Modernization of Distribution System & Integration of Distributed Generation and Storage

SDGE

A Sempra Energy utility®

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Modernization of Distribution System & Integration of Distributed Generation and Storage

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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.

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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

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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

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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

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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?*

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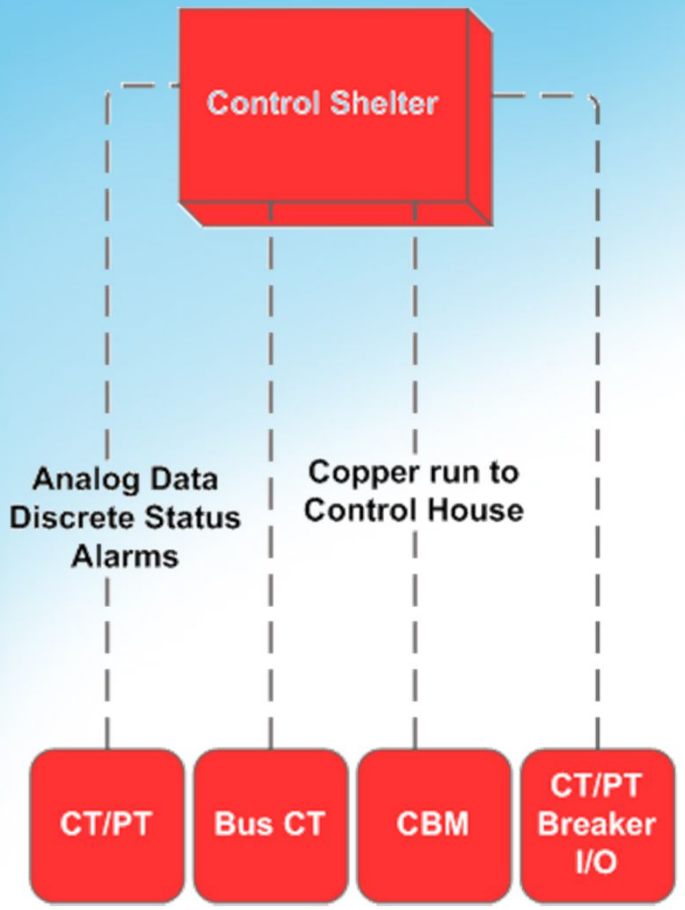
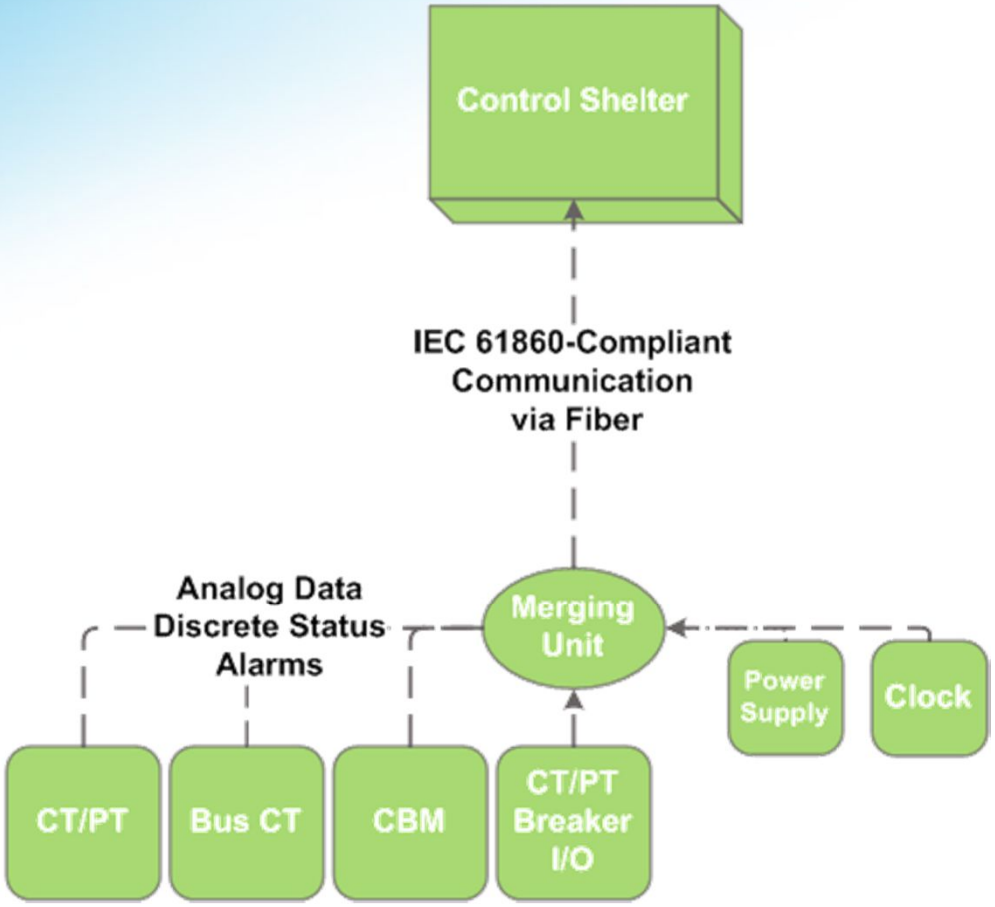
Comparison of Legacy and IEC 61850 System



Legacy Analog System



IEC 61850 Compliant System

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Our Challenges

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- 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

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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

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Contact Us

For questions or interest in this project please contact:

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