

grid smart 

PRODUCT OVERVIEW

61850
IMU

record | process | monitor | report | present IEC 61850 data



INTRODUCTION

61850IMU (Information Management Unit) is designed to 'capture' IEC 61850 network traffic within a substation environment. When installed it provides a record of all IEC 61850 data and events associated with the connected network – thus enabling operators to monitor, manage and optimise their lifetime assets.

The 61850IMU can store a large volume of GOOSE messages and MMS reports from the selected IEC 61850 network using dedicated storage capacity – thus effectively making it the next generation of substation recorder with the additional benefit of being able to monitor live IEC 61850 traffic and points within the substation.

The 61850IMU software is available in two formats:

61850IMU:

The 61850IMU software is pre-installed by Grid Smart onto a compatible hardware device

61850IMU VIRTUAL PACKAGE:

61850IMU VIRTUAL Packages enable users to install the 61850IMU software onto Windows based operating systems and substation servers compatible with VMware Player or ESXI

With the introduction of the latest generation SMART Meters and IEDs (Intelligent Electronic Devices) and through the utilisation of advanced communication technologies and protocols, substation automation is becoming increasingly intelligent. In such advanced and complex environments, it is now a necessity for substation operational data to be made available to remote processes such as business and asset management systems.

More than ever before, utilities invest into advanced substation automation systems, yet rarely exploit the potential of having access to real-time and historical substation data – the 61850IMU Substation Recorder provides these capabilities to enable utilities to capture and monitor this valuable IEC 61850 substation data.

WHY 61850IMU?

61850IMU IS SUITABLE FOR:

- Recording, processing and monitoring of IEC 61850 data to control and process technicians
- Archiving, reporting and presenting of IEC 61850 data to the upper business and management hierarchy
- Complete overview of IEC 61850 functionality for all relevant personnel
- Networks and systems utilizing IEC 61850 technologies (Substations and DER)

TOP LEVEL CORPORATE BENEFITS:

- Analyse and process IEC 61850 data
- Optimize maintenance activities and minimize downtime
- Protect and extend lifetime of owned assets
- Reduce costs and increase profitability

TOP LEVEL SOFTWARE BENEFITS:

- Open communication – Full benefits of using a mainstream communication technology such as Ethernet
- Integrated protocols to provide real time monitoring applications
- A standardised object model that supports logical location of data and device functions
- Standardised data naming conventions
- Common syntax and semantic understanding
- Common configuration control through SCL
- Minimal manual configuration is required for client applications and devices, reducing errors and lowering commissioning cost
- Secure remote connections from browsers such as Microsoft Internet Explorer/Firefox
- Live monitoring of GOOSE events and MMS reports
- Automatic integration of IEDs using 61850IMU MMS Client or via SCL files
- Remote access to IED configurations and settings



KEY 61850IMU SOFTWARE FEATURES

- Self-discovery
- MMS Read/Write
- MMS Client
 - Live MMS Reports (Buffered & Unbuffered)
 - MMS Discovery
- GOOSE Subscriber
 - GOOSE Live Analysis (Filtering by DataSets, Data Attributes, Events)
- Analyzer for archiving, searching and analysing
- GOOSE and MMS Report
- Supports use of VLANs and priority tagging
- Multivendor interoperability
- Embedded Tools

THE TECHNOLOGY

- WEB based tool – ready to use instantly
- Composed of two modules:
Server and Client
- 61850IMU Server
 - Running core software on Linux (Ubuntu) platform
 - Option for users to have the software pre-installed by Grid Smart onto a compatible device as either 61850IMU or 61850IMU VIRTUAL. Alternatively we can provide the 61850IMU VIRTUAL as a package for the user to install directly onto their own hardware
 - Connected to IED's network
- 61850IMU Client
 - Rich Internet Application (RIA) built on Adobe Flash platform
 - Initiated from PC browser connected to the same network as 61850IMU server or remotely using VPN



