**GFUVE**

IEC61850-SDK
IEC61850 Controls for .Net

Abstract IEC 61850 Controls for .Net includes client-side tree browsing, parameter configuration, report analysis, model checking, and background language script programming, which is convenient for the rapid development of the client-side. It also provides server-side IED simulation control for debugging with the client. It is suitable for IEC61850 substation client development, interoperability testing, dispatching simulation and scientific research project experimental research.

What it is ?

IEC61850 is the Client-server communication protocols. This is the client-server communication that takes place between the servers (the protection and control devices) and the SCADA and GATEWAY acting as clients.

In order to efficiently implement a client of IEC61850 to access to a server via MMS , a series of WinForm Controls were created on the platform of Windows .net so that they can be called or deployed with drag-drop click way under the IDE Visual Studio 2017/2019 . Usually it only takes 5 minutes to create an IEC61850-based client with HMI including tree-model, read/write data , event report received and Control command . Model-validation controls is included according to the SCL (Substation Configuration Language) rules as well. Besides, Autotest-script control is also included that can support in-line programming IEC61850 services, which have been encapsulated into C# functions, for the particular purpose via C# Script syntax. This Client control has a lot of successful experiences inter-operation with the IEDs manufactured by ABB, GE,SIEMENS, ALSTOM,NARI and so on.
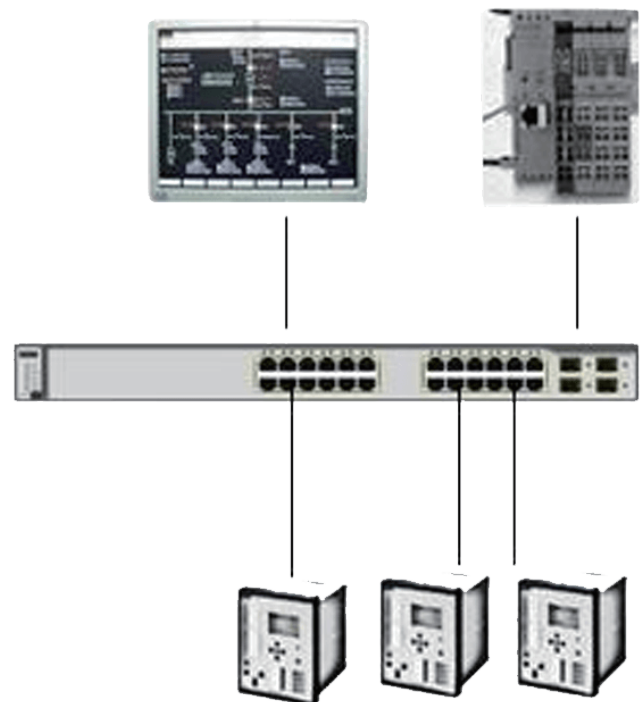
Who will use it ?

With the development of IEC61850 standard applied in Substation(Digitalized /Smart), Distribution station as Wind/Solar farm , more and more users need an IEC61850 client to see the "Tree" of data and read/write them from the IEDs(Intelligent Electronic Device) installed in the cubicle as well. However, this is not easy task to present all data with HMI under Windows platform from scratch even if some software kit relevant to IEC61850 is purchased. Because the custom-built development after the software kit procured is also complicated. That will need an experienced IEC61850 engineer to spend a few months on programming work that covers MMS communication, ICD (IED Configuration Description) model as well as the HMI under windows. It must bring risks and costs for your project. On the other hand, even if an off-shelf client software can be bought, it will be difficult to be integrated to your existing/developing SCADA system seamlessly. Therefore, the WinForm controls are the best solution for the users to quick access to the IED servers. It can be implemented through the drag-drop of click mouse to fulfil all the features of IEC61850 client.

How does it work ?

The IEC61850 Controls mainly comprise Client and Server(IED).For the client side , it includes ClientTree, Configuration ,Rx-Event-Report, Model-validation, and Script-language . While , for the server side srv_IED is there.

● ClientTree (cli_TreeCon)

Server,Logical Device ,Logical Node and corresponding data ,attributes ,data type, value are shown with Tree .Besides, DataSet, Rptcb and File are shown as well . Read / Write services are in-line supported with the expanded tree branch .

● Configuration (cli_ConfigState)

When a client is connecting to some servers, the arguments regarding the number of servers (IEDs) and corresponding IP address are initialized before their running .

● Rx-Event-Report (cli_RptEventCon)

Under the client- server running , this controls is dedicated to process receiving the report from server and parse it.

● Model-validation (cli_IEDmodelCheck)

For the ICD or CID file associated to IED , they are written in XML in terms of SCL language. This control validate the ICD or CID files against the grammar of   XML and SCL language .

● Script-language

All services of IEC61850 client are provided with C#-like functions , any custom functions are easily to created by manual coding with the C#-like script for the particular scenario .Furthermore , an automatic test is implemented by the method of programming with scripts .

● Srv_IED

This control simulates a IED including 1 breaker and 4 switches and measurements with control command and setting value .It is usually instantiated to set up a network with a client to implement client - server running to simulate SCADA system that covers station level and bay level with IEC61850 protocol .

Application Fields

- ● **Quick development for Client of IEC61850 for Operation regarding Substation**

- ● **Test for IEC61850 inter-operation in LabWind/Solar Farm**

- ● **Simulation for Dispatch Center –substationsWind/Solar Farm**

- ● **Research projects**