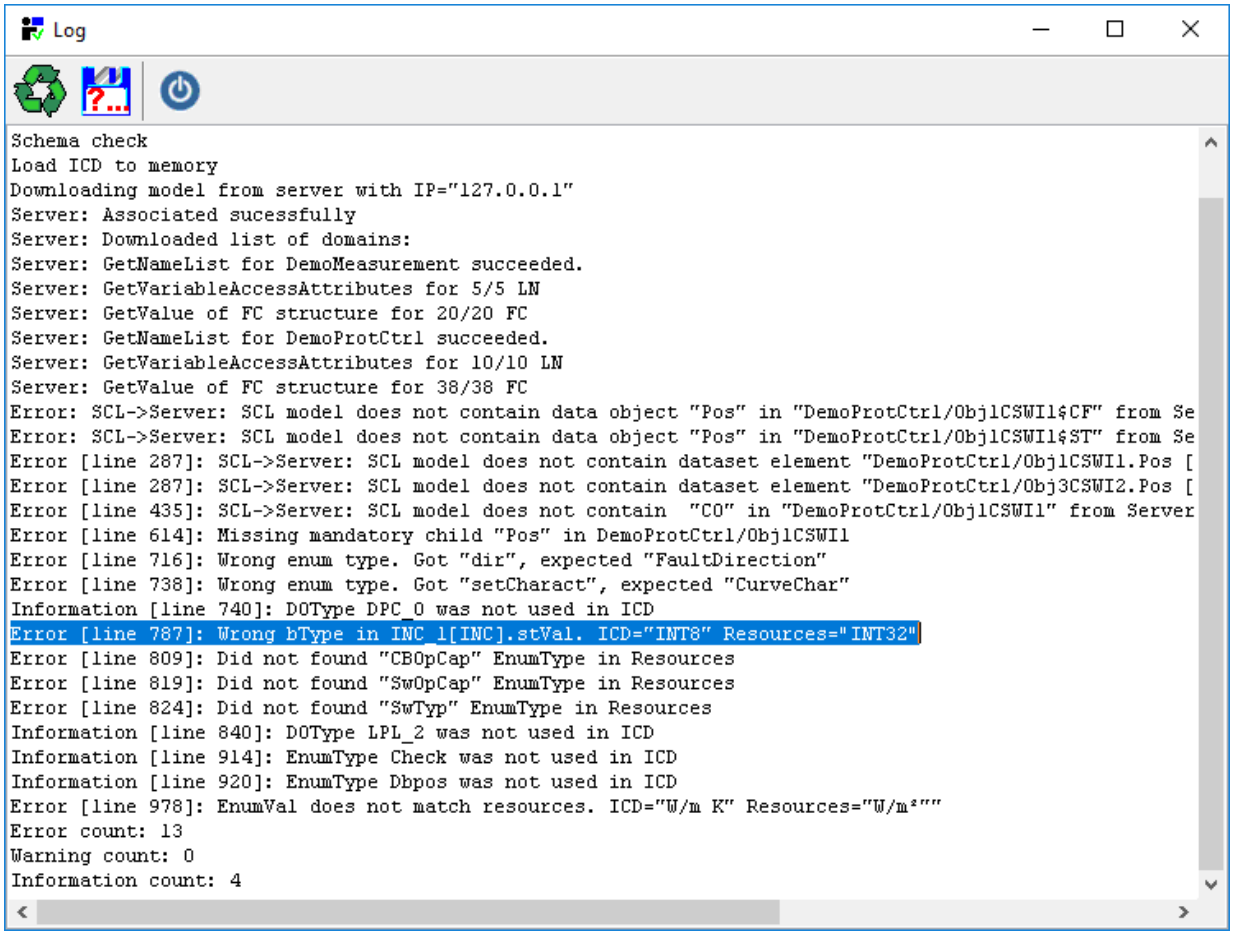
61850 Model Checker 2 – Log

After the test completion all information is displayed in the log window and can be saved to a file