61850IMU REQUIREMENTS

61850IMU FORMAT, HARDWARE AND NETWORK TRAFFIC

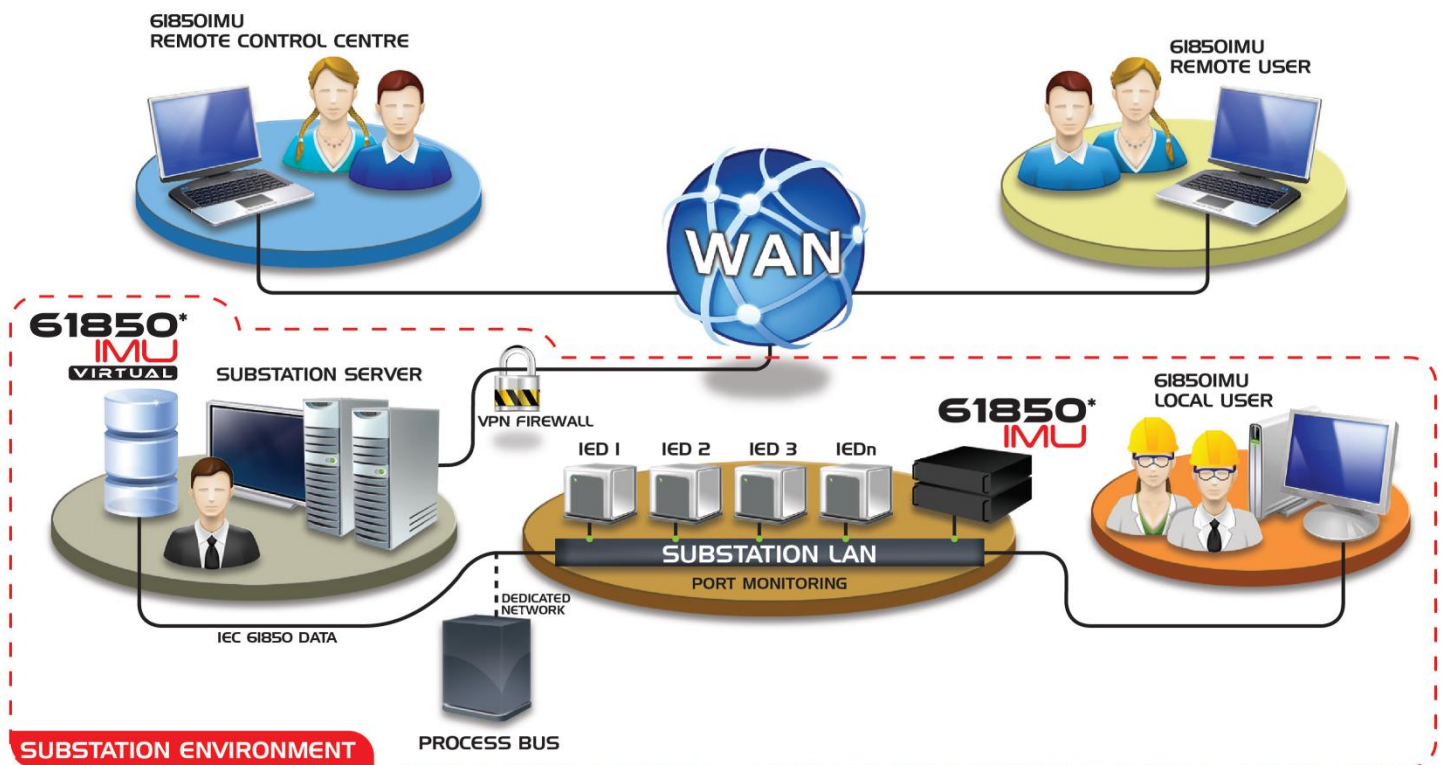
In order to determine the most appropriate 61850IMU solution for your IEC 61850 substation we will provide consultation with regard to your existing or planned network arrangements; in doing so we will need to determine four key elements:

- Number of IEDs within your IEC 61850 network
- The estimated number of GOOSE messages that exist/ are planned in your IEC 61850 network
- The number of days you require recorded data to be available for
- Your desired format (61850IMU or 61850IMU VIRTUAL)

We strongly recommend that customers consider a 61850IMU native build upon one of the hardware platforms that we have already tested; this ensures that the required GOOSE packet capture rates can be met within the processing capabilities of the designated hardware system and all builds are checked prior to shipping.

We can consider alternative hardware platforms that customers may request providing that they meet with the minimum compatibility requirements stated and on the understanding that the hardware would need to be verified by Grid Smart's testing processes following the 61850IMU software installation.

EXAMPLE OF IEC 61850 LAN CONNECTION WITH 61850IMU & 61850IMU VIRTUAL



*LOCAL AND REMOTE USERS CAN ACCESS EITHER 61850IMU OR 61850IMU VIRTUAL.

61850IMU FORMATS

61850IMU VIRTUAL

61850IMU VIRTUAL packages* are available to users who wish to install the 61850IMU software as a virtual machine on their own substation computers or server devices - thus removing the requirement for an additional hardware device to be installed. 61850IMU VIRTUAL packages should only be considered where a native build cannot be achieved or where the customer has a dedicated hardware platform that can be utilized for 61850IMU VIRTUAL.



Where requested, Grid Smart can offer to pre-install the 61850IMU VIRTUAL onto the customer's selected hardware device where compatibility permits, this may be via travelling to the customer's location or having the hardware delivered to our premises to carry out installation off-site - upon receiving such a request we will provide a formal quotation following customer consultation.

61850IMU VIRTUAL – MINIMUM HARDWARE REQUIREMENTS:

- Windows OS and compatible with the installation of VMware Player
- Minimum of 250GB of storage allocation from host device for Virtual Machine & Data to be captured
- Standard Disk Drive
- 2 x USB2.0 Ports

*61850IMU VIRTUAL installations carried out by customer's own personnel cannot be verified by Grid Smart Software Limited as we do not have a way of testing the performance of the customer's hardware device/ system or have direct control of the installation process.



61850IMU

The 61850IMU software is pre-installed by Grid Smart onto the compatible hardware device agreed between the customer and Grid Smart Software Limited during consultation period; these devices are normally compliant with the hardware requirements of IEC 61850-3. We then carry out testing of the software within the device to verify GOOSE capturing and storage mechanisms are functioning correctly before shipping the 61850IMU package out to the customer.

Customers have the option of sourcing and supplying the hardware device to Grid Smart for 61850IMU software installation or Grid Smart will provide a quotation to supply the hardware in addition to the 61850IMU software package selected following the customer consultation process.



