

San Diego Gas & Electric Company

SDG&E Grid Communication System

Abstract

San Diego Gas & Electric's (SDG&E's) Grid Communication System (SGCS) project includes the installation of an integrated wireless communication system. The network covers targeted intelligent electronic devices on transmission and distribution poles and other electric assets. The project is making critical communications upgrades at substations and supporting telecom sites, expanding and optimizing the communications infrastructure to support Smart Grid initiatives while increasing system resiliency. The project aims to enhance reliability and reduce outage durations and operations and maintenance costs. SGE&E is implementing two-way communications and applications to (1) allow for the integration of new distribution automation (DA) equipment, (2) provide increased system visibility and identify the scope and location of outages, and (3) prepare for more intelligent end-point devices that support new forms of electric generation such as wind and solar.

SDG&E is implementing advanced high-speed wireless communications systems, optimizing and expanding SCADA, and increasing the communications fiber footprint that will allow the utility to remotely monitor, communicate with, and control transmission and distribution equipment. Additionally, the project will improve grid security, reduce operating costs, improve grid resilience, and support future Smart Grid technologies.

Smart Grid Features

Communications Infrastructure includes a unified wireless radio frequency (RF) network that leverages multiple technologies and backhaul equipment. Technologies and equipment were evaluated in a pilot study to allow the utility to select best-of-breed systems for full-scale deployment. Wireless backhaul solutions provide the backbone for energy management programs and allow for the integration of synchrophasor technologies, DA equipment, smart meters, smart appliances, and home area networks. This scalable infrastructure provides opportunities to add future service offerings and further optimize electricity delivery, system reliability, and customer participation.

Low-Power Communications Network (LPCN) involves deployment of a proprietary unlicensed 2.4 GHz wireless radio system that provides low-speed, low-power, wide area communications to enable remote monitoring of overhead and underground fault circuit indicators (FCIs), smart transformers, Federal Aviation Administration (FAA) tower obstruction lights, and other similar low-bandwidth assets.

At-A-Glance

Recipient: San Diego Gas & Electric Company

State: California

NERC Region: Western Electricity Coordinating Council

Total Budget: \$59,427,645

Federal Share: \$28,115,052

Project Type: Electric Distribution Systems

Equipment

- Low-Power Wireless Communications Network
- SCADA Narrowband Internet Protocol (IP)-Based Network
- Expanded Substation Wide Area / Local Area Networks (WAN/LAN)
 - Microwave Technologies
 - FIBER JMUX Equipment
 - Substation Hardened Network Routers and Switches
- Field Broadband Device Connections
 - Unlicensed and "Lightly" Licensed Broadband Point-to-Point (PTP), Point-to-Multipoint (PTMP), and Mesh Wireless Radio Equipment
 - Distribution Automation Communications Network

Targeted Benefits

- Improved Electric Service Reliability and Power Quality
- Reduced Costs from Equipment Failures and Distribution Line Losses
- Reduced Troubleshooter Dispatch
- Reduced Service Costs for Customers
- Reduced Operating and Maintenance Costs

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Field Broadband Device Connections (FBDCs) at targeted locations support up to 80 advanced SCADA devices (high-speed SCADA devices with phasor measurement units enabled) and other high-speed intelligent electronic devices installed on 10 distribution circuits. This deployment creates a high-speed wireless radio infrastructure for future Smart Grid expansion.

SCADA Optimization & Enhancements include implementation of a narrowband internet protocol (IP)-based SCADA system to increase system capacity and enhance electric grid operations.

Substation Communications (SubComm) involves expansion of SDG&E's wide area network (WAN) to connect additional substations via microwave and last-mile fiber.

Lessons Learned (to date)

- One overall technology solution may not address all communications needs for an organization. Unique service territory characteristics may require a combination of technologies for optimal network performance.
- Pilot testing with end-user devices may uncover the need for more targeted solutions.
- Utilities implementing similar projects should allow significant lead time to accommodate any zoning and permitting requirements for multiple site implementations.

Future Plans

SDG&E plans to use its newly implemented advanced wireless communications system to monitor, communicate with, and control transmission and distribution equipment. In addition, the utility will utilize and expand the new high-speed wireless communications system to support additional Smart Grid functionality such as microgrids, advanced battery storage, dynamic voltage controllers, falling conductor applications, high-risk fire mitigation, and photovoltaic penetration volatility.

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