SCE DRET Findings
February 2015

DR12.08.02: Demand Response Ready Pool Pumps for Residential Retrofit Using ZigBee/Wi-Fi

OPPORTUNITY

In residential properties, pool pumps are generally the largest single electrical end-user. Pump motors **draw an average of 1.36 kW.**

There are many studies that prove demand reduction can be achieved when the utility sends a signal. This study evaluates the operation and capabilities of Demand Response (DR) controllers applied to single-speed residential pool pumps using ZigBee as the communication link within the residence. Testing of the communication abilities was conducted at 4 residential sites.

TECHNOLOGY

The Gateway connects to the homeowner's internet router via an Ethernet cable. This allows the customer to access and control the pump schedule of operation through a computer or mobile device.

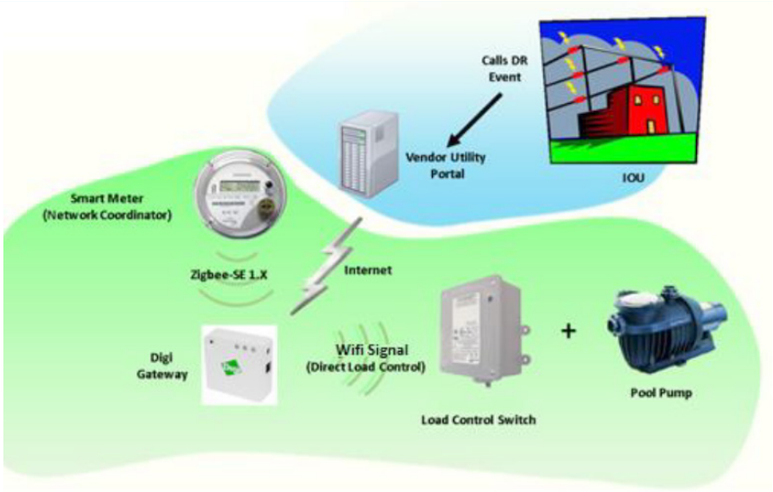

Figure 1. Communication Architecture

Communication Architecture: Two types of DR control products were tested using ZigBee in this study; **a load controller** (a switch that turns the pump motor on or off), and **a communication gateway** to receive and transmit DR signal using ZigBee wireless signals to the load controller. The gateway also communicates with the customer's SCE smart meter using ZigBee.

RESULTS

Clean and stable communications could not be established between the Gateway, load controller, and Smart Meter.

The test was unsuccessful at communicating signals using ZigBee reliably to initiate DR events for the pool pump motor load controllers during this trial. Equipment problems were encountered during the implementation and testing of the DR control devices. The primary problem encountered was establishing clean and stable communication between the gateway, the load controller and the smart meter. Important data gathered for the project such as when a certain percentage of pumps are on during the day, magnitude of pool pump load, etc., may be useful information for studies related to pool pumps.

CONCLUSION

Opportunity for DR on Pool Pumps exists possibly with another communication protocol.

As a result of these failures, and internal discussion with SCE's Advanced Technology Organization, no further testing of the ZigBee 1.X products will be pursued by SCE.