

# INFO TECH

# **IEC 61850 Software Library**

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# New IEC 61850 communication standard

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- The gossip says:
  - Terribly complex collection of protocols and models
  - Incomprehensive documentation
  - Costly implementation
- The truth is:
  - Easy to use and understand
  - Complex only in the implementation (like many modern technologies including Internet, GSM, GPS)
  - There are ready solutions – software libraries – offered to reduce the development effort and cost

# Most common problems

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- Terminology
  - Client / server vs master / slave
  - Logical device = module
  - Logical node = function
  - Data object = structured application data
  - Data attribute = elementary parameter value
- Notation
  - ASN in the documentation, UML in modeling
- Abstract model and actual protocol
  - Hierarchical models and flat MMS protocol variable space

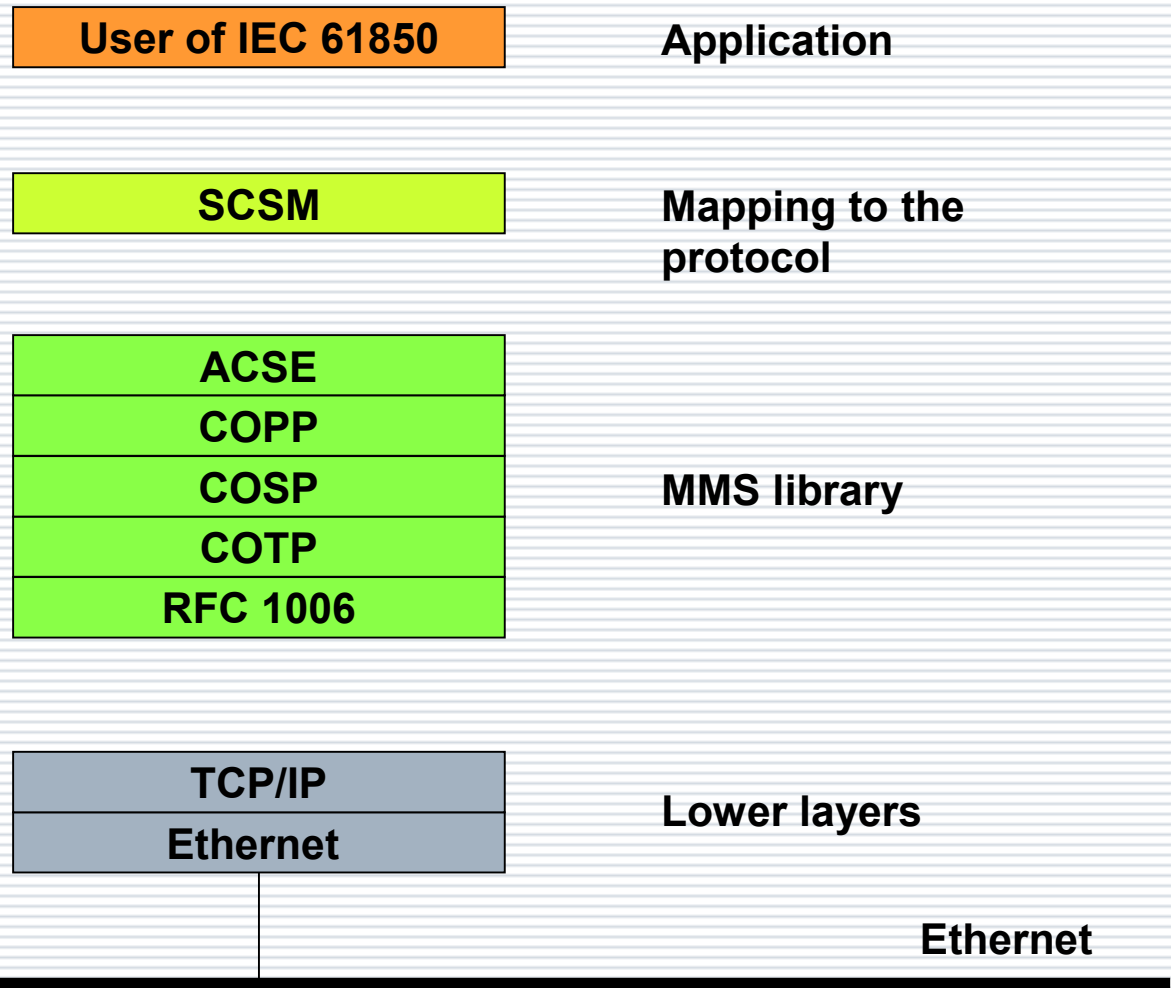
# INFO TECH solution

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- INFO TECH IEC61850 Software Library:
  - Designed in 2006 by INFO TECH
  - Updates following [tissue.iec61850.com](http://tissue.iec61850.com)
  - First implementations of servers and clients in the beginning of 2007
  - Licensed to several companies in Europe
  - Applied by INFO TECH to build testing tools

“This is not American ...” 

# Software architecture



# Client stack

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- Operating systems
  - MS Windows 2000, XP, ...
  - Linux
- Multithreaded with process synchronization
- Connections
  - Application driven
  - Unlimited number of simultaneous connections
- Source code
  - ANSI C / C++
- Memory allocation
  - Dynamic
- Software linking
  - Static
- Access to data (server model replica)
  - Direct access to MMS objects
  - XML based data interface
- Diagnostics
  - Configurable logging on protocol layers