As a guide to the minimum device specifications for native 61850IMU builds to be installed we have provided the details below:

MINIMUM 61850IMU HARDWARE REQUIREMENTS:

- Intel® Atom™ D510 1.6GHz Processor or higher specification
- Capable of running Ubuntu Linux 10.10
- Recommended minimum Hard Disk of 250GB
- 2 x USB2.0 Ports
- 1 x Ethernet LAN RJ-45 10/100/1000

61850 IMU

It is also possible to enable short term IEC 61850 capturing and monitoring capabilities utilizing the 61850IMU software within the RuggedAPE™ (Application Processing Engine) from RuggedCom®, the APE modules can be installed within the RX1500 family of switches from RuggedCom®.



61850 IMU

61850IMU PACKAGES

The 61850IMU Core Software Package enables up to eight IEDs to be added to the 61850IMU server. In the event of a customer requiring more than eight devices to be added to the server to accommodate their specific IEC 61850 network we offer 61850IMU Additional Device Packages. Each subsequent 61850IMU Additional Device Package allows the user to add an additional eight devices to the user's 61850IMU server. Core and Additional Device Packages for 61850IMU are available in both formats.

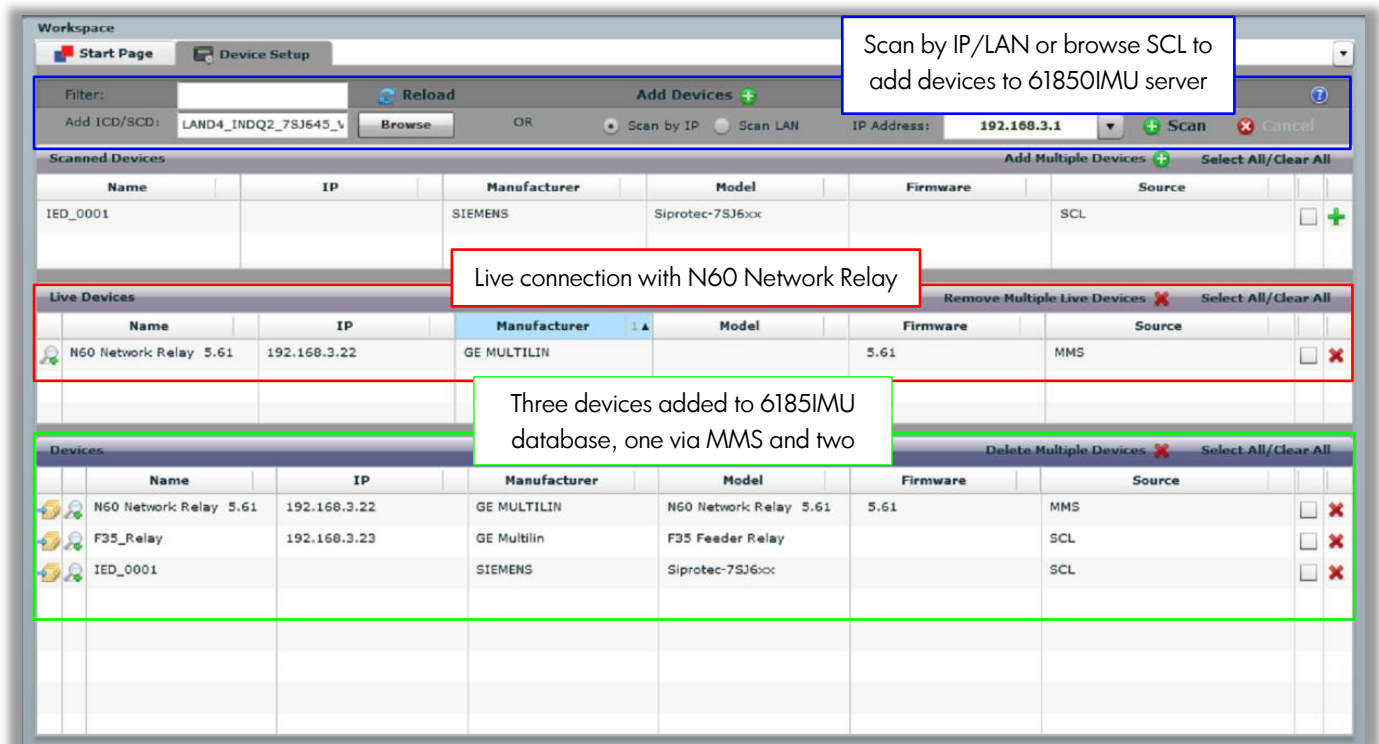
The number of devices for 61850IMU packages will be discussed during the customer consultation process.

61850IMU CORE SOFTWARE PACKAGE FEATURES

Setup & Management

- Easy UI's and navigation
- User management of hardware resources and database/storage
- Enables eight devices to be added to the 61850IMU Server:
 - Via SCL or MMS Client respectively
 - Via scanning the LAN/IP for live devices using MMS Client
- Browse any IEC 61850 Server and associated GOOSE Control Blocks, by adding devices to the 61850IMU Server
- Save/Load user workspace(s)
- The GOOSE Connections viewer provides an interactive GUI showing the publishing and subscribing devices from an imported SCD file

