



XEM Product Line Technical Differentiators

Introduction

The Xelas Energy Management (XEM) 61850 product line architecture is built for seamless smart grid management:

- Seamless between 61850 clients and servers
- Seamless between existing non 61850 equipment/applications and 61850 compliant equipment/applications
- Seamless between the Operations functions (OT) and the information functions (IT), between control centre (OT) and back office (IT)

This is a substantial step ahead from basic “stack vendors”. With XEM product line building blocks, a wide range of business solutions can be realized.

- Using XEM 61850 Client development and/or Server development it is easy to add, test, and verify IEC 61850 management capabilities to your equipment or applications.
- Using XEM dynamic integration framework, the network management communication with equipment and applications using different protocols and legacy is made easy, changeable and manageable.

Below we list the key **technical advantages**, the principles and their importance. We have sorted them, divided in IT features, OT features and generic architectural features.

Leading Information Technology (IT) features

- Fully modular and distributed architecture (using TCP- IP).
- The various XEM components (client adapters, server adapters, database, integration adapters, and translators) communicate using TCP-IP. This enables easy distributed component implementation and ensures the re-use of functions and logic among the XEM components. The overall system is therefore completely extensible and scalable, and configured for carrier grade availability (99,99x %).
- Fully customizable scripting environment
 - All functions are described using scripts, which can be easily developed and adapted (also with a runtime license). The scripts range from elementary operations functions, to full test suite scripts, user-case scripts, “standard” administrative actions scripts and report scripts.
- RDBM based
 - All data handling of XEM components is managed through the use of established RDBM databases. A wide range of RDBM databases can be used through our ODBC adapter. The direct database usage enables very

powerful data mining/reporting etc., and provides all the advantages of integration with ICT applications.

- Data persistence
 - One of the key advantages of RDBM based data handling is the highest possible data persistence, ensuring no data is lost or corrupted.
 - All actions can also be audited and reviewed.
- Lean adapters
 - Adapters are delivered as a binary, so they can be fully managed using the process management tools. Users with a developer license can program/develop the adapters (C/C++ code).
- CIM
 - All data is structured according to the various IEC provided data models and/or adapted to CIM. This allows rapid application development on top of already structured data, and ensures standard based applications can be directly integrated to all the equipment managed by XEM.
 - A database schema based on IEC 61850 is used as a base for the CIM.
- Web GUI
 - XEM components are fully configurable and controllable using an advanced WEB GUI, giving easy overview and access to the developer, operator, or tester.
 - The GUI also includes a full XEM system configuration manager for easy overall XEM control, the possibility to extend the management of the XEM applications through common Web GUI functionality.
 - The GUI can be integrated into any J2EE based application server.
 - Users with a development license can develop, change and fully customize the GUI (Java code).
 - Based on Java code it is also possible to develop additional services (data mining for example).
- XML and ODBC protocol adapters
 - The ODBC adapter enables direct RDBM data handling. The XML adapter allows integration with a wide range of familiar web services functionality. So all data, gathered by XEM operations technology, is directly available for familiar ICT applications for information integration.
- Dynamic integration framework IT advantages
 - The XEM dynamic integration framework enables full management information of non-61850 equipment and applications within the RDB.
 - The integration framework is based on a two-step translation method, enabling configuration and changes without system downtime (fully dynamic, data driven).
 - The specialist knowhow that is required to understand the various network protocols (OT specialists) is already within our standard XEM dynamic integration framework components. This knowledge is no longer needed to maintain the customer specific communication functions. These are easy to use/program/change for any ICT professional.

- Clever grouping of logical functions combined with the standard XEM distributed architecture enables reuse of logical functions, limiting the change management effort within your networks.
- All specific network management OT features and advantages are listed in the OT section
- Application Services
 - On top of the provided XEM functionality, new application services can be added, that can directly be used by any XEM component, again largely based on commonly available ICT knowhow. Already available application functions are e.g. topology (showing your network on a geographic map). Xelas Energy Software will expand its standard application services, but can also develop application services on customer request.
- Server toolkit for embedded systems
 - The server is written in POSIX compliant C-source code which can be ported to various embedded operating systems.
 - Out of the box supported operating systems are VxWorks and embedded Linux.
- Server simulator
 - The server simulator supports the exact same logic as the Server.
 - In addition the server simulator is integrated into the Web GUI – process management, and can be configured to dynamically accept or reject IEC 61850 operations.

