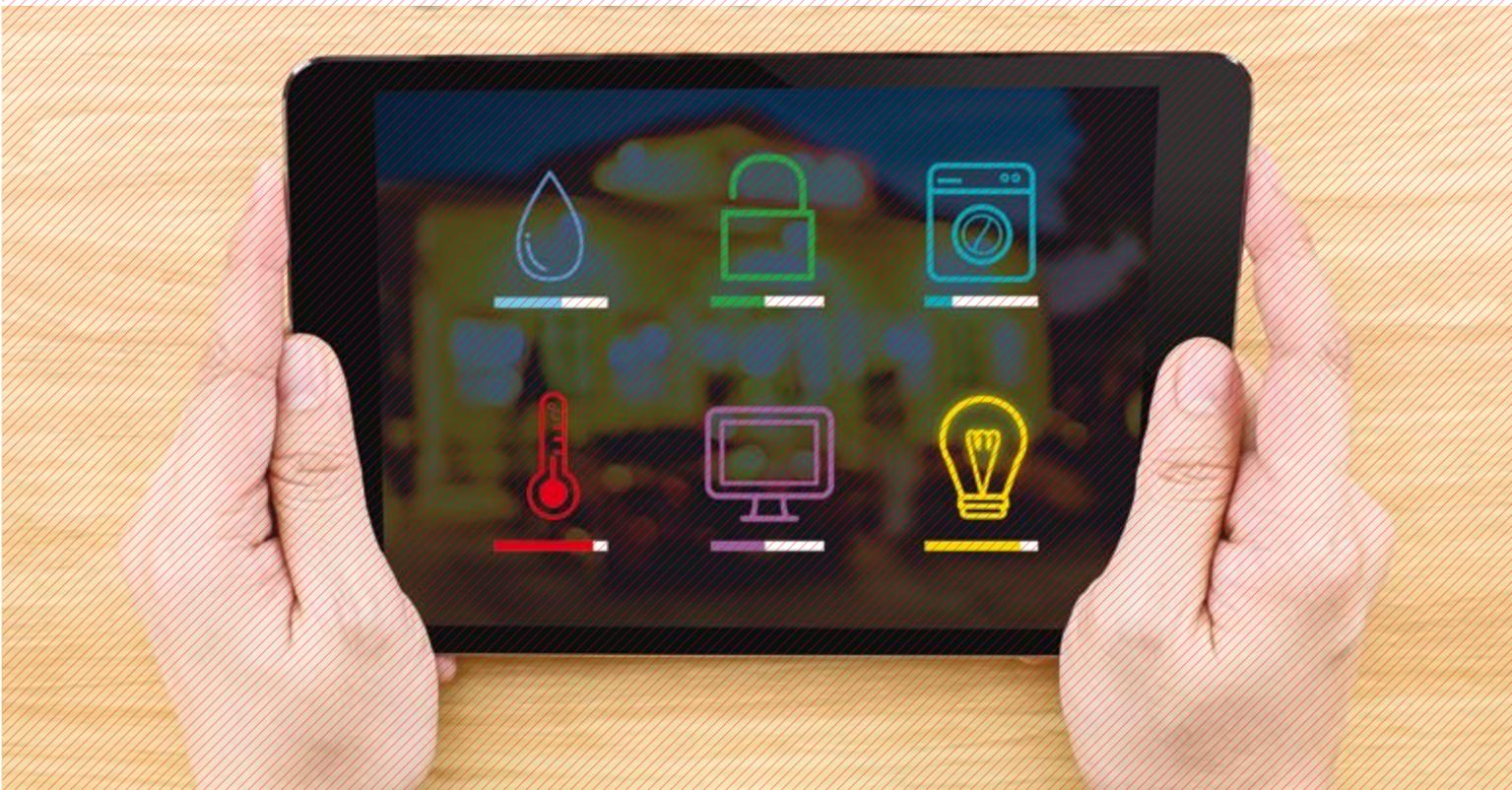# Connected Home Technologies

Part 2

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Hartford Steam Boiler

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Hartford Steam Boiler has set the standard in equipment breakdown insurance by anticipating and analyzing emerging risks. Today, with the number of home technology products – and consumer demand – growing, we have developed a series on **The Connected Home**. In this series, we examine what the connected home looks like today, how connectivity is being pursued, what to look for in the future, and the kinds of coverage and services that will be needed.