ADDING DEVICES – ADD DEVICES VIA MMS CLIENT AND SCL



Scan by IP/LAN or browse SCL to add devices to 61850IMU server

Live connection with N60 Network Relay

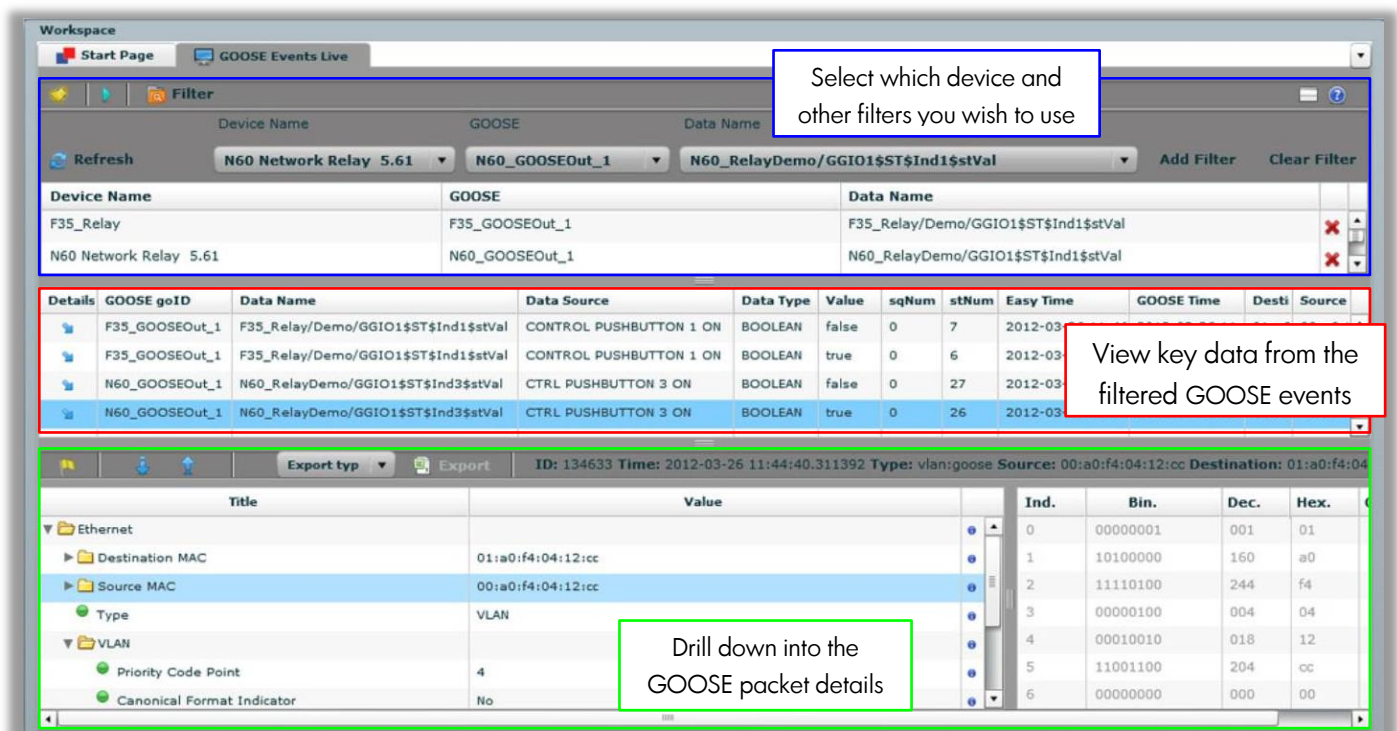
Three devices added to 61850IMU database, one via MMS and two

Name	IP	Manufacturer	Model	Firmware	Source
IED_0001		SIEMENS	Siprotec-7SJ6xx		SCL
N60 Network Relay 5.61	192.168.3.22	GE MULTILIN		5.61	MMS
F35_Relay	192.168.3.23	GE Multilin	F35 Feeder Relay		SCL
IED_0001		SIEMENS	Siprotec-7SJ6xx		SCL

GOOSE Subscriber

- Capture all GOOSE traffic in the selected network (including Fixed GOOSE) and monitor live traffic with flexible views and smart filters to show:
 - GOOSE Live capture
 - GOOSE DataSets Live (user-definable)
 - GOOSE Events Live
 - GOOSE Live 'Test' traffic
 - Live Capture of Simulated GOOSE traffic
 - Advanced device data mapping of GOOSE traffic utilising devices added to the 61850IMU Server
 - Export Live GOOSE packet capture to XML or CSV file format
 - Capture and diagnose incorrectly configured GOOSE messages

GOOSE EVENTS LIVE CAPTURE – FILTER DOWN TO SPECIFIC EVENTS OF A DEVICE



Select which device and other filters you wish to use

Device Name	GOOSE	Data Name
F35_Relay	F35_GOOSEOut_1	F35_Relay/Demo/GGIO1\$ST\$Ind1\$stVal
N60 Network Relay 5.61	N60_GOOSEOut_1	N60_RelayDemo/GGIO1\$ST\$Ind1\$stVal

Details	GOOSE goID	Data Name	Data Source	Data Type	Value	sqNum	stNum	Easy Time	GOOSE Time	Desti	Source
	F35_GOOSEOut_1	F35_Relay/Demo/GGIO1\$ST\$Ind1\$stVal	CONTROL PUSHBUTTON 1 ON	BOOLEAN	false	0	7	2012-03			
	F35_GOOSEOut_1	F35_Relay/Demo/GGIO1\$ST\$Ind1\$stVal	CONTROL PUSHBUTTON 1 ON	BOOLEAN	true	0	6	2012-03			
	N60_GOOSEOut_1	N60_RelayDemo/GGIO1\$ST\$Ind3\$stVal	CTRL PUSHBUTTON 3 ON	BOOLEAN	false	0	27	2012-03			
	N60_GOOSEOut_1	N60_RelayDemo/GGIO1\$ST\$Ind3\$stVal	CTRL PUSHBUTTON 3 ON	BOOLEAN	true	0	26	2012-03			

