

SimFlex™

IEC 61850 Protocol Analyzer

The power of simulators

With the introduction of IEC 61850 new system designs are enabled that allow creating a fully digital substation. In such a substation, systems components will exchange information based on serial communication networks using Ethernet. Testing integrated systems however requires serious consideration. How to verify the correct implementation of a function if it uses multiple IEDs communicating over a network? How to test it in the factory but also in service? The answer is simple with the simulators and support tools provided by GridClone!

The SimFlex™ family of simulators and tools

Simulation of IEC 61850 based systems and components require different simulators and tools. GridClone provides these tools in three categories:



PC based simulators



Embedded Simulators



Supporting tools



SimFlex™ Protocol Analyzer

The SimFlex™ IEC 61850 Protocol Analyzer is a tool for analyzing network traffic between IEC 61850 based clients and servers (IEDs).

This software tool is designed for analyzing IEC 61850 data and its mapping on MMS (ISO 9506). The Analyzer captures any Ethernet network packet, but has special decoding and analysis features for the following packets:

- MMS
- GOOSE
- GOOSE Management
- Sampled Values data



GridClone

Our experience moves you forward >>>

SimFlex™ Protocol Analyzer

Benefits

The main benefits of using the SimFlex™ Protocol Analyzer are:

- Fast and flexible capturing of network traffic from IEC 61850 based clients and servers (IEDs)
- Find errors in MMS-, GOOSE- and Sampled Value communication fast
- Not only network sniffing... but also real analysis!
- Assistance during the verification of IEC 61850 implementations
- Focused on IEC 61850 and MMS network communication

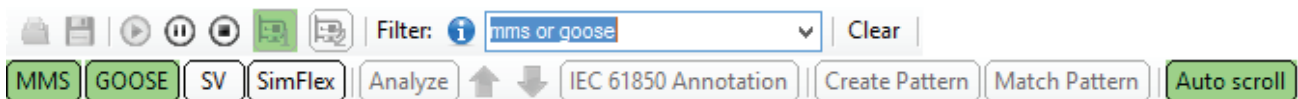
Applications

The SimFlex™ Protocol Analyzer has a wide range of applications:

- Network traffic analysis during System Integration
- Assistance in IEC 61850 Conformance Testing
- IED product development
- Analyze GOOSE messages and Sampled Value messages
- Assistance in preparation for UCA© International Users Group based IED certification

Tool Bar

The SimFlex™ Protocol Analyzer toolbar contains the most used functions within reach. The toolbar buttons provide an easy way to control the Protocol Analyzer and it also features a filter editor for advanced filtering of captured packets.



Capture View Filter

The Capture Filter is an editable filter. This way the user can define a filter for the frames that are displayed in the Capture View. Previously defined filters are stored in the user's registry and are available in the combo list. Some filters are very common and have been pre-programmed for the user. By simply clicking on the tool bar filter buttons, the Protocol Analyzer will apply the selected filter. Pre-programmed filters can also be combined.

Pre-programmed filter buttons:

- Clear – Clears the Capture View Filter. All captured frames will be listed
- MMS – Toggles MMS filter in the Capture View Filter
- GOOSE – Toggles GOOSE filter in the Capture View Filter
- SV – Toggles Sampled Values filter in the Capture View Filter

IEC 61850 Annotation

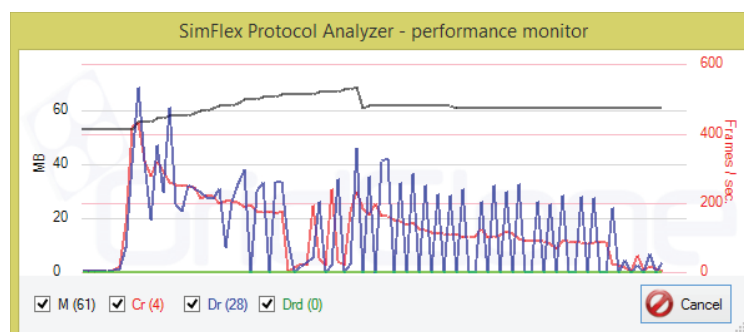
The SimFlex™ Protocol Analyzer can reverse look-up IEC 61850 service names on all captured MMS, GOOSE and sampled value packets. This means that the user can view the original IEC 61850 service names instead the MMS service names. This greatly improves readability of the network communication. After activating this function the information column in the Capture View will show the IEC 61850 service names and the most important parameters and/or values.