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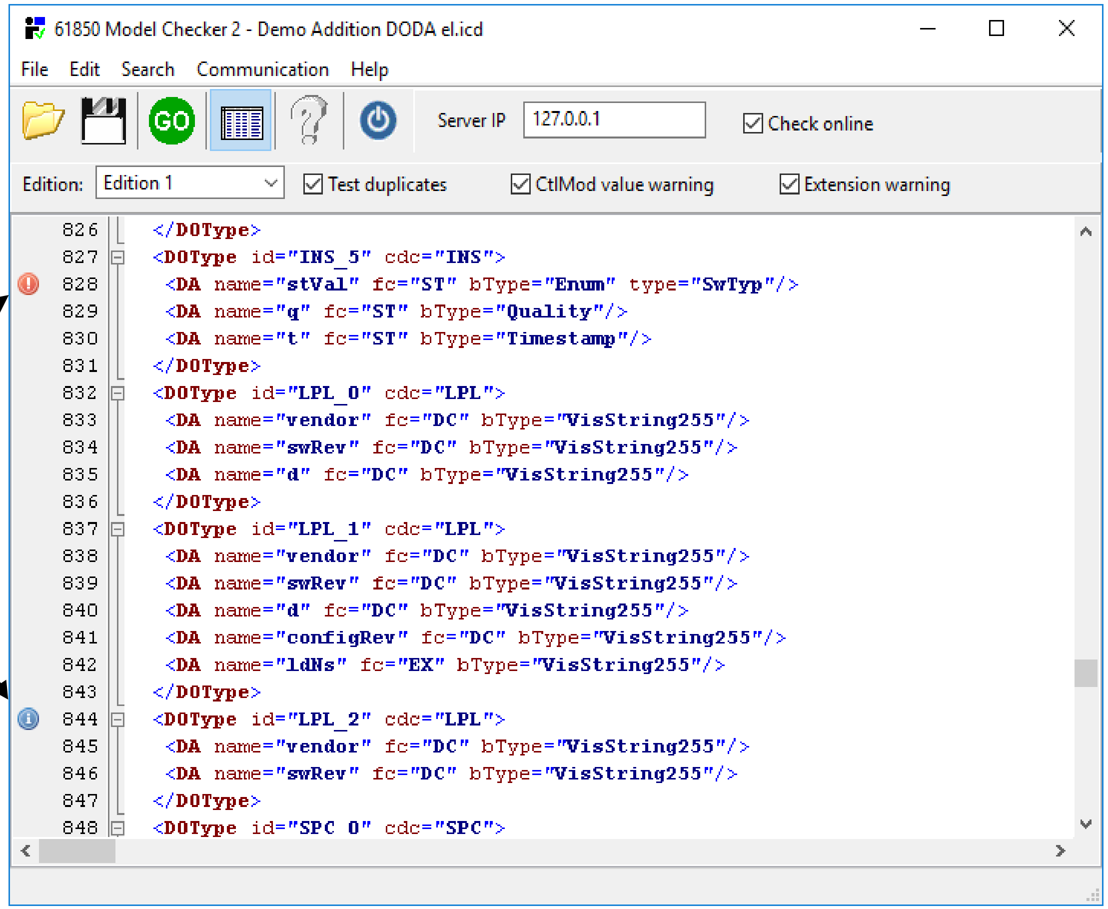
61850 Model Checker 2

Built-in editor allows for quick corrections in the tested ICD file to repeat of the test

Gutter icons help to locate problems without referring to log window



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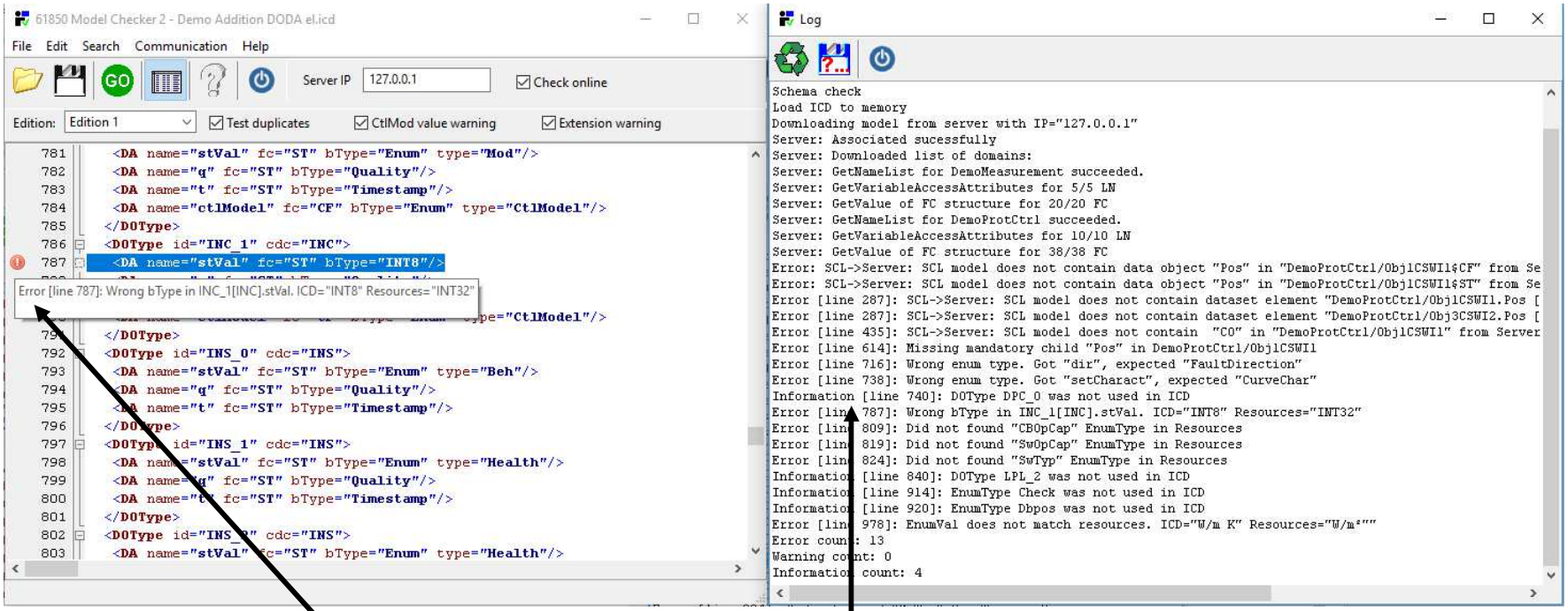
61850 Model Checker 2