View key data from the filtered GOOSE events

Drill down into the GOOSE packet details

Title	Value	Ind.	Bin.	Dec.	Hex.
Ethernet		0	00000001	001	01
Destination MAC	01:a0:f4:04:12:cc	1	10100000	160	a0
Source MAC	00:a0:f4:04:12:cc	2	11110100	244	f4
Type	VLAN	3	00000100	004	04
VLAN		4	00010010	018	12
Priority Code Point	4	5	11001100	204	cc
Canonical Format Indicator	No	6	00000000	000	00

GOOSE Analyzer

- Provides access to archived GOOSE packets with enhanced search facilities and smart filters:
 - Advanced device data mapping of GOOSE traffic utilising devices added to the 61850IMU Server
 - Access all archived GOOSE traffic
 - Export filtered data to XML or CSV file format
 - Export archived packets to XML or CSV file format

GOOSE ANALYZER PACKET SEARCH – SEARCH FOR PACKETS WITHIN USER DEFINED TIME RANGES

The screenshot displays the GOOSE Analyzer software interface. At the top, the 'Workspace' tab is active, showing a 'GOOSE Packet Search' window. The search parameters are set to 'From: 2012-06-11 14:36:26' and 'To: 2012-06-11 14:36:26' with a time range of 0 seconds. The search results table lists several GOOSE packets, including 'F35_GOOSEOut_1', 'F35_GOOSEOut_2', 'N60_GOOSEOut_1', and '61850easy'. A red box highlights the 'View GOOSE packet information' button next to the 'N60_GOOSEOut_1' entry. Below the search results, the 'Details' pane shows the packet structure, including 'Ethernet', 'Destination MAC', 'Source MAC', 'Type', and 'GOOSE'. A green box highlights the 'Drill down into the packet for further GOOSE packet data' button next to the 'GOOSE' section. The bottom pane shows the packet data in a table format, with columns for 'Ind.', 'Bin.', 'Dec.', 'Hex.', and 'Ch'.

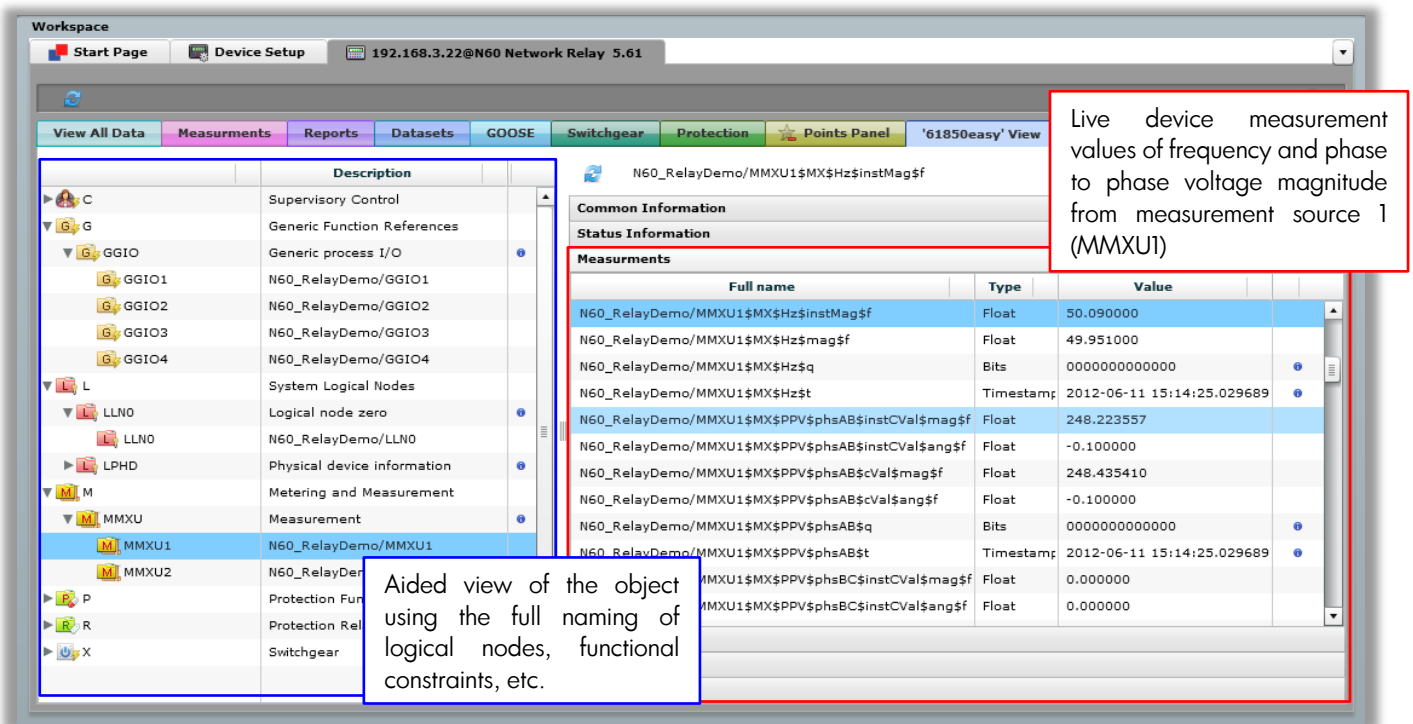
Details	GOOSE goID	GOOSE Type	Length	sqNum	stNum	Easy Time	GOOSE Time	Destination MAC	Source MAC
	61850easy	goose	127	113	1	2012-06-11 11:08:26.30	2012-06-11 10:20:19.02	01:0C:CD:01:22:01	00:A0:F4:02:01:92
	F35_GOOSEOut_1	goose	137	116	19	2012-06-11 11:05:17.61	2012-06-11 09:11:4	01:0C:CD:01:22:01	00:A0:F4:02:01:92
	F35_GOOSEOut_2	goose	135	5844	1	2012-06-11 11:05:16.13	1970-01-01 01:00:00.00	01:0C:CD:01:22:01	00:A0:F4:02:01:92
	N60_GOOSEOut_1	goose	166	120	105	2012-06-11 11:05:13.17	2012-06-11 09:07:55.22	01:A0:F4:04:12:CC	00:A0:F4:04:12:CC
	61850easy	goose	127	109	1	2012-06-11 11:04:26.30	2012-06-11 10:20:19.02	01:0C:CD:01:22:01	00:A0:F4:02:01:92