The screenshot displays the SimFlex Protocol Analyzer interface. The main window shows a packet capture table with columns for Frame, Time (abs), Source (mac), Destination (mac), Source (ip), Destination (ip), Protocol, Length, and Information. The table lists various frames, including GOOSE and MMS packets. A detailed view of a GOOSE packet is shown on the right, displaying the application layer information, including the GOOSE Control Block and Data Set. The application layer information includes the GOOSE ID, Sub2Bay1, and other parameters.

| Frame | Time (abs) | Source (mac) | Destination (mac) | Source (ip) | Destination (ip) | Protocol | Length | Information |
|-------|----------------------------|-------------------|-------------------|-------------|------------------|----------|--------|---|
| 3 | 12-06-2014 11:28:07.044000 | 00:02:84:90:2f:4f | 01:0c:cd:01:00:03 | | | GOOSE | 409 | GOOSE(Ltd_P145System/LLN0\$GO\$gcbST.st:1_sq:439475 |
| 4 | 12-06-2014 11:28:07.090000 | 00:30:a7:00:9f:9b | 01:0c:cd:01:00:07 | | | GOOSE | 194 | GOOSE(SEL_2411_ICFG/LLN0\$GO\$GooseDSet13.st:15 |
| 13 | 12-06-2014 11:28:07.551000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 245 | TX:Associate(10.20.1.220 - 10.20.1.50) |
| 14 | 12-06-2014 11:28:07.557000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 216 | RX:Associate(10.20.1.50 - 10.20.1.220) |
| 16 | 12-06-2014 11:28:07.561000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 91 | TX:GetServerDirectory |
| 17 | 12-06-2014 11:28:07.565000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 141 | RX:GetServerDirectory |
| 24 | 12-06-2014 11:28:07.575000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 103 | TX:GetLogicalDeviceDirectory(IE |
| 28 | 12-06-2014 11:28:07.589000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 108 | RX:GetLogicalDeviceDirectory |
| 29 | 12-06-2014 11:28:07.592000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 118 | TX:GetLogicalDeviceDirectory(IE |
| 32 | 12-06-2014 11:28:07.605000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 287 | RX:GetLogicalDeviceDirectory |
| 34 | 12-06-2014 11:28:07.605000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 127 | TX:GetLogicalDeviceDirectory(IE |
| 38 | 12-06-2014 11:28:07.624000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 209 | RX:GetLogicalDeviceDirectory |
| 39 | 12-06-2014 11:28:07.626000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 118 | TX:GetLogicalDeviceDirectory(IE |
| 43 | 12-06-2014 11:28:07.640000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 171 | RX:GetLogicalDeviceDirectory |
| 44 | 12-06-2014 11:28:07.642000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 123 | TX:GetLogicalDeviceDirectory(IE |
| 48 | 12-06-2014 11:28:07.656000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 434 | RX:GetLogicalDeviceDirectory |
| 49 | 12-06-2014 11:28:07.658000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 130 | TX:GetLogicalDeviceDirectory(IE |
| 53 | 12-06-2014 11:28:07.672000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 251 | RX:GetLogicalDeviceDirectory |
| 54 | 12-06-2014 11:28:07.674000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 119 | TX:GetLogicalDeviceDirectory(IE |
| 58 | 12-06-2014 11:28:07.688000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 266 | RX:GetLogicalDeviceDirectory |
| 59 | 12-06-2014 11:28:07.690000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 131 | TX:GetLogicalDeviceDirectory(IE |
| 63 | 12-06-2014 11:28:07.704000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 323 | RX:GetLogicalDeviceDirectory |
| 64 | 12-06-2014 11:28:07.706000 | 18:03:73:d2fd:9e | 00:09:8e:ff:1b:5a | 10.20.1.50 | 10.20.1.220 | MMS | 129 | TX:GetLogicalDeviceDirectory(IE |
| 67 | 12-06-2014 11:28:07.724000 | 00:09:8e:ff:1b:5a | 18:03:73:d2fd:9e | 10.20.1.220 | 10.20.1.50 | MMS | 299 | RX:GetLogicalDeviceDirectory |

Performance Monitor

The Performance Monitor provides useful information regarding memory use, capture rate and dissector rate. The information can be visualized by the SimFlex™ Protocol Analyzer or using the Windows performance monitor.



Protocol Analyzer

Key Features

The SimFlex™ Protocol Analyzer is designed to be an all-round tool in analyzing traffic between IEC 61850 devices and systems. Key features of the SimFlex™ Protocol Analyzer include:

- Support in the analysis of the results from test cases from the UCA® International Users Group detailed test procedures
- Any network traffic can be analyzed quickly through a flexible user interface
- Logging of analysis progress and analysis results in human-readable text format
- Network traffic is captured in PCAP format that can be read by other tools such as Wireshark
- Advanced GOOSE engine enables analyzing GOOSE messages, including faulty ones
- Visual representation of network traffic between IEDs
- Display of log messages from other SimFlex™ tools in between the captured packets
- Advanced Pattern Matching™: store capture sequences in an abstract format and compare future captures against these sequences