  - Debugging support

# Client stack parameters

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- Client and server identification
  - IP address
  - Selectors of transport layer, session layer, presentation layer
  - Application ID on presentation layer
- Time-out control
  - Keep-alive
  - Session layer time-out

# Server stack

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- Operating systems
  - Embedded
  - Linux, MS Windows 2000, XP, ...
- Connections
  - On client request
  - Pre-configured maximum number of simultaneous connections
- Source code
  - ANSI C, optimized for embedded systems
- Memory
  - Static allocation
  - Required minimum: 0.5 MB Flash and 0.5 MB RAM
  - In devices with configurable/programmable application recommended 1 MB Flash
  - In devices buffering large amount of event data recommended 1 MB RAM
- Software linking
  - Static
- Access to application data
  - Direct access to variables or via function calls
  - Non-volatile memory required for some data
- Diagnostics
  - Simulation on PC, debugger in target environment

# Server stack parameters

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- Client and server identification
  - IP address
  - Selectors of transport layer, session layer, presentation layer
  - Application ID on presentation layer
- Time-out control
  - Keep-alive
  - Session layer time-out

# Library deployment

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- Client
  - Server seen as VMD object
  - Depending on the application requirements, the interface to MMS layer from GUI software module or DB management module may be sufficient
- Example of client application
  - 61850 Avenue tool – with presentation of object hierarchy according to Part 7-2, not MMS layer

# 61850 Avenue

The screenshot displays the '61850 Avenue' application window. The title bar shows the server name and standard window controls. Below the title bar are tabs for 'Server' and 'About'. The main interface is divided into several sections:

