

Smart Grid Architecture Demonstrations



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Smart Grid Architecture Demonstration

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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

- **Perform pre-commercial demonstration of key candidate prototype building blocks (Intelligent Electronic Devices (IED), Systems, and Communication Standards).**
- **Improve the understanding of alternatives for future electrical system configurations and communication protocols, object models, and related standards.**
- **Document results to support communication standards decisions in development of a networked communication architecture.**
 - **For use by SDG&E internal stakeholders**
 - **For use by others**

Project Approach



- **Review existing SDG&E architecture, identifying next generation architecture principles, and evaluating standards and protocols for the various architectural constructs.**
- **Undertake a pre-commercial demonstration in a lab environment utilizing next generation architecture standards and protocols.**
- **Assess alternatives and develop recommendations for future adoption.**

Project Focus

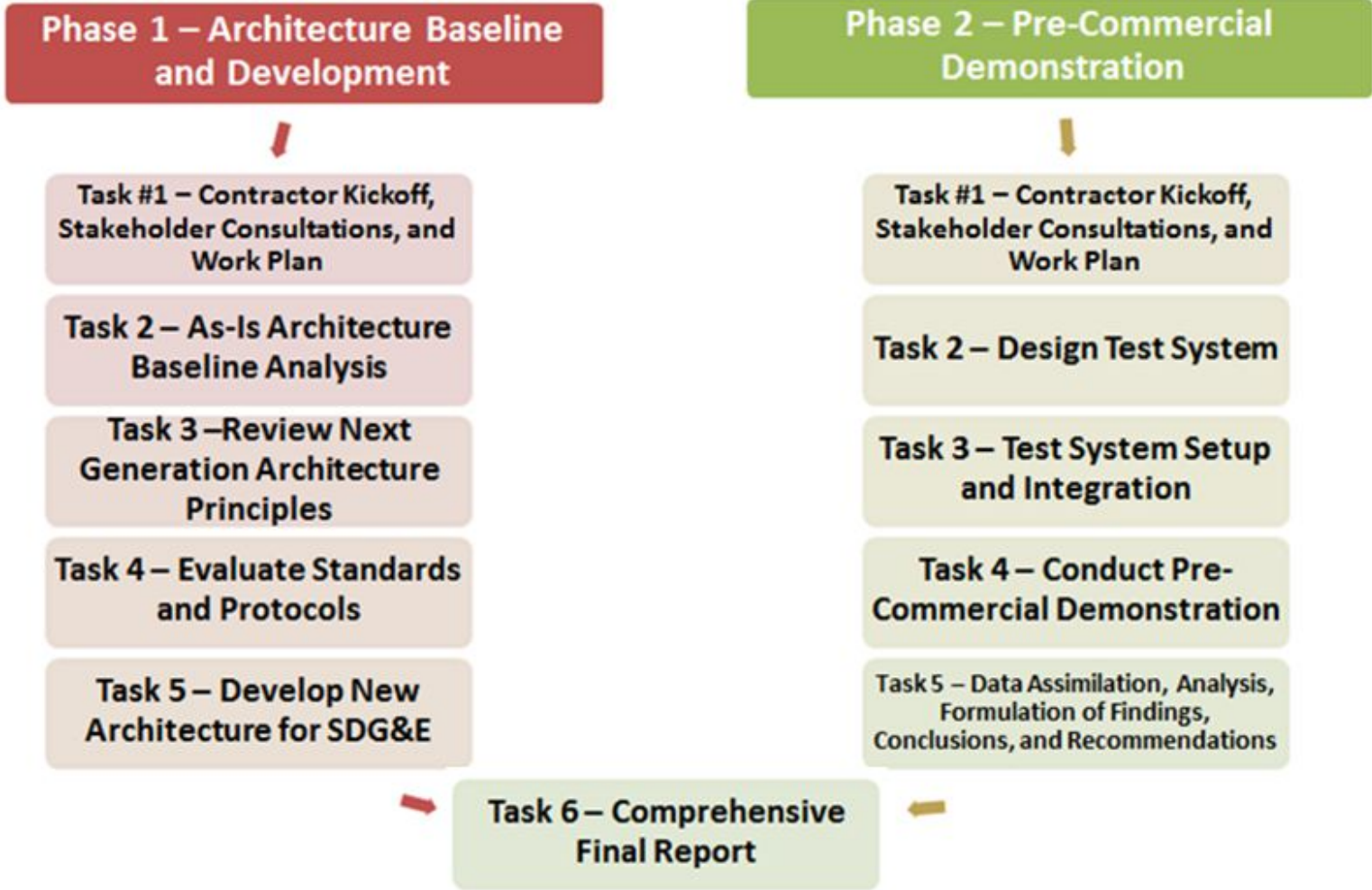
- **Determine preferred options for migrating legacy communication infrastructure to newly emerging industry standards.**
- **Build on existing architectural concepts, including the IEC 61850 and other relevant utility reference architectures.**
- **Simulate data flow between various devices and systems in the existing architecture in various use cases.**
- **Identify and capture high level functionalities and interoperability requirements of various systems.**

Project Phases



- **SDG&E Internal Project Work Prior to Contractor Procurement**
- **Team effort of SDG&E and Contractor:**
 - **Architecture Baseline and Development**
 - **Conduct Pre-Commercial Demonstration (Lab environment and field deployment)**

Project Phases



Data Flow and Functionalities (Phase 1)

- **SCADA and network operation**
- **Substation protection, monitoring, and control**
- **Advanced distribution automation**
- **Advanced distribution management**
- **Distributed energy resources (DER)**
- **Demand response and load control**
- **Meter reading and control**
- **Customers systems integration**
- **Operational planning and optimization**
- **Records and asset management**

Distribution Equipment Focus (Phase 2)

- **Interoperability with IEDs and Advanced Energy Storage**
- **Demonstrate a Distribution Process Bus using modern architecture and standard distribution equipment:**
 - **SCADA Distribution Feeder Switch. Ex: Trayer**
 - **Distribution Feeder Circuit Breaker**
 - **Reclosers (Ex: Cooper Form 6 and Intellirupters)**
 - **Fault interrupters (Ex: Elastimold Vacuum Interrupter)**
 - **Voltage Regulators**
 - **SCADA Capacitor**
 - **Dynamic Voltage Controller**
 - **Advanced Energy Storage (Ex: Battery Storage Inverter)**

Project Team



- **Internal SDG&E Groups**

- **System Protection and Controls Engineering**
- **Development and Advance Technology Integration**
- **Information Technology**
- **Information Security**
- **Electric Distribution Operations**
- **Distributed Energy Resources**

- **Contractor**

Project Schedule

- **SDG&E Internal Project Work**
 - **In progress and continuing to project completion**
 - **Includes selection of a contractor**
- **Architecture Baseline and Development**
 - **December 2016 to August 2017**
- **Conduct Pre-Commercial Demonstration (Lab environment and field deployment)**
 - **January 2017 to August 2017**
- **Contractor's Final Report**
 - **September 2017**

Project Status



- **Project plan developed**
- **Internal project team formed**
- **Internal literature review conducted**
- **Status of communication standards under review**
- **Request for proposal released; anticipated contractor selection date:**
 - **December 2016**

Remaining Steps

- **Review contractor proposals**
- **Select contractor**
- **Hold kickoff meeting with internal team and contractor**
- **Perform baseline analysis**
- **Perform pre-commercial demonstration**
- **Prepare final report**

Thank you



Q&A

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