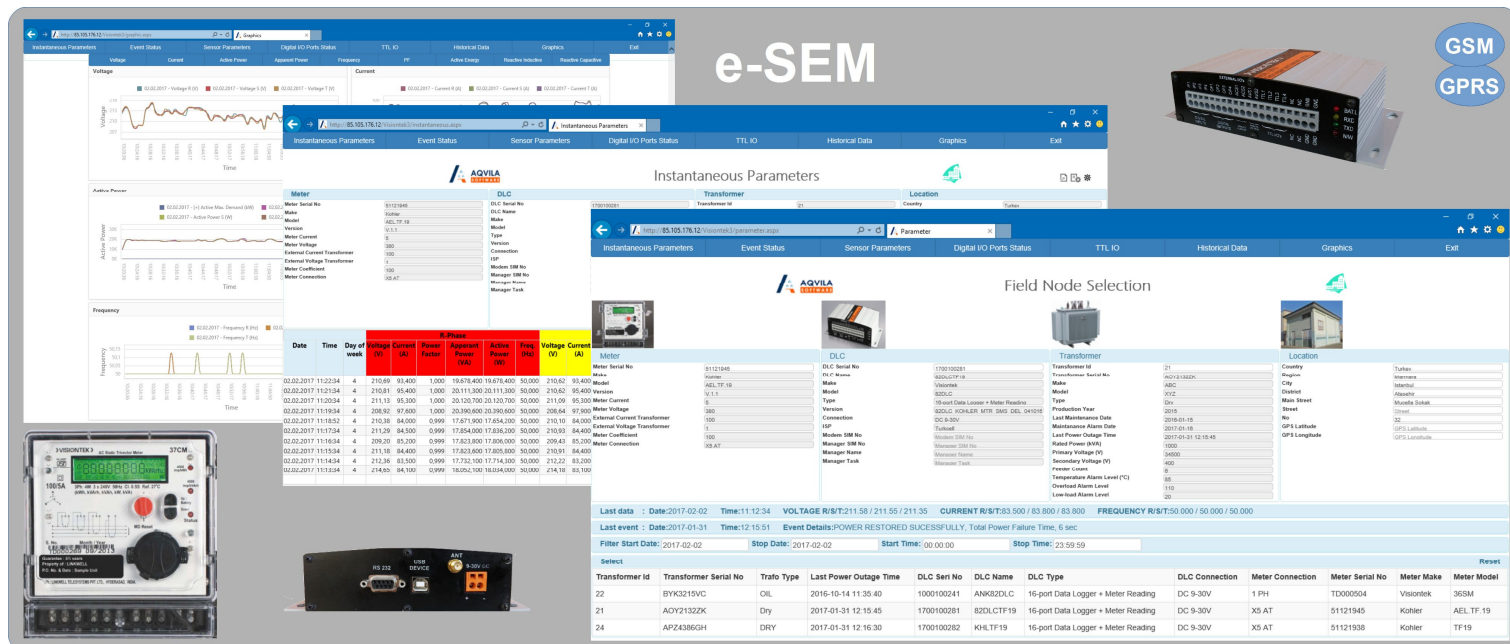# e-SEM Smart Energy Management

Overview

Aqvila Smart Energy management software e-SEM is a real time, comprehensive and easy-to-use application software to consolidate and process meter readings and data logger data received from different locations using GSM/GPRS technology. System consist of a X5 energy meter, a Visiontek 82DLC Data logger and controller capable for reading meter data in 1-60 min configurable intervals and e-SEM base software for collecting and evaluating data sent by 82DLC in 2-60 min configurable intervals.

All power failures, I/O port status changes and alarms created based on pre-configured sensor values are sent to e-SEM base software by GPRS and also to authorized personnel mobiles by SMS.

e-SEM is a scalable software for collecting and storing data from thousands of remote locations concurrently. Customized MIS reports and graphics help to organizations for efficient operations.

e-SEM+82DLC+X5meter combination is a unique AMR+SCADA solution with advanced features such as automatic meter reading, remote controlled digital outputs, automatic local controls in preset threshold values of sensors connected to analog voltage-current input.