Outpacing Change – The Evolution of the Connected Home, Part II

With the proliferation of personal smart phones, high-speed Internet and Wi-Fi, homeowners have the technology to control, with a few clicks, all major appliances, electronic devices, heat and lights. We call this quickly emerging trend the Connected Home. And because these new capabilities provide comfort, convenience, energy efficiency and cost savings, consumer demand is growing dramatically.

In the first part of this series, we focused on the market, the opportunity and some of the challenges of this evolving consumer technology. In Part Two, we look more closely at some of the available products and protocols, two key sectors driving the market, and home security.

The Hub: Protocols and Components

Connected home devices can network in many different ways. Some communicate using radio signals and others connect directly to the Wi-Fi network. Ultimately they all hook directly, or through a hub, to the home router for Internet access, so they can be easily controlled or monitored with mobile apps and websites.

The hub is a piece of hardware that communicates with home automation devices. Like a brain for the house, it coordinates a series of devices that may not otherwise be capable of communicating with each other.

But hubs can do more than just connect devices. Many are specifically designed to coordinate the home to match the occupant's habits. The homeowner can set up a schedule using different inputs – such as time of day or location tracking. As a result, porch lights can turn on after 11pm, coffee can be ready before the homeowner awakes, and the house and garage doors can be locked when the occupant leaves.

A major concern with hub platforms: which devices connect and communicate to which hubs. Just like other electronic systems, smart devices all run on a variety of different protocols or languages, with rules and standards for communicating. If one device only speaks ZigBee and another only speaks Z-Wave, they won't be able to communicate with each other. Ideally the home will be outfitted with devices that all speak the same language.

Here is a brief overview of major home automation protocols.

– **Thread.** This is a new IP-based wireless networking protocol developed by a consortium of technology and security companies – built on open standards and designed as a low-power, "mesh network." This means one Thread product will pass the signal along to another until it reaches its intended destination. This relay system greatly extends its range. But Thread does not bring together disparate networks.

– **Z-Wave.** Z-Wave also uses a "mesh network" and has extremely low power requirements, which is ideal for battery-operated devices. Z-Wave is typically recommended for home security and automation with short-range remote functions, such as lighting, heating, motion monitoring, and entertainment systems.

– **ZigBee.** ZigBee is another low-power, mesh-network structure that offers excellent range and speedy communication between devices. Some users have noted that ZigBee devices have difficulty communicating with those made by different manufacturers. ZigBee is typically used in products related to smart energy, health care, equipment monitoring, remote controls, and home automation.

– **Wi-Fi.** Homes that have a wireless router do not require a hub to connect Wi-Fi-compatible devices. But bandwidth and response time may be compromised if the house is already filled with Wi-Fi-connected devices. Wi-Fi also consumes a lot of power, so it's not ideal for battery-based smart products like doorbells and locks.
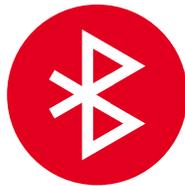
– **BLE** - Bluetooth Low Energy (BLE) technology is found in everything from bike locks to light bulbs to speaker docks, and sometimes in home automation. BLE does not use a lot of power and has a fairly limited range compared to other networking protocols, so it's not recommended for devices like security systems and motion sensors, which must be connected all the time.

– **Insteon** - This home automation protocol bridges the gap between power line-based and wireless protocols, because it uses both. It's also compatible with X10 devices. A wide range of Insteon devices are available.

Key Sectors Driving the Connected Home

In the early 2000s, few people envisioned how pervasive smart phone technology would become within the decade. It's not unreasonable to expect a similar expansion of "hub connected devices." It's also highly likely that both home healthcare and home energy management will have a significant impact on the evolution of the connected home.

A Booming Home Healthcare Market

Traditional medical care is rapidly changing, driven by an aging population and an evolving insurance market. The number of people over 65 years old will increase from 35.1 million in 2000 to 71.5 million in 2030[1]. This trend will significantly increase the demand for health services. We can also expect the elderly to want to remain in their homes for as long as possible, which will drive the demand for remote medical care that can be delivered in the home.

According to a research report from the analyst firm Berg Insight[2], approximately three million patients worldwide were using remote wireless devices at the end of 2013 to display health-monitoring results. That number is expected to grow at an annual rate of 44.4% to 19.1 million by 2018.

