Software Development and Engineering the Future

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1 KES Company

KES was established to provide high quality software solutions to its clients. As a dynamic and independent company, we are committed solely to the success of our customers and can react quickly and flexibly. Today, high-quality is considered the main problem clients are facing with software providers and KES is committed to help in solving this major problem. KES is dedicated to the assessment, consultation, design, and implementation services in all areas of software solutions. As a technology-neutral professional services company, KES assists clients in selecting best of breed services and tools for customized solutions across various industry sectors.

We put the requirement and needs of our customers first. We orientate ourselves to meet their requirements regarding project implementation, aiming to achieve optimality and efficiency. We help our customers reduce time-to-market and save time and costs on R&D by helping them integrate advances in technology (or emerging communication standards) into their existing products, thus extending their product's reach and application scope.

We act independently of external financiers and stock markets. We invest extensively in research and development in several areas including power systems engineering, energy engineering, control theory and communication and information technology to build cutting edge standards based communication and optimization solutions and products for the development of Smart Grid and energy efficiency technologies. Our commitment to independence is evident in our products, which enable the greatest possible freedom when selecting hardware and software.

We embrace challenges and set the pace for modern, contemporary automation. We naturally meet standards, but spend just as much time and energy creating software that enables the free development of individual working methods and individual customer solutions.

Our customers are much more than business partners for us. They inspire us, their trust strengthens us and their feedback enables us to think in new ways and meet diverse requirements. We collaborate with leading utilities, OEMs and system integrators in the generation, transmission, distribution and renewable energy sectors to provide technology leading solutions, products and services. With strong partner networks across the globe, and customers focusing on energy markets, KES understands the regional challenges better and offers solutions that are flexible, scalable and secure.

2 Why to invest into Substation Automation System (SAS)

The System Operators face the problem of:

- Not having all relevant information (from sensors) at the control
- Slow and error prone data acquisition at the substation level
- Eventually not an optimal network operation (critical for loss minimization)

A SCADA System connected at key places in the substations can bring many benefits for the network operation and for the data management.

Regarding data management, the reality of many EMS/DMS networks is that operators must maintain the log files manually, reading the data from the feeders and writing them in the register (for example every hour). This manual process is slow, inefficient (regarding man power) and prone to errors. Furthermore, loads of information related to the network operation is lost, because not every signal coming from the RTU is forwarded to the control center.

A small SCADA System (SAS) at the substation level can improve the data management by automatizing the information intake and significantly reduce the errors (only possible hardware errors would remain). Also, if numerical relays are directly connected to the SCADA at the substation level all information can be saved, enabling a much deeper and accurate knowledge of the network. This information can later on be used for planning and operating purposes. For instance, historical and reliable information regarding the feeder's loading can help with the planning process of the network. Also, a much more accurate post-fault analysis can be done if information from all sensors was saved.

A small SCADA System at the substation level would not only help the data acquisition and management process, but also to improve the network operation. Nowadays the distribution network model is pyramidal: All decisions are taken centralized at the control center, where substations are passive and not able to make any decisions on their own. The disadvantage of a pyramidal model is the high dependency on the control center: if any problem appear it would affect the whole distribution network. Also, network healing in pyramidal model is not possible if dedicated master (control center) fails (complete system will be unreachable).

The future of distribution networks is rather the distributed architecture, where decentralized decisions at the substation level are taken. In the future, SCADA-Systems will be multi-agent active devices, and connected at the substation levels. They will be connected to each other (peer-to-peer) and take decisions decentralized. Depending on authority and the configuration, few small SCADA can automatically take over control as virtual center if the real control center is not available. Throughout a distributed model a better and safer operation can be achieved. These concepts are the key for achieving smart grids in the future.

3 NetzAgent

The **NetzAgent**™ is single user SCADA / Substation Automation System (SAS), uses the latest technology, supports main communication protocols (including the new standard protocol IEC 61850) and is independent from the operating system. It can work under Windows, Linux as well as other devices such as raspberry PI. This feature is of major importance for incorporating low cost solutions that are also compatible with the existing data. Another important feature is that the SCADA-System includes an interface to the real-time database, which enables the incorporation of further applications independent from the ones we offer. These features enable to reduce significantly the installation costs, especially when targeting a distributed model in the distribution network, for example by using Raspberry PI devices.

