CASE STUDY:
DER Utility Integration

Utility Integration of DER assets for PG&E as per California Rule 21 Guideline

For Power Distribution Utility

Clientele

Pacific Gas and Electric Company incorporated us one of the largest combined natural gas and electric energy companies in the United States. The company provides natural gas and electric service to approximately **5.5 million** *people throughout a* **70,000**-*square-mile service area in northern and central California using* **106,681** *circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines.*

Executive Summary

As part of PG&E's goals to reduce interconnection costs and enable Distributed Energy Resource (DER) integration, PG&E is implementing a Common Smart Inverter Profile (CSIP) certified IEEE 2030.5 enabled utility headend solution to demonstrate the ability to monitor and control DERs.

To reduce customer costs for large DER interconnections, the ownership and control of customer sited telemetry devices will likely be transitioning from the utility to customers. With this change, come potential interoperability and cybersecurity risks that need to be evaluated and mitigated. PG&E planned to procure and test the capability of customer-owned site-located IEEE 2030.5 compliant Remote Site Gateways to communicate securely with PG&E's IEEE 2030.5 utility headend. Additionally, the Remote Site Gateway must be able to communicate with the DER device on site (e.g., smart inverter or Energy Management System (EMS)) using communication interfaces defined in IEEE 1547-2018.

The communication capabilities of the Remote Site Gateway will be validated through testing at PG&E's Applied Technology Services (ATS) facility. There may be additional tests conducted at external third-party sites (e.g., cybersecurity penetration testing). PG&E will conduct the testing with an eye towards production.

Kalkitech

Kalki Communication Technologies Pvt Ltd

Challenges

Client is looking for the Remote Site Gateway device which shall have certification by an authorized testing laboratory to be compliant with the CSIP 2.1 specification. The device shall also meet the functional, non-functional, and cyber security specifications provided by PG&E.

The intended Remote Site Gateway shall also have capabilities to control DERs using CSIP 2.1 defined implementation of Rule 21 Smart Inverter Working Group (SIWG) and specific Phase 3 functions.

Client also requires a centralized management platform to monitor the gateway status and logs. Management system shall also be used for remote maintenance activities including configuration management, updating security and application patches etc.

How ASE/Kalkitech Solution helped

Kalkitech DER Gateway SYNC2310 along with was Kalki.io SaaS was used as the solution to meet the requirement. SYNC DER Gateway used IEEE 1547-2018 defined Sunspec Modbus/DNP3.0 interface to communicate with inverters/EMS (customer DER devices) and poll telemetry data.

*ASE/Kalkitech enabled PG&E to adopt a Remote site Gateway complying to the CSIP standard and **California Rule 21** Guideline. Gateway with multi-protocol conversion engine with **IEEE2030.5** function set helps utility to integrate with multiple types and models of inverters over various protocols including sun-spec, Modbus, DNP3.0 etc. for both telemetry and Control use case.*

The polling frequency and post rate will be configured by customer. Collected data is send the data to PG&E Headend via the IEEE 2030.5 protocol.

Gateway flexible SunSpec Modbus libraries helps utility to load any SunSpec Modbus map during

configuration as per the DER assets which is connected and shall have full capabilities available as defined in SunSpec Modbus 700 series. SYNC device also can assign unique identifiers and differentiate connections/data for multiple assets that may be needed for site telemetry (e.g., inverters, EMS, net load metering, etc.). Gateway also include an LTE modem complying to FirstNet (LTE Band 14) modem) to communicate with the communication network implemented by utility.
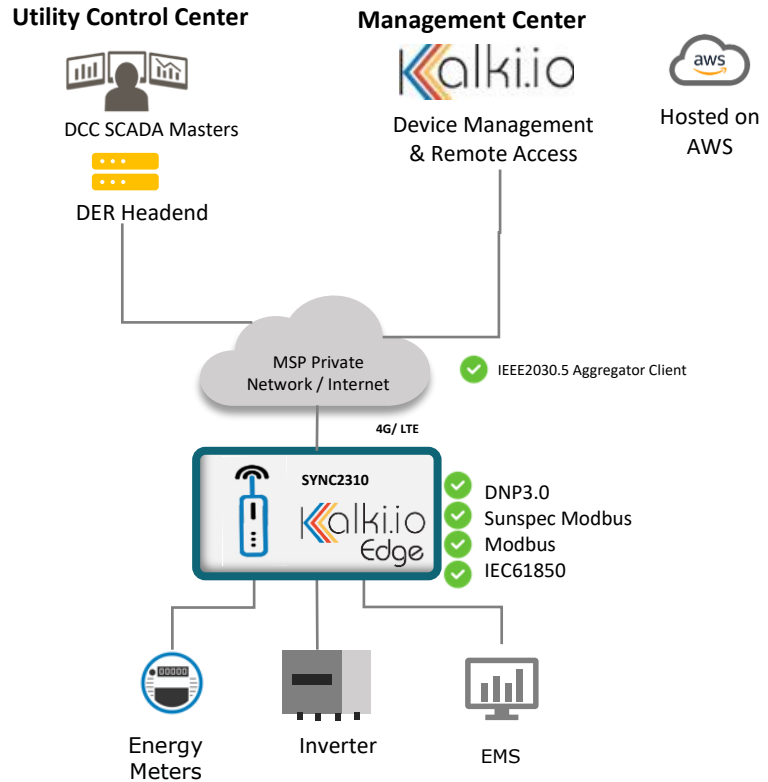
Kalki.io Device management service software as a service (SaaS) is hosted on Amazon Elastic Compute Cloud (Amazon EC2) instance. DER device status, and log are collected by Kalki.io for regular operations and monitoring purpose. Kalki.io is also used for management of the device configuration and updates. User can schedule the firmware updates in kalki.io as part of regular maintenance schedule. Kalki.io also serves as remote access service to access gateway and downstream devices through an over zero-trust access control.

Results & Conclusion

ASE solution helped PG&E to integrate multiple types of DER assets using SYNC2310 DER Gateway. PG&E has tested and approved the solution for interoperability with PG&E's Common Smart Inverter Profile (CSIP)-certified IEEE 2030.5 solution as required by California Public Utilities Commission (CPUC) Resolution E-5038.