TIP 364: EPRI Program 161b: Information and Communication Technology for Transmission (ICT)

Program Description
This project set provides technical guidance for information and communication technology (ICT) items of interest to transmission-focused organizations. Utilities continue to invest in sensor technologies that provide real-time information for managing the grid and grid assets. Among these are phasor measurement units (PMU) that deliver precise time stamped grid status and also video cameras for substation security monitoring. Both of these technologies require a robust communications infrastructure; however, utilities face challenges in putting a comprehensive communications infrastructure in place. For many utilities, their service areas cover expansive geographic areas. The scale and diversity of these areas creates challenges for putting a communications infrastructure in place that can be economically justified.

The objective of the ICT for Transmission Systems project set is to enhance the situational awareness and asset management of the transmission system by identifying requirements and industry best practices for a robust communications infrastructure; developing effective approaches for integrating, managing and analyzing internal and external data sources; and creating a standards-based approach for integrating sensors. The results of this work could ultimately help utilities reduce long-term operations and maintenance expenditures and improve system reliability and resiliency.

Current Project Set
P161.022: Streaming Data Infrastructure and Data Management
Utilities are making investments in communications infrastructure to obtain real-time information to enhance the management of both the grid and the grid assets. Many of the new sensors being installed, such as phasor measurement units, use a streaming data protocol that “pushes” data out from the device rather than waiting to be “polled” for data. Utilities face challenges in creating a comprehensive communications infrastructure that can accommodate streaming data. They also face challenges in managing the tremendous amount of data that will result from streaming.

P161.030: Integration of Internal and External Data Sources for Informed Decisions
The Integration of Internal and External Data for Informed Decisions project will investigate business enhancement opportunities that arise when considering the wide spectrum of external and internal data sources that are available to support transmission system operational functions. Examples of external data are tornado paths or demographic data while internal data may be the cross linking of power system state with asset condition data. Central to this effort is geospatial information and the relationship between the location-specific impacts.

P161.036: Standardized Data and Interoperable Communications for Transmission Assets
Monitoring asset condition has routinely been accomplished by utilities through substation inspections, field testing, lab testing of samples, and other surveillance methods. As the cost for sensing devices has reduced, installation of sensors and sensor systems has proliferated as utilities have used the capabilities to help maintain or improve reliability. Each of these sources of asset condition information tends to utilize its own approach to the organization and naming of data, making it difficult to integrate with other systems. Within the Common Information Model, or CIM, and IEC 61850, there exist object models applicable to condition monitoring. Many of the models have been applied in previous work at EPRI in this area; however, in each case compromises were made in the approach to accommodate the existing models. This project will take a fresh look at the requirements for asset condition monitoring from the perspective of standards and communications. The work being done in this project is closely coordinated with and designed to complement the work being done in the Substations Program (P37) and also supports IEC 61850 working group activity.

Why It Matters
BPA has a significant investment in sensor technologies that provide real-time data to help manage the grid and grid assets, including PMUs. These sensors create data, and there is a growing number of external data sources that may offer invaluable insights when correlated with PMU data. These insights can be leveraged by BPA’s transmission operations, planning, and maintenance functions. Legacy sensor devices monitor asset conditions with many protocols. This variety requires a diverse set of mechanisms to extract data. As more devices are deployed, utilities will need to consider adopting standards and applying consensus-built data management techniques that thoughtfully archive aged data and delete data that is no longer relevant or useful.

Data is increasingly understood to be central to operations to help make money or save money. This research project in EPRI’s ICT program enhances BPA’s current approaches to integrating, managing, and analyzing...
internal and external data sources and creating a standards-based approach for integrating sensors. It also aids BPA’s work to ensure that the most reliable and robust telecommunications infrastructure is designed, deployed, and managed to support transport of the volumes and velocities of data from advanced sensors and other intelligent devices.

Goals and Objectives
The ICT for Transmission Systems project has three goals: enhance situation awareness and asset management by identifying requirements and industry best practices for a robust communications infrastructure; developing effective approaches for integrating, managing, and analyzing internal and external data sources; and creating a standards-based approach for integrating sensors.

Project results can help BPA reduce long-term O&M expenditures and improve system reliability and resiliency.

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Project Start Date: October 1, 2016
Project End Date: September 30, 2017

Funding
BPA FY2017 Budget: $63,000

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Reports, References, Links
EPRI Program Overview: P161 - Information and Communication Technology (membership required)

Related Projects

Participating Organizations
Electric Power Research Institute (EPRI)
San Diego Gas & Electric,
Xcel Energy,
CPS Energy,
Arizona Public Service,
Salt River Project, and others