The SCADA-Systems supports a wide possibilities of databases such as Firebird, Oracle, SQL, MySQL, Postgres, etc. For real-time database we suggest using SQL-Lite, since is fast and completely independent from the operating system and it's portable and compatible with most of them (Windows, Linux, etc.). For historical database use we suggest Firebird or MariaDB due to its low costs. System with less historical data can use SQLite too. The SCADA-System is also component based, so any type of improvements or additional features are easy to implement.

Build-in Single line diagram (SLD) is the representation of a power system using the simple symbol for each component. The SLD of a power system is the network which shows the main connections and arrangement of the system components along with their data. SLD takes the current status of the topology elements and shows different symbols according the topology status.

Our system is scalable and not only limited to SAS purpose. KES SCADA-system can be used as primary SCADA for main online-system supervision and control, as secondary SCADA for online-system supervision, working parallel to the main SCADA, and as tertiary SCADA to manage historical data and perform reports.

3.1 Mean features

NetzAgent SAS has the following features:

- Single user SCADA with integrated HMI interface
- Single line diagram (SLD) with Scalable Vector Graphics (SVG)
- SVG Editor Inkscape is used for SLD
- Logging
  - Alarms
  - Events
- Hierarchically relation of objects in database and presentation
- Relation database e.g. SQLite3
