Grid Metering for Generation and Distribution

Background
Customer:
State Transmission Company (STC) in North India

Industry:
Power Transmission

Solutions
MDAS on kalki.io platform

Eltrix DOPS for Transmission Operation Management

SYNC 2000

The overall solution was to achieve grid metering for generation and distribution, with scheduling, accounting and settlement systems for the power transmission utility.

Challenge
There was a need to collect meter data from manual channels as well as automated ones and make this information available to the operations management system that handled complex transactions.

Business Need

The STC sought to implement a smart system for Transmission Operations Management to enable the State Load Dispatch Center (SLDC) to manage daily business operations including scheduling, accounting, settlement and invoicing of energy. In addition, they sought to ensure that business processes would be streamlined with necessary controls to reduce operational risks.

The system needed to be capable of collecting meter data from around 5000 grid interface energy meters of different types (ABT and ToD meters[1]) at specific time intervals every day. This data needed to be accessible to the Transmission Operations Management system to enable it with the essential input to handle scheduling, accounting and settlement for multiple stakeholders, including solar and wind farm generators, thermal power generators, distribution utilities in the state and open access customers[2].

The STC wanted an automated meter reading system to retrieve 15-minute interval meter data from ABT and ToD meters using DCU's, modems and a head end system in order to publish it to the central database of the Transmission Operations Management system.

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[1] *ABT = Availability Based Tariff; ToD = Time of Day*
[2] *Open access customers are large power consumers who can buy power directly from the power transmission company instead of buying it from the local power distribution company*

Solution

Kalki.io was selected to facilitate collection of metering data from multiple locations spread across the state and to centrally aggregate it. Meters are connected through a data concentrator installed in each location that connects to kalki.io over a cellular network. The data can be easily and securely accessed remotely by users and applications. Since the operations management system required access to meter data, kalki.io was ideal because of its simple and straight forward mechanism to access data using REST APIs over JSON format.

Kalki.io successfully demonstrated its ability to acquire data from multiple locations and centrally aggregate it, making it available for the Eltrix DOPS system handling the settlements.

Results

Other benefits of the MDAS application include the ability to handle different meter types / templates and logical grouping of meters. It also offers core platform capabilities like device management, security and redundancy, providing a powerful yet easy-to-manage comprehensive solution.

The kalki.io MDAS application offers integrated capability to handle meter templates. With templates, adding new meters is simplified and accelerated. Around 30 parameters need to be configured for each meter, and this is done easily through templates.

The kalki.io platform portal helps in configuring meters, managing other meter related tasks from the MDAS application, and in configuring and viewing custom dashboards, reports, etc. Reports can be generated for data availability and time synchronization for meters, making it easy to track if these parameters are in place, and to know if any action is needed.

Another related advantage is the logical grouping of meters, given the different types of stakeholders involved in this case. This enables the STC to create reports based on groups, such as generators, renewable energy suppliers, or railways as consumers. The same meter can be mapped to multiple groups to provide flexibility in analysis.

Other devices, such as Data Concentrator Units (DCU), Kalkitech's SYNC 2000, are used to collect data and interface seamlessly with the kalki.io platform. Link redundancy for these devices (which have an internal as well as external modem) is supported by the platform. Central management features such as data monitoring and device configuration and firmware management add to the ease of managing these devices as part of the infrastructure.

System security is important, given the high value of payments that depend on accurate data. Tampering of the system can lead to serious repercussions, including but not limited to financial losses arising out of incorrect payment calculations. Kalki.io is a secure platform, that uses end-to-end encrypted connections for communications. Two-way authentication is used, and each component is at least TLS 1.2+ compliant. Only devices with the right security certificates and licenses can connect with the platform and exchange data with kalki.io reducing unauthorized access.