The editor gutter also shows additional information

Double click on error message in the log window moves the cursor to specific line in the editor window

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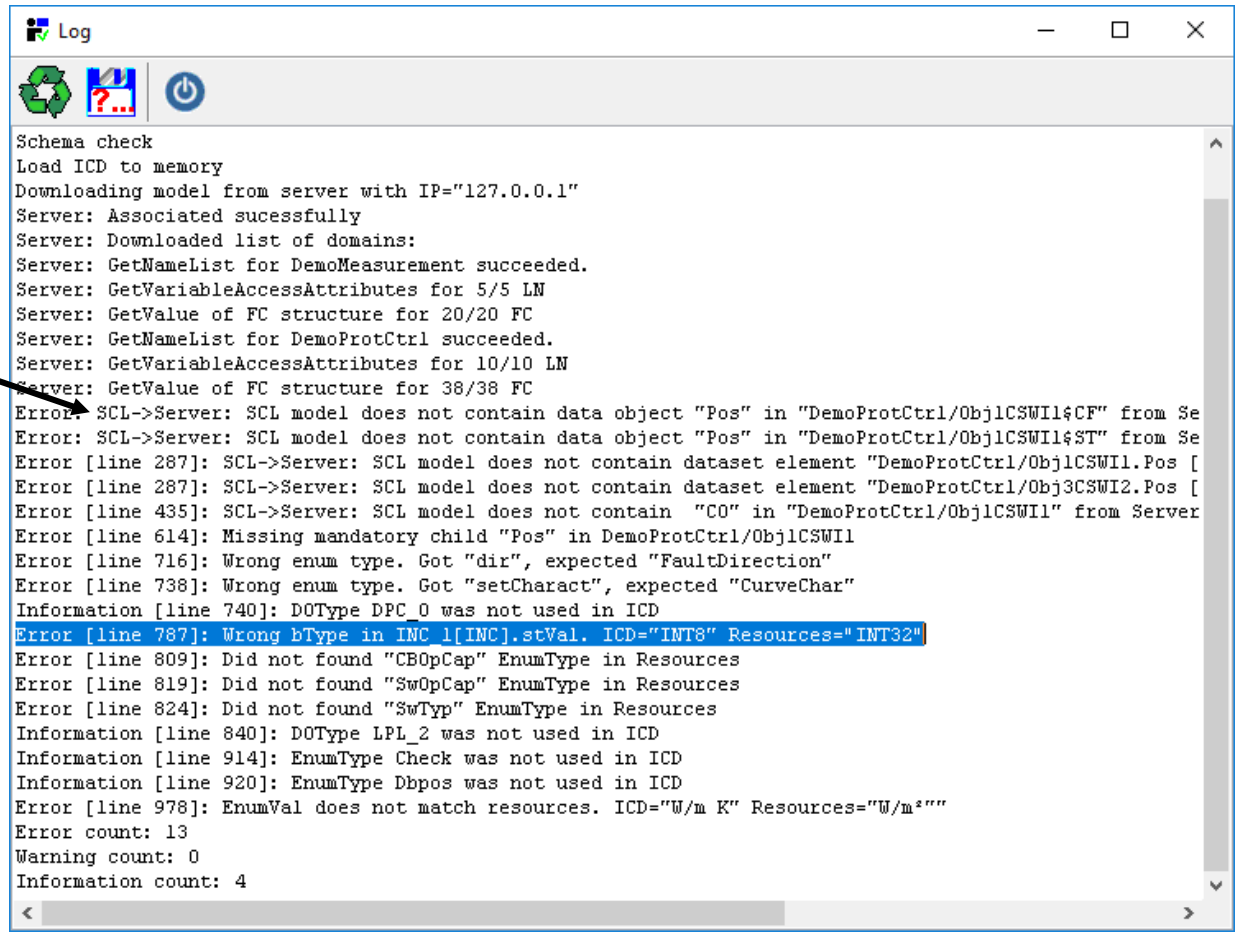
61850 Model Checker 2 – On-line test

Explored data model is checked against ICD file



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To discuss and order test service please contact:

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