

by Tom Kerber, Director, Research, Home Controls and Energy, Parks Associates

Individual Connected Products



Many countries throughout Europe have exceeded the 50% mark for broadband penetration. In particular, broadband subscriptions in the Netherlands, Denmark, and Switzerland exceed 85% of households. In Italy and Portugal, 55-60% of households have broadband subscriptions.

Broadband creates the foundation for the connected home, opening a conduit for many new control and management applications. This high-speed, persistent connectivity enables cloud services like real-time feedback and automated controls, which can send repair notifications and synchronize operations to off-peak hours.

The connection to the Internet also allows devices to offload the computing power from the devices to central servers where extensive analytics can be performed, providing sophisticated solutions at a small cost premium. Both broadband and the cloud allow solutions to use existing displays such as smartphones, connected TVs, or tablets to interface with connected devices in the home. Using existing screens in the home instead of a dedicated display also lowers hardware costs and allows for faster product development cycles.

Today, numerous connected products targeting the residential market are available. Lowe's premiered its Iris line of products in 2012 and will showcase its solutions at the upcoming Smart Energy Summit, February 25-27, in San Antonio, Texas.

In Europe, lighting dimmers from **KlikaanKlikuit**, smart plugs from **Elro**, alarm systems from **Woonveilig**, and IP cameras from **Marmitek** are widely available in retail outlets such as Saturn, where 3% of floor space is dedicated to home controls.

Connected Appliances

Connected appliances can provide services that respond to demand and price fluctuations and extend benefits to the owners, the manufacturers, and the utilities. OEMs can leverage connectivity a variety of value-added features to their products, such as personalized services that recommend other features, software upgrades, and customer care services (e.g., remote diagnostics). They can also collect data on product usage to improve their understanding of their product in a real-world context and create new features based on that knowledge. Similarly, companies can collect operational history data to get specific information on time-to-failure to improve the quality of appliances.

Global appliance manufacturers LG and Samsung have launched Wi-Fi-enabled appliances, but European appliance manufacturers are taking a more guarded approach to connected appliances. These manufacturers are watching the industry, ready to partner with others who are moving into the market, while European OEMs are busy finding partners and platforms that will provide them broader capabilities in the long term. One example of this approach is the Miele and QIVICON partnership.

Connectivity will provide immediate differentiation, but in the long term, consumers will not find much use for products that do not interoperate with the other products in their home. As consumers acquire more connected products, interoperability must be prioritized.

Achieving interoperability

Today, if an OEM wants to develop an interoperable product, it can choose from several common protocols or develop a proprietary solution.

Manufacturers can choose common protocols such as Z-Wave, ZigBee HA, or DECT ULE, which would open their products to a larger connected home ecosystem by allowing them to connect with solutions from other manufacturers. In doing so, the manufacturer benefits from interoperability but may also have to give up some control of the user experience. In addition, using a common protocol provides interoperability at the gateway, allowing consumers to manage their connected devices even when the Internet connection is lost.

Some manufacturers may want more control over the data and the interface with the customer and may choose to connect their devices directly to servers under their control. In order to connect to other devices in the home, the OEM must connect via application programming interfaces (APIs) with a platform vendor that communicates to other devices in the home.

Both gateway and cloud-based approaches to interoperability are in use today.

The gateway approach to achieve interoperability uses the gateway and common protocols as the primary mechanism to establish communication with end devices from different networks. Once the gateway has established communication with the end device, the software within the gateway provides a common method for applications to talk with the devices, abstracting the network details so that to the application software, a ZigBee HA thermostat looks the same as a Z-Wave thermostat.

The gateway approach to interoperability requires that devices within the home communicate using common protocols such as Z-Wave, DECT ULE, or ZigBee HA. Gateways can either integrate some of the more common protocols into the hardware or use USB dongles and firmware updates to add communication for a specific protocol.

In order to achieve interoperability with other products, common protocols specify the details of all layers in the OSI model. Detailed specifications at the application layer allow devices to advertise their capabilities and connect to the network. Because the gateway also acts as a

controller, when a new application is developed, the gateway must be updated with the new application before the new product can be fully operational on the network.

The cloud-based approach uses web services and open APIs to achieve interoperability. Individual devices may use Wi-Fi or other protocols that pass through the gateway and connect directly with servers under the OEM's control. From the servers, the devices are then connected using web services in the cloud rather than in the gateway. The gateway is more of a pass-through device in this approach, and control is moved from the gateway to the cloud.

There is also a third option, a peer-to-peer communication scheme that can be used in the home or the cloud to allow devices to coordinate activity in more of a distributed control system.

Many of today's systems use either a gateway-centric common protocol approach to provide interoperability or a hybrid approach. In the hybrid approach, the gateway is the primary connection to the home for most devices, but some IP-enabled devices and web-based data services are integrated in the cloud.

For example, Lowe's uses a hybrid approach with its Iris product, employing an Iris Hub and the cloud to balance use of multiple protocols in the home, including Z-Wave, ZigBee HA, and Wi-Fi.

Looking forward, developing a viable ecosystem of products requires a new way of looking at the puzzle-with a larger, more connected viewpoint, where competitors will have to collaborate. As more connected devices and their associated apps enter the market, the opportunity to create new interactions and applications increases exponentially.

The wide availability of broadband and continued adoption of smartphones and tablets make new, more cost-effective solutions possible. Connected home controls systems, once limited to high-end households, now have the potential for mass-market adoption, but appeal of specific use cases varies segment to segment and market to market. Energy management is a very prominent entry case for a large segment in Denmark, where the residential cost for electricity is very high. Security and home monitoring are equally prominent in the U.K.

Launching Connected Home Solutions in Europe

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The diversity among consumer demands and the complexity of adding new devices into an ecosystem mean the business models for integration are not straight forward. Creative business models can unlock the value for stakeholders willing to finance all or part of the service.

As stakeholders increasingly recognize the diversity in the larger market and realize they cannot develop and maintain their own backend infrastructure cost effectively, there will be more willingness to leverage service providers' platforms, especially as connectivity forges a more direct and ongoing relationship with the customer.

As the market moves to second-generation products and beyond, consumers will expect that product capability will be upgraded periodically. Efforts to improve customer loyalty, which is driven by the user experience with the current product, will require companies to support and upgrade existing products over their lifetime.

Tom Kerber, Director, Research, Home Controls & Energy, *¶ leads Parks Associates research in the areas of home controls, energy management, and home networks. Tom's work includes industry reports, consumer and utility industry survey work, and consulting engagements to leading home systems device and service companies. Tom regularly speaks at industry conferences in the U.S. and abroad and is a frequent guest at client planning meetings.*

Prior to joining the firm, Tom was a client of Parks Associates' Home Energy Management service (2010) while serving Lennox Industries as Corporate Director, Advanced Engineering and as Director of Product Management.

Tom has previously worked in the utilities industry, the consumer goods industry, and for Motorola in the telecom industry. He holds a MS in Software Engineering from the University of Texas and a BS in Systems Engineering from the United States Naval Academy.

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