Title	Value	Ind.	Bin.	Dec.	Hex.	Ch
Ethernet		14	00000000	000	00	
Destination MAC	01:a0:f4:04:12:cc	15	00000001	001	01	
Source MAC	00:a0:f4:04:12:cc	16	00000000	000	00	
Type	GOOSE	17	10011000	152	98	
GOOSE		18	00000000	000	00	
ETYP APPID	1				00	
Length	152				00	

MMS Discovery

- Live object model monitoring
- Browse any IEC 61850 MMS server
- Device Discovery:
 - View latest real time data values from polled devices
 - Display tabs/subsets of the object models (measurements, protection, etc.)
- Points Panel – display of real time data values in a user definable view
- Add descriptions to data attributes
- Edit accessible data attributes within an object model

MMS DISCOVERY (61850easy VIEW)



Live device measurement values of frequency and phase to phase voltage magnitude from measurement source 1 (MMXU1)

Full name	Type	Value
N60_RelayDemo/MMXU1\$MX\$Hz\$instMag\$f	Float	50.090000
N60_RelayDemo/MMXU1\$MX\$Hz\$mag\$f	Float	49.951000
N60_RelayDemo/MMXU1\$MX\$Hz\$q	Bits	00000000000000
N60_RelayDemo/MMXU1\$MX\$Hz\$t	Timestamp	2012-06-11 15:14:25.029689
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$instCVal\$mag\$f	Float	248.223557
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$instCVal\$ang\$f	Float	-0.100000
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$cVal\$mag\$f	Float	248.435410
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$cVal\$ang\$f	Float	-0.100000
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$q	Bits	00000000000000
N60_RelayDemo/MMXU1\$MX\$PPV\$phsAB\$t	Timestamp	2012-06-11 15:14:25.029689
N60_RelayDemo/MMXU1\$MX\$PPV\$phsBC\$instCVal\$mag\$f	Float	0.000000
N60_RelayDemo/MMXU1\$MX\$PPV\$phsBC\$instCVal\$ang\$f	Float	0.000000

Aided view of the object using the full naming of logical nodes, functional constraints, etc.

MMS Client

- Live access to Buffered & Unbuffered Reports
- Edit the individual attributes of the report control block
- Enable individual or multiple reports simultaneously with unique colour tagging
- View the active DataSet from a selected report

BUFFERED REPORTS – COLOUR TAGGING OF LIVE BUFFERED REPORTS

The screenshot displays the 'Workspace' window of the N60 Network Relay software. The top section is for configuring reports, with fields for Device (N60 Network Relay 5.61 @192.168.3.22), Report ID (N60_RelayDemo/MMXU2\$BR\$brcbMX), Purge Buffer (true), Integrity Period (5000), and Buffer Time (100). Below these are radio buttons for report types: Reserved, Data change, Quality change, Data update, Integrity Period, and General interrogation. An 'Add Report' button is also present.

A red box highlights the report configuration area, with a callout stating: 'Enable reports with a click of the mouse'.

The middle section shows a list of reports with columns for Visible status, IP address, Report ID, and various report types. The third report, N60_RelayDemo/MMXU2\$BR\$brcbMX, is selected and highlighted in blue.