Leading Operational Technology (OT) functions

- All defined 61850 operations are supported
 - Contrary to many of our competitor products, the Xelas Energy Management (XEM) product line is built to support all the by IEC 61850 defined functions. 61850 defines many more functions than the legacy protocols it can replace. Interoperability between different subsets of the IEC 61850 standards is one of the most mentioned frustrations in standardization projects. Using XEM, you are certain that ALL operations are supported, so incomplete support of other equipment can easily be diagnosed, verified, and tested, and work-arounds can be provided.
 - Both, persistent and non-persistent datasets are supported.
- MMS, GOOSE, SV, 60870-5-104, SNMP, XML protocol adapters
 - XEM offers off-the-shelf adapters for all IEC 61850 protocols, including adapters for general management communication protocols such as SNMP. An adapter to build on plain ASCII code is also available. The XEM product includes a development kit to build new adapters (or for Xelas Energy Software to develop your adapter on your behalf).
 - Out of the box adaptation logic is provided based on IEC61850-80-1 standard, to provide easy integration between 60870-5-104 and IEC 61850 protocols.
- Dedicated models for substation (IEC 61850), wind power (IEC 61400), hydro power and DER

- XEM can handle readily available dedicated information models for various IEC standards. Management of substations can therefore be seamlessly integrated with management of wind parks, CSP, hydro or different distributed energy resources (DER).
- Fully automated long duration client-server regression testing
 - It is easy to claim carrier grade reliability, and much harder to prove. XEM client – server communication can be tested fully automatically, and for as long as you want.
 - HTML Test reports give clear indications when specific test parts were not fully successful. Detailed logs and Wireshark captures can be added if required. This makes test reports easy to interpret – and therefore enables rapid bug fixing.
 - Test diagnosis reports include OSI layers (which are also Xelas Energy Software owned protocols), MMS, ACSI and many more, and It is easy to define test subsets
 - The implicit XEM Many-to Many communication also makes it possible to test many clients towards many servers similarly.
 - This very high grade of testing automation provides a huge cost advantage for equipment and application vendors.
 - Xelas Energy Software products are developed and tested in the same way as we test our software for telecommunications networks, with long term tests under heavy load, using high numbers of simulators and against changing test scenarios.
- Secure encryption and authentication
 - XEM offers fully IEC 62351 functionality, providing secure encryption and authentication.
- Dynamic integration framework OT features
 - The framework consists of adapters, a common bus, script driven translator and system management and configuration components in a totally distributed architecture. Components can be run anywhere in your network.
 - Off-the-shelf protocol adapters are available for IEC 60870-5-104, OPC-DA, ODBC, XML, SNMP, and of course for 61850-8-1 (MMS) and 61400.
 - Adapters can be duplicated and reused for any type of equipment and/or application that uses its protocol.
 - A basic ASCII adapter is also available off-the-shelf.
 - The framework includes a powerful adapter development toolkit, to rapidly develop adapters for legacy devices.
 - The protocol adapters provide the basic semantic protocol translation. The adapters are loaded with metadata, and can be reloaded in runtime.
 - The logical functions are provided separately within dynamically changeable cript engines.
 - Within the logical function translation engines, again a large part of the specific protocol-to-protocol translation logic is already prepared and/or

preconfigured. Only customer specific tables and parameters need to be added during the integration setup.