Diagnostics of network and device health are critical to the STC since their assets are spread across the state and site visits are costly. Kalki.io remotely monitors the health of the network and connects to distributed field devices and offers detailed diagnostic dashboards with summarized information such as data acquisition efficiency, availability of interval data and communication status of DCUs. A notification of any device outage is sent to the user with details of communication diagnostics logs to simplify and accelerate identification of root cause of communication issues. Remote configuration updates significantly reduce the number of field visits required by maintenance staff. The kalki.io platform's built-in redundancy ensures that even in times of infrastructure failure, such as a server crash, a redundant server can immediately take over. The server load balancing feature ensures better utilization of available resources. The platform has a capability to set up a DR site that is always up-to-date through incremental database backups and can be activated to take over should the primary site fail.
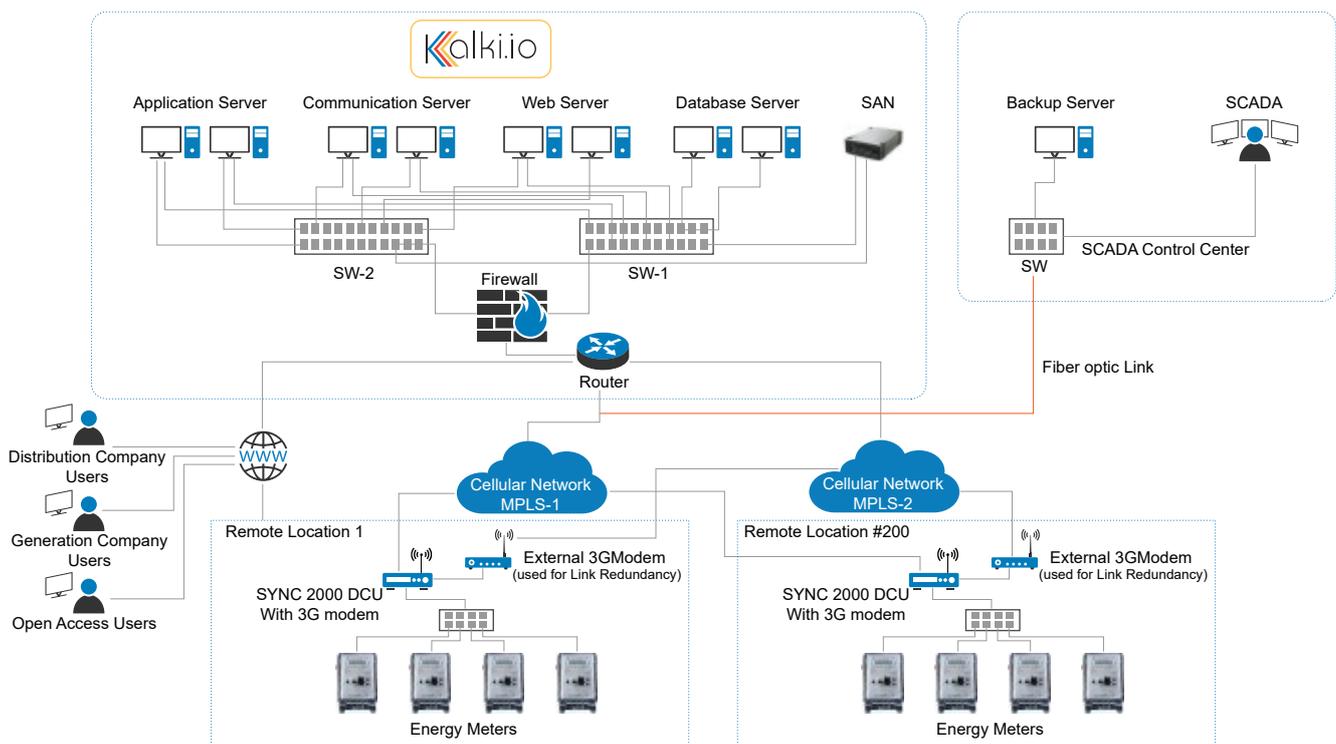

Figure 1: Solution Architecture