- Possibility to interchange database between Windows and Linux systems. File copy operation.
- Database is NOT encrypted. User with appropriate right can use simple SQL command to browse DB.
- No addition cost of third party software
- User defined number of Masters
- Supported protocols
  - Modbus
  - DNP3
  - IEC 60870-5-104
  - IEC 61850
- Number of I/O Point is limited with license contract
- Plotting
  - Real-time plots of current values
  - Charts from historical database
- Storing of data for analysis and export. Received measurements and signalization are stored into database with timestamps.
- DB Export
  - Export into CSV file
  - DB can by simply copied and used
- DB Backup
- In house developing and testing
- Platform independent and portable code, directly support
  - Linux 64 bits (Centos 7)
  - Microsoft Window 64 bits
  - Other platforms on request
- Object oriented development based on C++11
- with warranty and optional upgrade for defined period
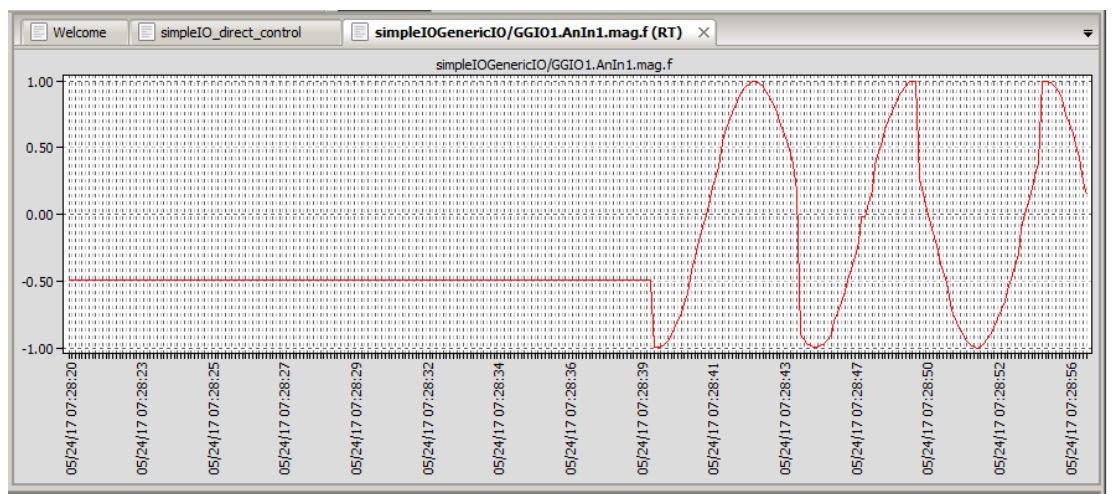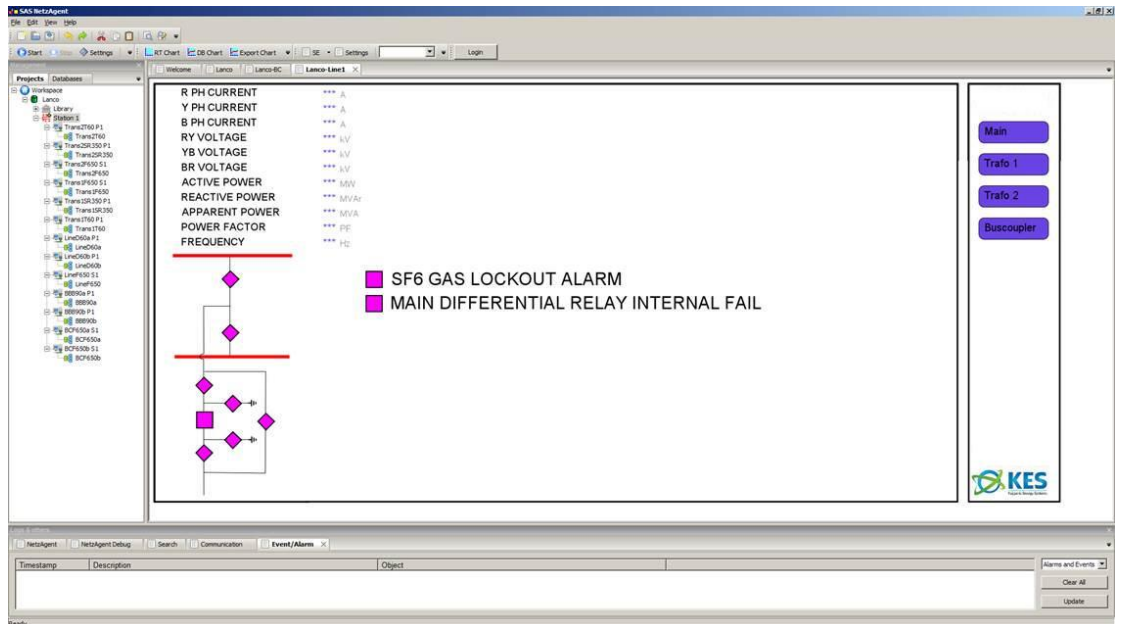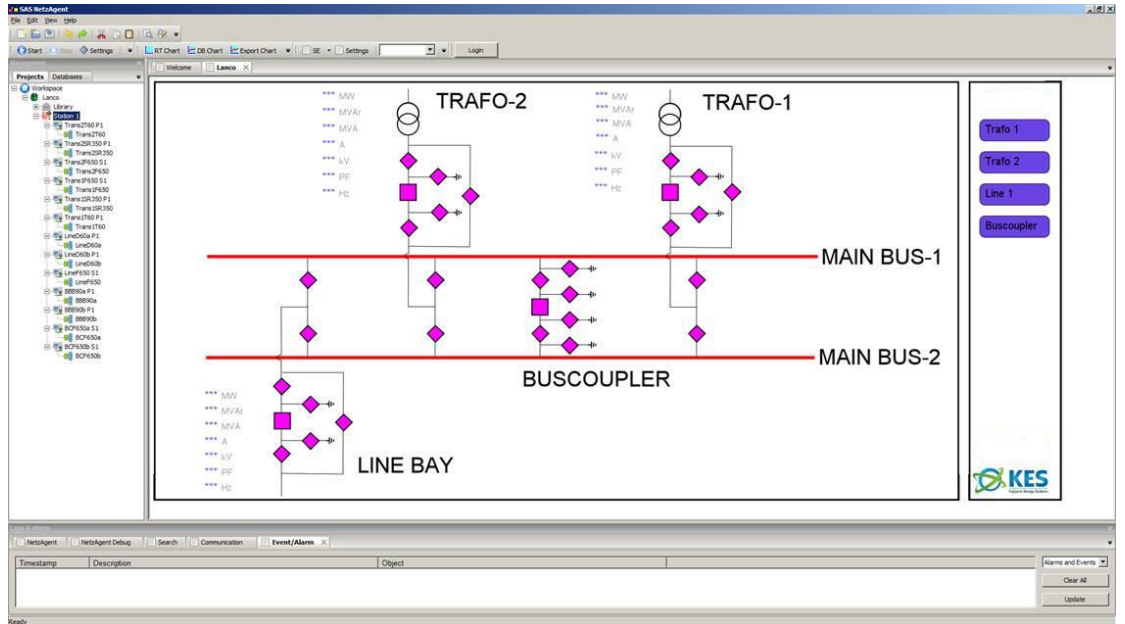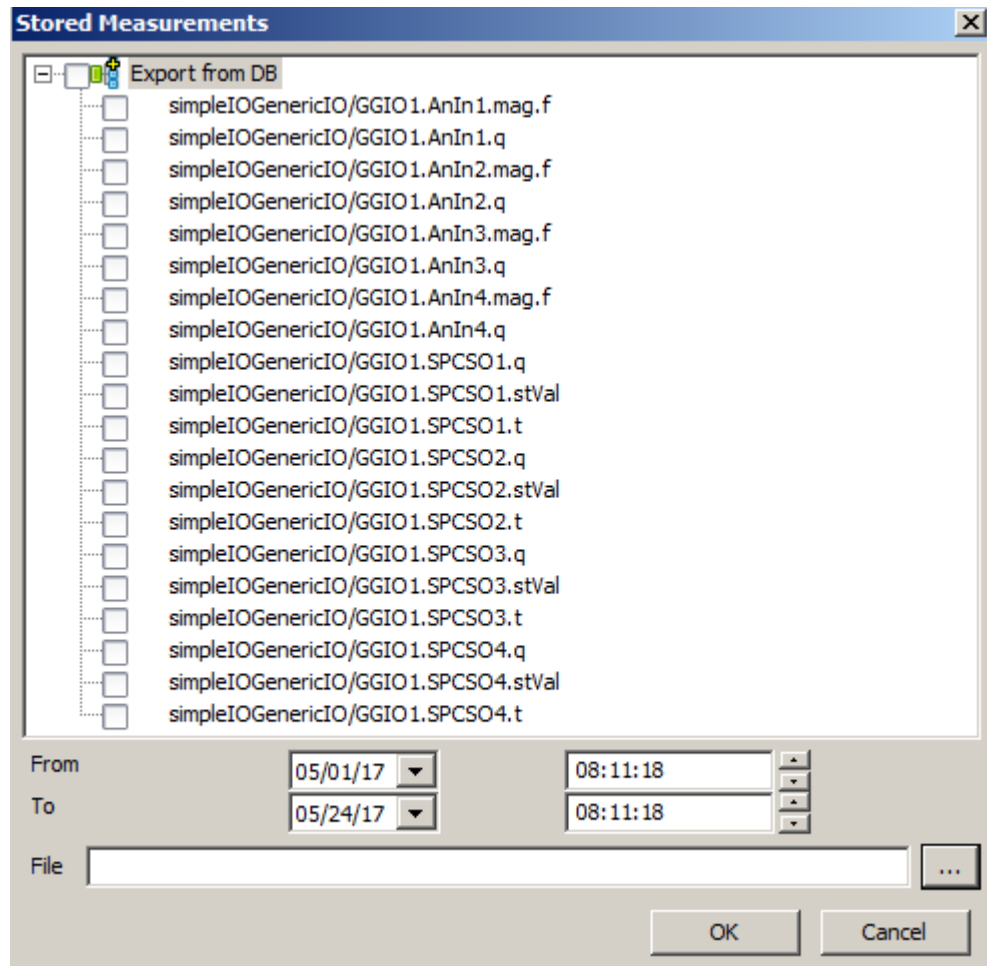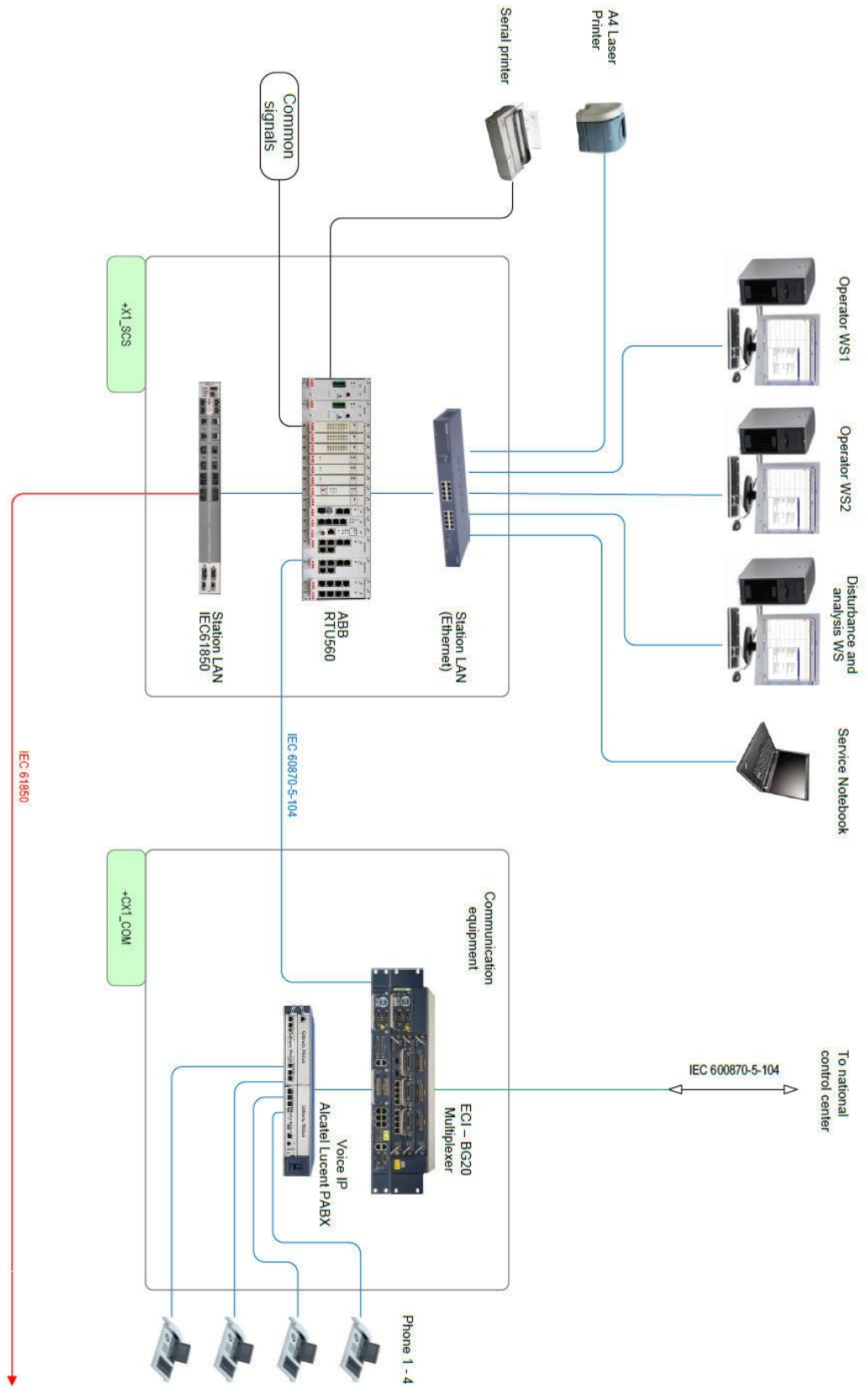
3.2 Price

We are offering the development of individual working methods and individual customer solutions. The price is based on:

- Number of protocols
- Number of I/O Points
- Single or online/hot standby system
- Number of users
- Number or Workstations
- Database redundancy

3.3 Questions

For all questions, please contact us directly or use our authorized partners

4 Example of configuration