Architectural benefits

- Both Standardization and Integration
 - We do not see IEC 61850 as a goal; we see it as an important path toward seamless smart energy network management. The XEM 61850 product line includes every tool and function you need to expand equipment or applications with IEC 61850 management. Also, the integration with non-61850 equipment and applications can easily be accomplished through XEM. All these functions communicate for overall network integration.
- Test and conformance tools are included
 - Within the various XEM products you will always find the tools to test, and to verify, conformance of integrated equipment or applications with the IEC standards. We provide feature rich simulators. Communication tests can be automated to a high degree.
- Maximal scalability
 - The XEM architecture and internal XEM communication is completely based on the often expressed operational need to distribute components into various applications and equipment. This fully distributed architecture, built for optimal reuse of functions of components, makes it extremely easy to scale the numbers of components to fit the required performance.
- Optimal reuse of functions (through applications services) and logic (in adapters and scripts)
 - The XEM architecture provides robust overall seamless network management solutions, through cleverly defined building blocks that can easily be replicated, distributed and functions can be reused. Internal communication between the XEM building blocks uses TCP-IP.
- Possibilities to reduce number of interfaces and intermediate boxes
 - The re-use of functions, logic and components make it possible to streamline your network management infrastructure. Often the total number of interfaces between network equipment and applications can be reduced, and you can critically evaluate whether separate intermediate boxes are really required.

To order an evaluation package or get more information about the Xelas Energy Management (XEM) product portfolio, please email: info@xelasenergy.com

Xelas Energy Management Product Portfolio

The Xelas Energy Management (XEM) product portfolio offers all the necessary building blocks to implement an IEC 61805 standard based communication network.

Protocols for all Essential Layers of the IEC 61850 standard

- Protocols are delivered with toolkits to implement customer solutions.
- Manufacturing Message Specification (MMS) Protocol Stack including OSI Protocols
- RFC-1006 OSI Protocol stack
- GOOSE and Sample Values

IEC 61850 Client Toolkit

- 61850 Edition 1 and 2 fully supported
- Native MMS, GOOSE/SV Support
- Built on top of Java J2EE Framework. C and C++ APIs also available
- Persistent storage of all data, multiple database support, though ODBC/JDBC
- Multiple Information modules supported such as 61850-7-420 and 61400
- Multi-threaded scalable architecture
- Ported on various platforms: Linux, Windows, UNIX

IEC 61850 Server Toolkit

- 61850 Edition 1 and 2 fully supported
- Native MMS, GOOSE and SV support
- C Development environment for greater portability and performance
- Architecture optimized for embedded RTOS
- Ported to VxWorks, pSOS, Embedded Linux
- Both binary as well as source code available

IEC 61850 Dynamic Integration Platform

- Integrate various Protocols and Information Models
- Dynamic reconfigurable with Java script Off the shelf adaptors: IEC 61850, SCADA 5-104, OPC, XML, SNMP, ASCII
- Platforms: Linux, Solaris, HP-UX, Windows
- Off the shelf Adaptations for various Information Models:
 - IEC 61850-7-2/3/4 – Substation Automation
 - IEC 61400 – Windpower
 - IEC61850-Part 7-410 – Hydro-electric Power Plants (HYDRO)
 - IEC61850-Part 7-420 – Distributed Energy Resource (DER)

Check www.xelasenergy.com for more product information.

About Xelas Energy Software

Xelas Energy Software is a dedicated division within Xelas Software. The Xelas Energy Software products and solutions are based on twenty five years of experience of implementing complex network management solutions. There are multiple products, originally built for telecom network management, that are applicable to IEC 61850 management as well.

Xelas Software established its market role through intense participation in industry collaboration, and developed standard software components now widely used by market leaders such as Alcatel-Lucent, Nokia Solutions Networks (NSN), Motorola, Ericsson, IBM, NTT, NEC, Samsung, Huawei and Telefonica. Xelas Software products are made to fit energy, telecom, messaging and aviation network management markets.

Xelas Software is a privately owned company, which acquired the software licenses and intellectual property of Vertel Corporation and Retix. Xelas Energy Software, a division of Xelas Software, with development offices in the U.S. and Europe, is one of the few software vendors worldwide to have implemented in-house the IEC 61850 standards, including MMS protocol, GOOSE, SV and OSI Protocols (RFC1006).

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