Capturing Value from Connected Homes

Pacific Northwest NATIONAL LABORATORY

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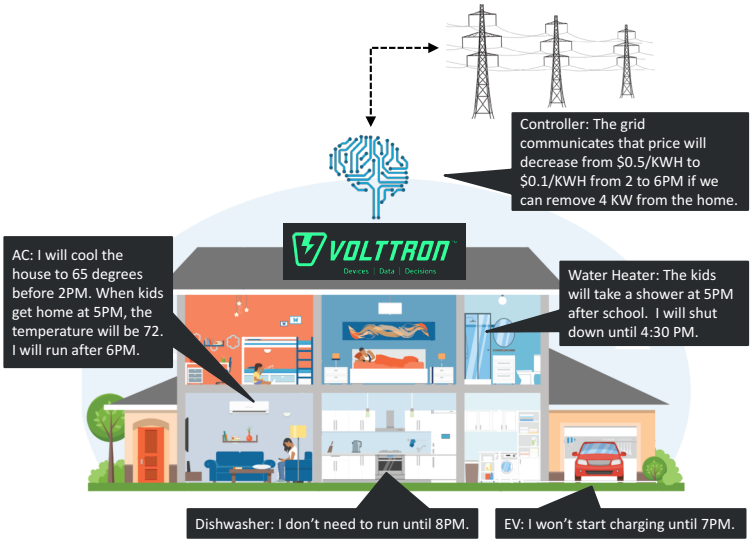
Despite the projected tremendous market growth of connected devices in the near future, current "connected" technologies for residential buildings have not been valued in the mainstream housing market, according to our findings from focus groups held with the National Association of Realtors. This is partially due to lack of clear consumer benefits beyond convenience, or demonstrated grid benefits that utilities could reward. As a result, many applications for smart home devices function as internet-based digital remote controls—in terms of providing a digital interface through IoT devices—that provide convenience to the consumer.

At Pacific Northwest National Laboratory, we are focused on developing system-level research strategies that enable a full integration of fragmentally-developed connected devices—"fragmented" in terms of being cyber-physical assets as well as data repositories. To accomplish this, PNNL is evaluating platforms to commingle data allowing control applications to not only integrate the devices operations seamlessly, but also derive energy-related insights that could benefit the consumer and utility. Additionally, these platforms may create new opportunity points for consumer or sales interaction that could lead to more efficient energy utilization. Ultimately, any platform for home related information must enable and allow for transaction of services beyond energy. Resulting solutions and applications should be driven by consumer desires to deliver what is most important to home owners.

REDEFINING HOME

We believe that a home is more than a collection of devices. Homes are vessels for activities, events, memories, and other time-based interactions—these interactions lead to consumer decisions either immediately or in the future that affect their energy usage. Therefore, home applications should learn and adapt to unique home settings and even embrace social interaction beyond simply looking at a users' calendar. Home is also an investment and a place of use and maintenance, where energy plays a large part.

Home applications should capture all aspects of lives as a record of home and as an interactive dynamic member of the family. Various services that provide value can be delivered from these applications. For the Department of Energy (DOE), those services help the consumer achieve energy efficiency or may help utilities improve their operations. It will take common storage and collection of home-related information on a centralized platform to allow for this analysis and in order to deliver targeted advertisements, opportunity, and action.



How Transactive Controls work in homes. Fully integrate the current and future IoT devices and automatically detect and connect to new devices, learn and adapt to unique home settings and embrace social interaction, and driven by consumer desires and deliver what is most important to home users.

Simply, connected devices could offer more value and insights for utilities[1], just as they offer more benefits and values to consumers, if they were integrated more closely to either party—beyond being remote controls or digital interfaces to analog devices.

OUR MISSION

PNNL is developing a proof-of-concept in summer 2017 and plans to pilot test with interested utilities in fall 2017 to verify these assumptions and measure the solution's value. The proof-of-concept will demonstrate an in-home load control and coordination platform using VOLTTRON™ (DOE's open source controls platform). The goal of PNNL's DOE Buildings-to-Grid portfolio is to enable a truly transactive utility network for residential buildings, the attributes of which are also shared with small commercial buildings. Transactive energy is a system of economic and control mechanisms that allows the dynamic balance of supply and demand across the entire electrical system.

[1] Utilities' demand-response programs that relies on control signals to be passed (from grid to house) have low participation rates due to the historical lack of knowledge of behind-the-meter activities.

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