Modernization of Distribution System & Integration of Distributed Generation and Storage

Presentation for EPIC Symposium
December 1, 2016
Sacramento, CA
Modernization of Distribution System & Integration of Distributed Generation and Storage

Presented jointly by:

Zoltan Kertay – Project Technical Lead

Kirsten Petersen – Engineering Support Staff, System Protection & Control Engineering

© 2016 San Diego Gas & Electric Company
SDG&E EPIC Communication
Infrastructure Projects

• Visualization and Situational Awareness Demonstrations (EPIC-1 Project)
  – Focus: Presentation of data to system operators in a way that enhances situational awareness

• Smart Grid Architecture Demonstrations (EPIC-1 Project)
  – Focus: Communications standards for integration of feeder equipment and DER into networked automation

• Modernization of Distribution System and Integration of Distributed Generation and Storage (EPIC-2 Project)
  – Focus: New communication standards for substation network

• Monitoring, Communication, and Control Infrastructure for Power System Modernization (EPIC-2 Project)
  – Focus: Open Field Message Bus (presented at last EPIC symposium)
Project Objectives

• Pre-commercial demonstration of distribution system modernization solutions, with main focus on new substation protection systems, integration, control and monitoring.
  
  – Develop more knowledge of IEC 61850 to aid in decision making on whether or not SDG&E should pursue the IEC 61850 standard on a commercial basis and what the requirements for doing so would be.
  
  – Address the IEC 61850 interoperability of merging units, process bus and station bus within the substation yard.
Project Team

• Internal groups/resources
  – Technology and System Demonstrations, Distributed Energy Resources Section (Project Technical Lead and DER engineering support staff)
  – System Protection & Control Engineering (Support staff)
  – Integrated Test Facility (ITF)

• External
  – Engineering consulting firm
  – Competitively procured contractor
Project Approach

• Conduct pilot mock-up and pre-commercial demonstration of an IEC 61850-conformant substation network
  – May take place at SDG&E’s Integrated Test Facility (ITF) or a similar facility.

• Assess the pros, cons, and benefits of using IEC 61850 by examining a variety of use cases
Project Work Flow

1. Stakeholder identification and development of SDG&E project team

2. Fact finding and baselining of legacy system approach

3. Development of project plan and RFP

4. Evaluate RFP responses and select contractor

5. Demonstration: Test system development, testing and measurement, analysis of test data, and preparation of findings and recommendations

6. Technology transfer and preparation of comprehensive final report
Proposed Use Cases

• Control/Communications Cases
  – Integrate digital messaging with analog inputs by using merging units in the substation yard
  – Test broadcast-capability of substation devices using GOOSE and measured values to protective devices

• Protection Cases
  – Demonstrate IEC 61850 integration with legacy equipment present at existing substations
  – Test the interoperability of merging units with relays for 61850-9-2 sampled values
    • Are vendor solutions configurable?
    • Are solutions compatible with devices made by other vendors?
Comparison of Legacy and IEC 61850 System

Legacy Analog System

IEC 61850 Compliant System
Our Challenges

- Interoperability of merging units / vendor-proprietary restrictions
- Developing SDG&E subject matter experts / experience with IEC 61850
Deliverables

• Comprehensive final report describing work done and results available
  – For use by SDG&E stakeholders in road mapping SDG&E’s future plans in this area
  – For delivery to CPUC to be made available to other prospective users
Current Status

✓ Project plan drafted
✓ Internal SDG&E project team formed and activities launched
✓ Project plan to be finalized in December 2016
✓ Request for Proposals to be issued by January 2017

• Next step: Competitive procurement of prime contractor in early 2017
Contact Us

For questions or interest in this project please contact:

- EPIC Program Manager
  Frank Goodman
  fgoodman@semprautilities.com

- Project Technical Lead
  Zoltan Kertay
  zkertay@seucontractor.com

© 2016 San Diego Gas & Electric Company