With the introduction of the HealthKit app on the new iPhone 6, and Google Fit for Android smart phones, an increasing number of people may be able to transmit medical information to their providers. These applications have the potential to be common platforms for multiple systems.

In addition, a variety of technologies – including cameras, motion and temperature sensors, and wearable monitors – will enable care givers to actively monitor the activities of aging occupants, to make sure they're safe, eating properly and taking their medications.

Making Home Energy Management More Efficient

Home Energy Management Systems (HEM) are designed to better track and control energy usage. The prime motivation for these products is cost savings, with the added benefit of convenience.

In early 2014, the HEM industry was valued at $1.5 billion, according to GTM[3], and there is about a 1.5% market penetration[4]. According to projections, the U.S. HEM systems market value could surpass $4 billion by 2017. The amount of money coming into this field is also increasing rapidly, as evidenced by Google's recent acquisition of Nest for $3.2 billion.

Google's move indicates that independent companies are vying for a piece of the HEM market, including Apple (HomeKit), ADT, Vivint, and AT&T, as well as electric and cable companies. One of the devices that could play a critical role in the future is the smart meter, connected to a house to report the consumption of electricity to both the utility and the homeowner.

While most current meters only provide information about electricity usage, smart meters are likely to perform more functions. Wherever utilities adopt dynamic or variable pricing (see Part I of this series), smart meters can increasingly play a role in controlling power usage in the home.

The Move to Solar Energy

A trend worth noting is the increasing use of distributed power generation in the home. In several areas of the country, solar photovoltaics now produce electricity at a lower cost than the local utility can. As the efficiency of solar collectors improves, solar power in the home will become an economically viable option.

Another emerging trend is "in home" electrical storage batteries, which can store electrical power during the day and use it in the evening. As many as 30% of electric vehicle owners have homes powered by solar photovoltaics panels.

In the not-too-distant future, HEMs may be called upon to make complex decisions to optimize home energy usage. For example, they may assess weather forecasts for solar availability, hourly projections for variable electric rates, charge levels for in-home and car batteries, as well as home energy demand (air conditioning, cooking, laundry, dishwashing), to balance the homeowner's need for power usage, convenience and cost savings.

1. Family Caregiver Alliance, 2012
2. Berg Insight, 2014
3. http://www.greentechmedia.com/articles/read/home-energy-management-systems-market-to-surpass-4-billion-in-the-us-by-201
4. http://www.greentechmedia.com/research/report/home-energy-management-systems-2013-2017

How to Make the Connected Home Secure

Most home automation devices connect to existing home Wi-Fi networks. Any wireless communication and the physical devices themselves are susceptible to hacking.

Homeowners need to put systems in place to make sure home networks and data remain secure. Each router/firewall manufacturer may have its own custom security feature but no security system is foolproof. Some suggested practices include: changing the 'default' password on routers and firewalls, disabling guest access, changing the default network name, and restricting all incoming connections to the router/firewall.

It should also be noted that devices are increasingly being manufactured with pin codes, two-factor authentication, and data encryption to prevent hackers from breaking in. (See installment three for more on security.)

Barriers to Adoption

To date, connected home adoption rates have been relatively slow – barriers must be overcome to gain wider acceptance. Here are some challenges:

– Many Americans think they can't afford connected home technology. The upfront costs of hardware are a major concern. Costs can range from $50 for a single sensor to thousands of dollars for a hub that controls multiple devices.
– Many consumers see smart homes as only for "techies," early adopters and wealthy people.[5]
– Security concerns are a major factor in low adoption rates. Much like the early days of the Internet, home connectivity comes with real concerns about security and privacy.[6]
– The lack of industry standardization is a major impediment, creating confusion to consumers who struggle about which products to purchase.

Eventually some companies and communication protocols will emerge as "winners." But until that happens, many consumers will be wary of investing in equipment, devices and systems that are not secure, cannot communicate with each other or that may not have support a few years down the road.

Connected homes give rise to new risks for which solutions exist. For more information visit http://www.munichre.com/HSB/connected-home

In the third installment of this series, we will focus on future prospects, including an overview of connected home security issues and the implications and challenges for insurers.

5. http://fortune.com/2014/11/11/ge-quirky-smart-home
6. Time 7/4/14 "The Smart Home is Conscious"

This is a summary of coverages.
For all coverages, terms,
conditions and exclusions, refer to
the actual insurance policy.

HSB-147 (New 1/16)

NOT IF, BUT HOW