Features

- Compatible with all standard energy meters, reading and logging of meter data in 1-60 min configurable intervals.
- Reading and logging of Digital I/O and Analog Voltage-Current inputs data in 1-60 min configurable intervals.
- Sending of logged data to e-SEM Base software automatically (push) in 2-60 min configurable intervals or collecting of logged data by e-SEM manually (pull) on request.
- Alarms for power failures, I/O port status changes, pre-configured sensor values. Sending all alarms to e-SEM base software by GPRS and also to authorized personnel mobiles by SMS instantly.
- Real time synchronization with GSM network time
- Indicating transformer location on map with GPS (optional)
- Easy access to Field Nodes and groups by an advanced search
- Detailed reports and graphics, customized reports, MIS reports.
- Flexible design to cover special requirements of utilities.
- Users and groups with different levels of access rights
- Reliable data transfer with 3rd party software.

Benefits

- Power failure start-end-duration records, alerts to authorized personnel mobiles by SMS instantly, detailed reports.
- Near to accurate calculations for transformer and line losses by evaluating collected data in an advanced algorithm.
- Energy quality measurement with selectable parameters such as Voltage, Current, Frequency, etc.
- Precise load profile for each phase, alarms for phase overloading.
- Prevention of failures caused under extreme operating conditions by collecting frequent sensor data for temperature, humidity, pressure, and conductivity. Alarms for abnormal operating conditions.
- Remotely manual or automatic control for digital outputs based on pre-configured sensor threshold values.
- Instant alarms to e-SEM base software by GPRS and also to authorized personnel mobiles by SMS for transformer house door opening, over current, relay contacts open/close, etc.
- Improving efficiency and ensuring customer satisfaction.

| Scada + AMR | Power Failure Alerts | Energy Quality Reports | Efficient Utilities |
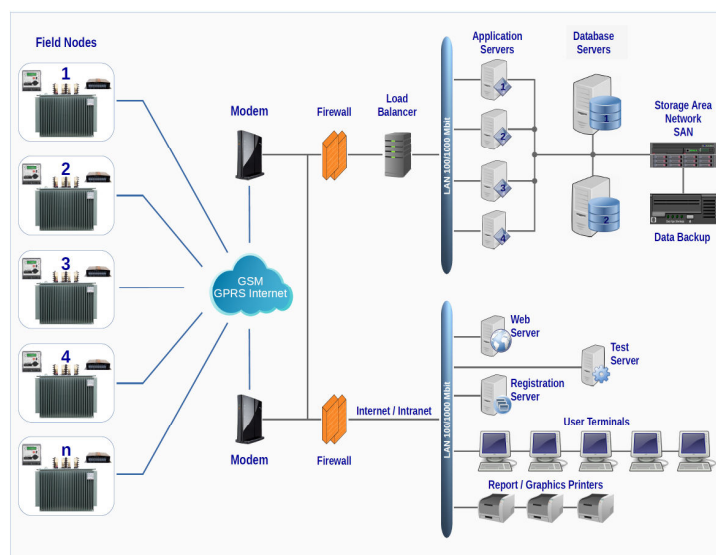
Technical Specifications

Server Side Requirements

Operating System	Windows Server 2008 R2 SE or above
Database	Oracle 11g Express / Microsoft® SQL Server® 2008 R2 Express Edition or above
Processor	4-core or above
RAM	32 GB or above
HDD	2 x 300 GB or above
Ethernet Card	100/1000 Network Ethernet Card or above
Power Backup	Uninterrupted Power Supply (UPS)
Hardware	GSM/GPRS Modem (optional)
Framework	.NET framework 4.0 or above, crystal reports re-distributable package (crredist_2005.MSI) or above
Others	MS OFFICE 2007 or above, Acrobat Reader (for exporting into PDF), USB to serial drivers
Web Server	Internet Information Server (IIS 6.0 or above)
Web Browser	Microsoft Internet Explorer V 10.0 or above Mozilla Firefox V 45 or above

Administration Interface

Transformer Details	Reg. No (automatically assigned), Serial No, Make, Model, Type, Year of Production, Last Maintenance Date, Maintenance period (day), Last Power Failure Time, Nominal Power (kVA), Primary Voltage (V), Secondary Voltage (V), No. of Feeders, Over Temperature Alarm Level (°C), Over-Lower Load Alarm (% of Nominal Power).
Area Details	Country, Zone, City, District, Street, No., GPS coordinate details
DLC Details	Serial Number, Name, Transformer Reg No., Make, Model, Type, Firmware Version, Grid Connection Type, GSM Network Operator, Modem SIM No. Administrator Name, Tittle and Mobile Number.
Meter Details	Serial No., DLC Serial No., Make, Model, Type, Firmware Version, Grid Connection Type, Current (Amp.), Voltage (V), External CT Ratio, External VT Ratio.