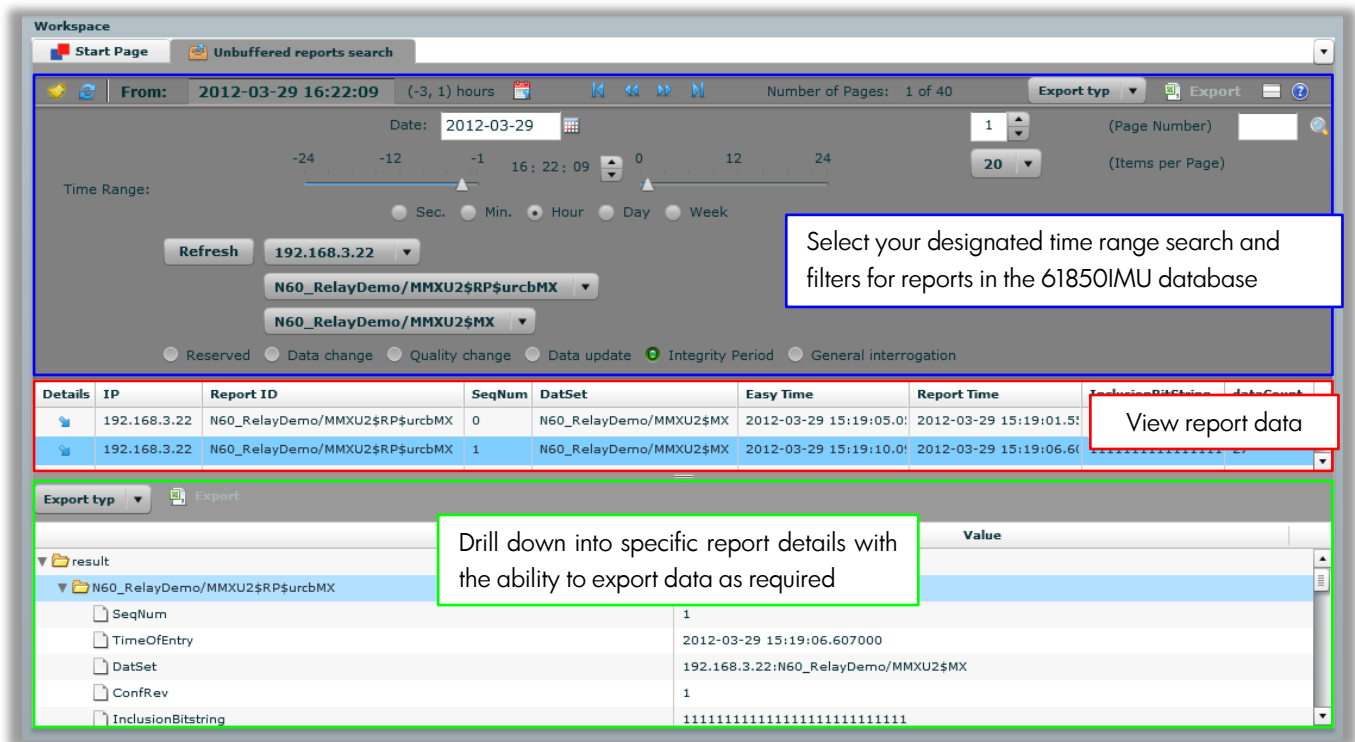
The bottom section is a table of live reports with columns: Details, IP, SeqNum, DatSet, Easy Time, Report Time, InclusionBitstring, and dataCount. The table lists 12 reports, with the first three highlighted in blue, red, and green respectively.

A green box highlights the table of live reports, with a callout stating: 'View your selected live reports and click the details tab for further information'.

MMS Analyzer

- Provides access to archived reports with enhanced search facilities and smart filters:
 - Access all archived MMS Buffered & Unbuffered reports
 - Export filtered data to XML or CSV file format

UNBUFFERED REPORTS SEARCH - SEARCH FOR PACKETS WITHIN USER DEFINED TIME RANGES



Workspace

Start Page Unbuffered reports search

From: 2012-03-29 16:22:09 (-3, 1) hours Number of Pages: 1 of 40 Export type Export

Date: 2012-03-29 (Page Number) 1 (Items per Page) 20

Time Range: -24 -12 16: 22: 09 12 24

Sec. Min. Hour Day Week

Refresh 192.168.3.22

N60_RelayDemo/MMXU2\$RP\$urcbMX

N60_RelayDemo/MMXU2\$MX

Reserved Data change Quality change Data update Integrity Period General interrogation

Details	IP	Report ID	SeqNum	DatSet	Easy Time	Report Time	InclusionBitString	DataCount
	192.168.3.22	N60_RelayDemo/MMXU2\$RP\$urcbMX	0	N60_RelayDemo/MMXU2\$MX	2012-03-29 15:19:05.0	2012-03-29 15:19:01.5		
	192.168.3.22	N60_RelayDemo/MMXU2\$RP\$urcbMX	1	N60_RelayDemo/MMXU2\$MX	2012-03-29 15:19:10.0	2012-03-29 15:19:06.6		

Export type Export

result

N60_RelayDemo/MMXU2\$RP\$urcbMX

SeqNum 1

TimeOfEntry 2012-03-29 15:19:06.607000

DatSet 192.168.3.22:N60_RelayDemo/MMXU2\$MX

ConfRev 1

InclusionBitString 11111111111111111111111111111111

Value

Select your designated time range search and filters for reports in the 61850IMU database

