Wireless Technology for Industrial Automated Demand Reduction and Energy Saving

Functional Devices, Inc., Honeywell Smart Grid Solutions

When a large manufacturing facility with 70 rooftop air conditioning units in Grand Terrace, California wanted to address the need for an automated demand reduction solution for the purposes of allowing their utility to unload portions of their load from the grid, a collaborative solution pairing wireless and wired, was the perfect solution.

Honeywell Smart Grid Solutions and Functional Devices, Inc. [1], both members of EnOcean Alliance [2], responded with an integrated solution that involved both short range and long-range wireless technologies. Although energy efficiency wasn't the primary goal, the Automated Demand Response (ADR) program resulted in energy savings and a noticeable bill reduction.

In California, this is not a unique need. Electricity rates are rising and rolling blackouts and brownouts are increasingly becoming more common with utilities trying to find ways to reduce demand and alleviate the need to add generation.

Three years ago, in a response to growing concern for energy conservation, the Department of Energy initiated an $11 million dollar grant [3] to deliver ADR solutions into California investor-owned utilities. Over a trillion dollars in energy savings opportunities are available in the U.S. In order to realize these savings, however, state and local programs need to become involved for financing of efficiency measures – by offering programs such as repayment on utility bills and/or property tax bills. Such measures, including the support of most efficient technologies to increase energy productivity across the economy, are part of the Energy 2030 [4] plan of the Alliance Commission on National Energy Efficiency Policy, with government objectives to cut energy waste in buildings and homes in half by 2030.

Projects like the one described in this case study are one example of how wireless technology utilizing the EnOcean [5] standard can be integrated into a larger system for effective control and to meet these energy saving requirements.

Honeywell Smart Grid Solutions specializes in designing solutions that allow utilities some mode of control over how they unload grid power. At this California manufacturing facility, Akuacom [6] (also a Honeywell company) provided the Demand Response Automation Server (DRAS) through the local utility, SCS. EnOcean Alliance member Tridium [7] manufactured the ADR gateway, which is based upon their JACE (Java Application Control Engine) controller and was adapted by the DOE project team of Honeywell Smart Grid Solutions to use as the Automated Demand Response Gateway.

By creating a suite of drivers to communicate to the Akuacom DRAS, this client gateway enables a site to communicate with that server. These communications include meter interval data using the oBIX Data Transport ™ driver.

This will allow meter loads to be visible to the user and the utility in near real-time, as well as the Open Automated Demand Response (OADR) first generation driver to handshake with the server on event state dispatch conditions. This driver suite will be changed shortly to the new AODR 2.0a/b driver in compliance with the Open ADR Alliance development of new ADR standards and the adoption by such agencies as the California Public Utilities Commission (CPUC). The new driver suite will allow for a much broader range of responses, new reporting structure for monitoring and reporting tools for the owners and for client communications monitoring for reliability of the system.

The Honeywell & Functional Devices team took Tridium’s JACE controller and

implemented machine-level programming, allowing it to communicate with DRAS and the system at large. The Demand Response event information from the DRAS is passed onto the JACE controller and then out to the different control systems via a wireless bridge. The 70 rooftop air conditioners on the buildings needed the ability to receive a demand response signal, which allows different timing of events to occur through the 70 wireless relay receivers meshed across the rooftop. These wireless relays are manufactured by Functional Devices, better known in the industry as RIB wireless relays.

Combining both Functional Devices' long-range RIB wireless device network with the short range EnOcean RIB relay network, allowed for such a project to be possible, where years ago it was unthinkable to do. In addition, utilizing a wireless solution eliminated the traditional wiring associated with the equipment on the rooftop, saving thousands of dollars while eliminating added expenses with material and labor, saving additional monies.

It is becoming increasingly important to be able to provide building owners and facility managers with "solutions" instead of expecting them to know how to string together the necessary hardware and software for a project.

However, whether it is for Demand Response, energy management projects or just upgrading building automation systems, there are many possibilities with these wireless technology products.

EnOcean-enabled technology, which is both wireless and self-powered due to energy harvesting, can be adopted as a stand-alone solution to control HVAC, lighting and plug loads, or integrated into a larger solution combining a variety of technologies and communication standards. There are obvious instances where wireless sensors and switches are the most cost effective solution: particularly in retrofits, in situations where project timing is critical, where there is an abundance of glass fenestration (making wiring difficult) and where it is desirable to have device maintenance kept to a minimum.

In this instance, the manufacturing facility in California was able to take advantage of a variety of solutions working together to control the significant load from the grid. The energy harvesting technology and relays enabled considerable energy savings and provide an excellent example of Building Automation Systems, HVAC, and Energy Savings Groups working together with wireless and non-wireless

solutions for a terrific result.

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