Moving Towards Integrated Grid Management with CIM-based Solutions

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In today’s modern utilities there are a variety of IT systems that contain electrical grid data, such as asset management systems, SCADA Energy/Distribution Management Systems (EMS/DMS), Geographical Information Systems (GIS), and multiple network planning applications. The combination of such IT systems is often referred to as a “grid management system.” It is obvious that the various subsystems within a grid management system can and should share data to increase both productivity and reliability. The data content and data flow among the various subsystems need to be designed carefully in order to be streamlined with the utility’s business processes.

With network planning applications being a key part of a grid management system, utilities are confronted with the challenge of maintaining consistency among multiple network models, primarily between transmission operations and planning. This indicates the need for an enterprise-wide model management system. In many cases the utility’s network planning process includes a certain degree of automated creation and synchronization of planning models. However, these automated processes typically fall short of achieving comprehensive synchronization within the grid management system; in this situation, duplicated manual effort is unavoidable. The perpetuation of redundant, separately maintained network models is a major source of inefficiency within electrical power utility organizations today.

The solution to this problem is an integrated model management system to serve as the “system of record” for the transmission network model. For effective and efficient network planning, engineers need flexible provision of network models representing different possible future grid configurations (typically referred to as “cases”) in different degrees of detail as needed for short-term and long-term grid planning activities. This implies the capability of storing and managing multiple variations from the current baseline network model to include planned future changes to the electrical grid. Critical data security is another significant consideration. Naturally there exist various technical and procedural challenges involved in deploying such a model management system. Seamless integration with existing systems typically presents the greatest technical challenge. Flexible, intuitive and accurate modeling and visualization of planned grid projects is another significant technical challenge. Additionally, effective deployment requires certain procedural changes to ensure coordination among multiple organizational divisions that may be accustomed to working largely independently.

To address the need for transmission network model management within the broader context of grid management, Siemens PTI’s PSS®ODMS commercial off-the-shelf product offers a comprehensive network model management solution including built-in data conversion and network analysis functions. Based on the IEC 61970 subset of the CIM (Common Information Model) standard, with its extensive feature set and open, enterprise system architecture, PSS®ODMS offers a robust model management solution and has been successfully deployed at various power utilities, independent system operators and regional transmission owners and similar organizations throughout the world for more than a decade. In addition to its pure model management functionality (including historical and future project modeling), PSS®ODMS offers powerful graphical editing and visualization capabilities. In addition, plug-in integration with historical or near real-time measurement data combined with a fully integrated State Estimator
calculation module can be used to produce complete, accurate pre-solved operational snapshot cases for planning studies. With built-in automation, this process yields a continual stream of valuable data for post analysis.

Below is a high-level example view of PSS® ODMS centrally deployed within a grid management system.

As shown in the above example, PSS® ODMS connects asset management, GIS, and operations and planning. Taking into consideration CIM/XML file exchange and custom automation scripts leveraging the public API’s of the various systems, there are many possibilities for data flow in terms of direction, content and frequency. Besides full, partial and incremental CIM/XML import and export functions (compliant with the CPSM and ENTSO-E CIM profiles), PSS® ODMS also includes built-in functions to import and export network model data in native PSS®E format. Near-real time and historical measurement data integration are based on the (OLE for Process Control) OPC DA and OPC HDA protocols, respectively. An OPC DA client-server interface can utilize the ICCP/Tase.2 protocol for near real-time measurement integration with SCADA.

With all IT systems sharing the same grid model, there exist new possibilities for sharing network analysis and simulation results among different systems, for example, the network planning tools from the PSS® suite integrated within the grid management system. Although the exact system architecture will certainly vary by client based on unique business requirements, the centralization of model management offers undeniable benefits to any organization facing a similar set of challenges. Deploying Siemens PTI’s PSS® ODMS product means deploying a customized CIM-based solution to improve business processes.

More and more of our customers are moving towards integrated model management systems and Siemens PTI is working on several projects related to this topic. Please contact Mr. Bob Beckett or Sven-Hendrik Koch for more information.