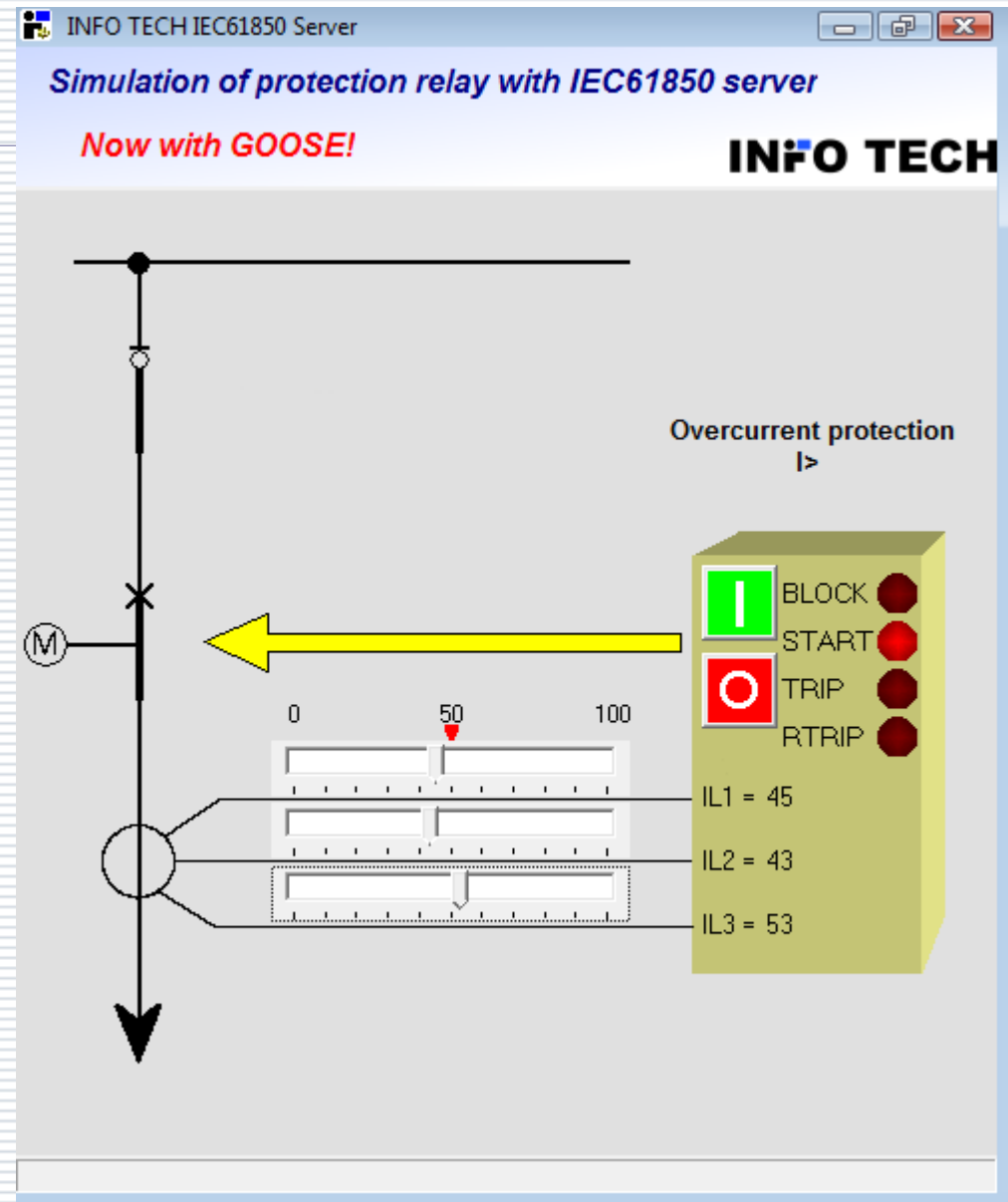
- Data**: A tabbed interface with 'Selected Data', 'RCBs & Data Sets', and 'Reports'.
- Tree View (Left)**: A hierarchical tree structure showing the server's components. The 'LLN0' folder is expanded, and 'gcb1' is selected and highlighted in blue.
- Properties View (Right)**: A detailed view of the selected 'gcb1' component, showing several properties with checkboxes:
  - GoEna [GO]: True
  - Gold [GO]: VAMP
  - DatSet [GO]: Vamp2xx/LLN0\$DSG1
  - ConfRev [GO]: 1
  - NdsCom [GO]: False
  - DstAddress [GO]
- Functional constraint**: A dropdown menu at the bottom right of the properties view.
- Auto refresh**: A checkbox at the bottom right of the properties view.
- Status Bar**: Located at the bottom of the window, it displays 'Server IP: 192.168.0.105', 'Connected', and 'no error'.

# Library deployment

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- Server
  - Application data mapping to IEC 61850 objects in MS Excel sheets
  - Automated mapping code generation
  - Successful porting to various platforms, including embedded RTOS, uClinux, Linux, MS Windows
- Example of server implementation
  - Protection relay simulator with IEC 61850 server and GOOSE publisher and subscriber

# Protection relay simulator



Contact: [www.infotech.pl](http://www.infotech.pl)  
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