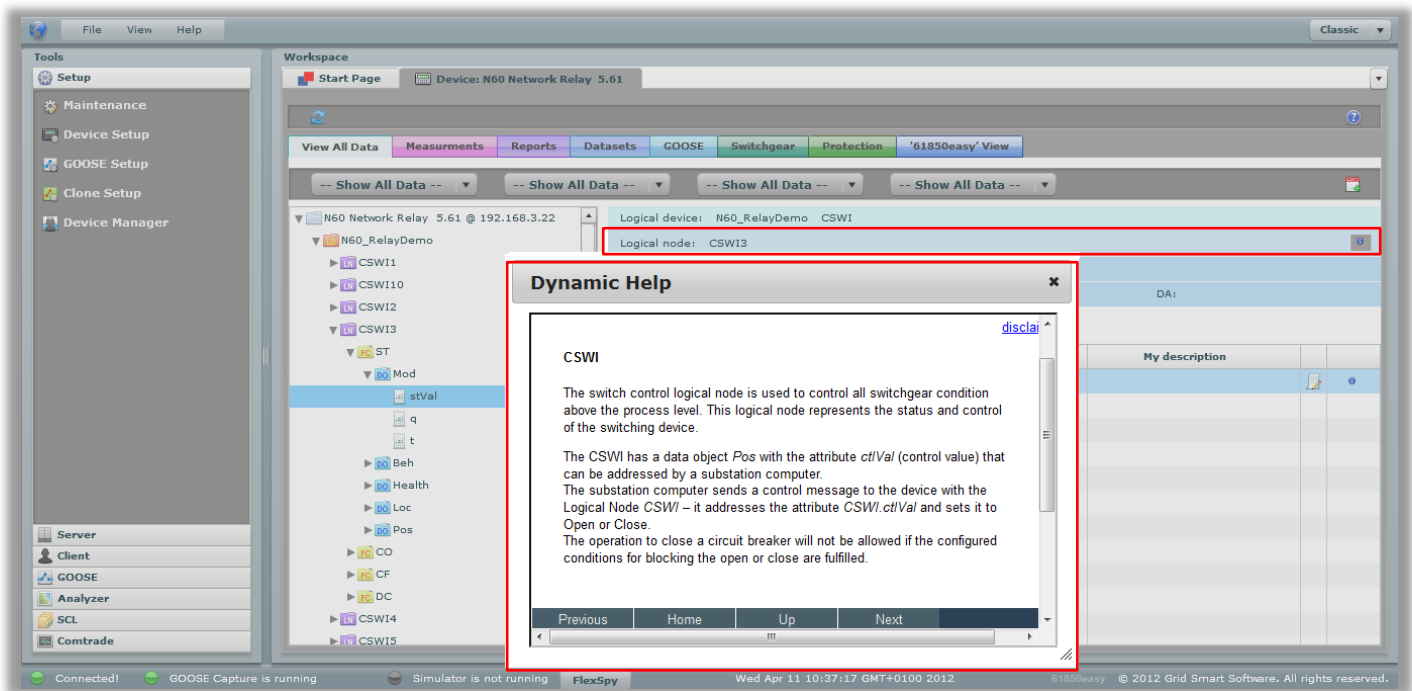
View report data

Drill down into specific report details with the ability to export data as required

Embedded Tools

- SMART grouping and dynamic help for all IEC 61850 models to assist users
- Viewer & Diff function for SCL files (IEC 61850 part 6-1) based upon XML technology
- COMTRADE viewer for displaying of stored binary or ASCII files signals and waveforms

DYNAMIC HELP FUNCTION – WITH THE CLICK OF A BUTTON ACCESS HELP ON THE ELEMENTS OF IEC 61850



61850IMU ADDITIONAL DEVICE PACKAGES

- Enable an additional eight IEDs to be added to the 61850IM Server
- All features and functions of the 61850IMU Core Software are enabled for the additional devices

61850IMU LICENCE INFORMATION

Grid Smart's 61850IMU Core Software Packages are provided with a single licence, additional client licences may be purchased if required by the user.

MULTIPLE CLIENT LICENCES

When a client PC accesses the 61850IMU server for the first time it must be registered. Once a client PC has been registered it consumes a licence, when all the available licences are consumed no additional client PC's are able to access the 61850IMU server. In order to allow another PC to connect to 61850IMU the user must unregister a previously registered PC from the 61850IMU server.

SERVICE SUPPORT & DEVELOPMENT

Each 61850IMU package has an accompanying annual support package which provides users with access to technical support and software updates when issued from our specialist team. Renewable annually, the support package ensures all updates are provided accordingly and information in relation to the future development of the equipment and software will be made available by Grid Smart Software, including any new functionality releases that are relevant to the respective 61850IMU packages.

SERVICE SUPPORT

Account Management – Each client is assigned an Account Manager from the outset. The Account Manager is the primary contact for client requirements (via the Service Desk), excluding immediate service support requirements. The Account Manager will deliver all release update information; statutory change update information; R&D strategy with precedence. The Account Manager will also work with you to ensure you have full visibility of all 61850IMU user groups and online forums.

Service Support Model – The Grid Smart service model allows users to liaise directly with the System Development Team. We don't believe that 1st /2nd /3rd Tier support models deliver value to the customer. In line with our agreed Service Level Agreement (SLA), the service support team will provide issue resolution and fault diagnosis; problem resolution; 'how to' support; system and software updates; statutory changes to software; release documentation and training notes.

DEVELOPMENT

As a part of the annual support package, at no additional cost, users will have access to all system updates for the software. New functionality that is released through Grid Smart's Research & Development (R&D) schedule may be included with the annual support package (dependent upon the functionality provided).

As a core supplier within the IEC 61850 global market, Grid Smart operates an aggressive R&D strategy that sees new functionality and modules released across the year, alongside full documentation, technical notes and user guides.





AT THE HEART OF IEC 61850 EXCELLENCE

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Company No. 07387754

A decorative graphic at the bottom of the page featuring a wavy, flowing pattern in shades of orange and red, resembling a flame or a liquid surface.