User Interface

Control Panel	Instantaneous Parameters, Event Status, Sensor Values, Digital Inputs and Outputs, TTL Inputs and Outputs, Historical Data, Graphics.
Instantaneous Parameters	Date, Hour, Voltage (V) – Current (A) –Power Factor – Apperant Power (VA) – Active Power (W) - Frequency(Hz) for each phase. Average Power Factor, Max Active Demand (kW), Active Energy (kWh), Reactive Ind.(kVARh), Reactive Cap (kVARh) for all phases.
Event Status	Start – End date and time, Period, Event type (Power Failures and Restores, Automatic Controls – Remote Controls) Event Details.
Sensor Values	Date, Hour, AC1(mA), AC2(mA), AV1(V), AV2(V); Sensor values are changed to °C, %RH, etc automatically.
Digital Inputs and Outputs	Date, Hour, Digital Input 1-2-3-4 status, Digital Output 1-2-3-4 status.
TTL Inputs and Outputs	Date, Hour, TTL 1-2-3-4 status, TTL 1-2-3-4 Configurations.
Historical Data	Date, Hour, Voltage (V) – Current (A) –Power Factor – Apperant Power (VA) – Active Power (W) - Frequency(Hz) for each phase. Average Power Factor, Max Active Demand (kW), Active Energy (kWh), Reactive Ind.(kVARh), Reactive Cap (kVARh) for all phases.
Graphics	Auto scale graphs for Voltage, Current, Active Power, Apparent Power, Frequency, Power Factor, Active Energy and Reactive Ind - Cap.

Reports

SMS Reports	Following reports are sent to (10) defined operation personnel mobiles by SMS on request. • System start date and time, start parameters. • Power failures date, start-end time, period • Digital inputs and outputs port status changes • TTL inputs and outputs port status changes • Automatic local controls performed based on pre-configured sensor values. • Remote Controls
Data Reports	As default following reports and also customized reports are created based on data collected in 1-60 min intervals.

<u>A) For Energy Parameters;</u>
- Energy quality measurement reports covering Voltage, Current, Frequency, etc. for each phase
- Active power, apparent power, power factor reports for each phase
- Total Active Power Reactive Power Reports,
- Over Load and Load Balance reports for each phase
- Other customized reports on request.

<u>B) For Event Status;</u>
- Power failures and restores date, start-end time, period reports
- Remote and automatic local control reports for digital outputs.
- Reports for RTC control on digital outputs.
- Status change reports on digital inputs and outputs

<u>C) For Sensor Values;</u>
- Reports for Temp, Humidity, Pressure, etc sensors connected to Analog Voltaj input (0-10V).
- Reports for Temp, Humidity, Pressure, etc sensors connected to Analog Current input (4-20mA).

<u>D) Other custumized reports on request</u>

Alarms

Power Failure – Restore Alarms	Instant alarms for power failures and restores with date, start – end time
Energy Quality Alarms	Instant alarms for exceeding the configured threshold energy parameter values such as voltage, current, frequency, etc.
Sensor Data Alarms	Instant alarms for exceeding the configured threshold sensor values such as °C, %RH, mmHg, etc. Automatic local controls based on configured sensor values.
Digital / TTL Inputs Status Alarms	Digital / TTL inputs status change alarms such as Relay On/Off, Door Opened/Closed, Fan On/Off etc.
Digital / TTL Outputs Status Alarms	Digital / TTL outputs status change alarms based on automatic local controls and remote controls.

Field Requirements

Hardware	• 82DLC Scada+Osos Data Logger and Controller with energy meter reading function. • GSM/GPRS enabled SIM Card • X5 Energy Meter with RS232/485-Optical communication interface • Grid compatible Current Transformer

1. Transactions limit is purely dependant on Oracle Server support and disk space
2. Number of hits per second is dependant on the TCP/IP connection
3. Speed of the transaction is dependant on bandwidth of the connection
4. Firewall Security has to be given to the Server
5. Back up of the database has to be taken from server