In the last several years, demand response programs have steadily migrated from one-way communicating devices to two-way communicating smart thermostats (both direct install and bring your own thermostat (BYOT)) and load control switches. Two-way communications add several benefits to the utility, including more precise control events through performance monitoring of connected devices and making real-time adjustments, as well as constant insight into device availability. This white paper explores these benefits in more detail.

There are a number of network options that utilities can use to communicate back and forth with these devices, such as advanced metering infrastructure (AMI), cellular and Wi-Fi.
Wi-Fi offers utilities a superior option due to cost-effectiveness, high bandwidth and increasing ubiquity in households and small business. However, the primary drawback with Wi-Fi is that the consumer owns and controls the network, which makes it difficult to keep 100 percent of devices connected.

For more than two years, Itron has been working with Wi-Fi devices for demand response and energy efficiency programs, and in this paper we share lessons learned to help keep devices online.

1. Give the Customer a Reason to Stay Connected
The easiest way to keep Wi-Fi devices online is to encourage the customer to want to keep the device online. For smart thermostat customers, this can be accomplished by providing engaging applications and tools that help the customer manage the thermostat in ways that drive substantial energy savings. Most Wi-Fi thermostats include an app that enables the user to monitor the temperature of their home remotely, program the schedule of their thermostat, and adjust temperature and mode. But an engaging app goes further and offers actionable energy-saving suggestions with personalized estimates of expected bill savings.

Once the customer begins to see the bill savings resulting from these insights and automation, they will feel more compelled to make sure the device remains connected. While the above carrot approach works for smart thermostat customers, it doesn’t apply to load control switch customers. For these customers, more often than not, the stick approach of withholding their incentives encourages them to maintain connectivity. Many users sign up for demand response programs based on the financial incentives, which are usually paid on an annual or per-event basis. Therefore, it is incumbent to ensure the customer is aware that they will not receive any incentives unless the device remains online.

Dynamic pricing programs provide another great motivator for customers to keep their Wi-Fi devices online and connected, since failure to automatically respond to a high price period could translate to a high energy bill. We typically see higher device connectivity in these programs than direct load control programs.

2. Optimize Device Firmware for Reconnecting
The Wi-Fi connected thermostats and load control switches being deployed should include firmware that is designed to understand the process for reconnecting when the customer changes passwords, routers or even internet service providers (ISP). The device and system should also be able to reconnect after a router gets reset or unplugged at night. This is critically important as our data shows these are the most common reasons for devices going offline.

3. Configure the Demand Response Management System to Receive Notifications for Offline Devices
One of the benefits of two-way devices is the insight given into device availability prior to executing control events. Utilities should use this capability to perform constant checks on device availability. The demand response management system (DRMS) used to control the devices should be configured to deliver notifications to a call center or network operations center once a device is offline. Utilities should then regularly review the offline device aging report and take appropriate actions (see step 4).
This figure shows how we can identify offline devices by using a map to see if there is a pattern to the geographical dispersion of the offline devices. We also generate a sorted table of the device status to use for targeted customer notifications.

4. Implement a Multi-Pronged Communication Approach to Reconnect Offline Devices

Once utilities establish that a device is offline, they should develop a multi-faceted communications process to get the customer back online. They can send text messages and emails to the customer with notifications and instructions or use highly-trained call center staff to contact customers and work with them to get the device back online. Given the reluctance some people have to answer calls from an unknown number, we also recommend leaving the instructions on voice mail.

For example, a communications program we implemented for one of our utility clients that notified customers to reconnect their offline thermostats increased the amount of online thermostats to more than 95%.

It is also particularly important to have a communications strategy to manage customers who have moved into a new home that contains a Wi-Fi device that was once part of the program. Once utilities are aware someone has moved into this home, they should send that person a mailer notifying them of the benefits of joining the program and follow up with a call soon thereafter.

5. Educate the Customer During the Installation Process

When a field technician is at the participant’s home installing the smart thermostat, the technician should take the time to walk the participant through the process for reconnecting the device, while also providing an easy reference card that includes step-by-step instructions.

CONCLUSION

As utilities start implementing more and more Wi-Fi connected devices for demand response programs, it is critical for the cost-effectiveness of the program to keep the devices online. In this paper, we’ve shared Itron’s initial findings on best practices that should lead to ensuring a high percentage of devices remain online and available for demand response control events.
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