HARNESSING 5G TECHNOLOGY TO IMPROVE SOLAR FARM EFFICIENCY THROUGH REMOTE MONITORING AND MANAGEMENT SYSTEM

Customer

Clean Energy Firm

Application

Industrial IoT/M2M Connectivity for Renewable Energy

Solution

BEC MXConnect® MX-220-UT-5G Advanced Industrial Router

Data Connectivity

5G Connectivity

Results

Clean Energy Firm improves the operational efficiency of a 5 MW Community Solar Farm with BEC's MX-220-UT-5G Advanced Industrial Router.

Summary

Solar power farms have gained prominence in the quest for sustainable energy solutions. Remote monitoring and management systems have become essential to optimize efficiency and performance. This case study delves into the 5G device connectivity implementation that enabled remote monitoring and management of a Community Solar farm, improving efficiency and operational effectiveness.

Customer Background

The customer is a well-established Clean Energy firm with 15 years of experience. They specialize in developing, constructing, and operating complete renewable energy solutions for utility-scale and distributed solar farms. Additionally, they provide services related to storage, smart EV charging, microgrids, and energy management systems tailored to commercial and industrial clients.

Challenges

Setting up and running solar farms presents multiple challenges. The installation process is not only expensive but logistically intricate. Furthermore, the maintenance and inspection of solar farms post-operation can prove challenging due to various factors, including geographic constraints, weather, and climate conditions, and the need for effective system monitoring. Given their typical deployment in remote areas, traditional monitoring systems were limited in their reach, making it challenging to collect real-time data and monitor performance.

The chosen PV inverters, operating on a three-phase system, provided multiple connectivity options via RS-485, Ethernet, and Wi-Fi. Due to their familiarity with Wi-Fi technology, the company purchased additional Wi-Fi Plug-in modules for each inverter. However, this configuration designates the inverters as Wi-Fi clients, requiring an outdoor Wi-Fi router with internet access. Due to issues related to interference and weather conditions, Wi-Fi connectivity was unreliable. As a result, the company decided to explore using 5G technology as an alternative solution.

Solutions

To overcome the challenges, the company opted for the MX-220-UT-5G Advanced Industrial Router to establish connectivity for their solar farm infrastructure. With features such as Dual SIM interfaces, Dual-Gigabit Ethernet, multiple RS-232/RS-485 ports, and digital IO capabilities, this router provides robust connectivity, flexibility, and redundancy, effectively meeting the company's requirements. The company was able to daisy chain each inverter via the RS-485 interfaces and utilize Ethernet connectivity to the MX-220-UT-5G, enabling additional connectivity to better storage systems and surveillance cameras.

Results

The MX-220-UT-5G implementation significantly affected the community solar farm, spanning about 32 acres and equipped with approximately 14,800 solar panels. Utilizing the MX-220-UT-5G router, the solar farm achieved fast, reliable, and secure communication for transmitting essential data on energy production, performance, and potential issues to a centralized monitoring system.

The company reduced overall costs and improved operational efficiency by implementing real-time production and consumption monitoring, predictive maintenance, remote troubleshooting capabilities, performance control, and video surveillance to ensure physical security.