WHITE PAPER

What is SHaaS? And why should you care?

Comcast survey shows that homeowners want a smart home. They want services, not a collection of connected devices.

By Cees Links, GM of Qorvo Low Power Wireless
Formerly CEO and Founder of GreenPeak Technologies

In April 2016, Comcast released a report, compiled from almost 1,300 U.S. consumers, providing valuable insight into why customers are interested in smart home services, what features they really want and how they plan to use smart home technologies.

The findings are detailed in **The Safe & Smart Home: Security in the Smart Home Era**.

The big take-away from this report is that what consumers really want in the smart home is services – smart home as a service (SHaaS) – not a bunch of connected devices that remotely control various widgets and devices in the home.

So What is SHaaS and How Does it Work?

First off, there is a big difference between a connected device and a smart device. Devices for the so-called automated home have been around for decades. For many years, solutions have existed that allowed a hobbyist or homeowner to remotely control the home's doors, windows, environment, entertainment, etc. You (or your parents or grandparents) may remember the X10 communications protocol technology, which was able to wirelessly control a wide range of in-home devices.

Many of today's so-called smart home devices are only slightly more sophisticated than X10 systems. Instead of, or in addition to, a local remote control, these devices can now be controlled over the Internet by a smart phone.

In some ways these new devices may be even a bit less sophisticated than X10 because a single X10 controller could manage a variety of devices, whereas many of today's smart devices each require their own app running on the smart phone. This means one app to control the home's security, another for air conditioning and heating, and yet another for controlling the lighting. You get the picture; it's not ideal.

Problem: The battle to own the smart home and IoT affects us all.

Consumers: It's difficult for consumers to decide which communication technology to use in their homes. In addition to Wi-Fi, Bluetooth® and ZigBee®, industry service providers are introducing their own smart home communication technologies.

Hardware and Software Providers: Companies who develop and market the various components destined for the smart home ecosystem are challenged to deliver lower consumer costs, which could be captured from design reuse and volume production.

Service Providers: If they guess wrong and roll out a line of products based on an emerging standard that does not catch on, they may waste millions of dollars on development costs and years of development time, not to mention customer support and/or transition costs.

Solution: SHaaS

To convert a basic connected device to a smart device requires three additional capabilities. One – it must connect to and communicate with other smart or connected devices in the home. The security system needs to exchange data and commands with the home's environmental controls (i.e. heating and air conditioning), leak detection, lighting, entertainment, lifestyle, etc.

Two – it needs to be intelligent. More than being programmed to perform certain functions at certain times, a smart home solution needs to recognize what is going on in a home and learn what is normal. And when something unexpected happens, take action and/or send an alert to the residents, proper authorities, caregivers or family members.

SHaaS Smart Device Must-Haves

1. Communicate with others
2. Intelligent
3. Manageable by a common user interface

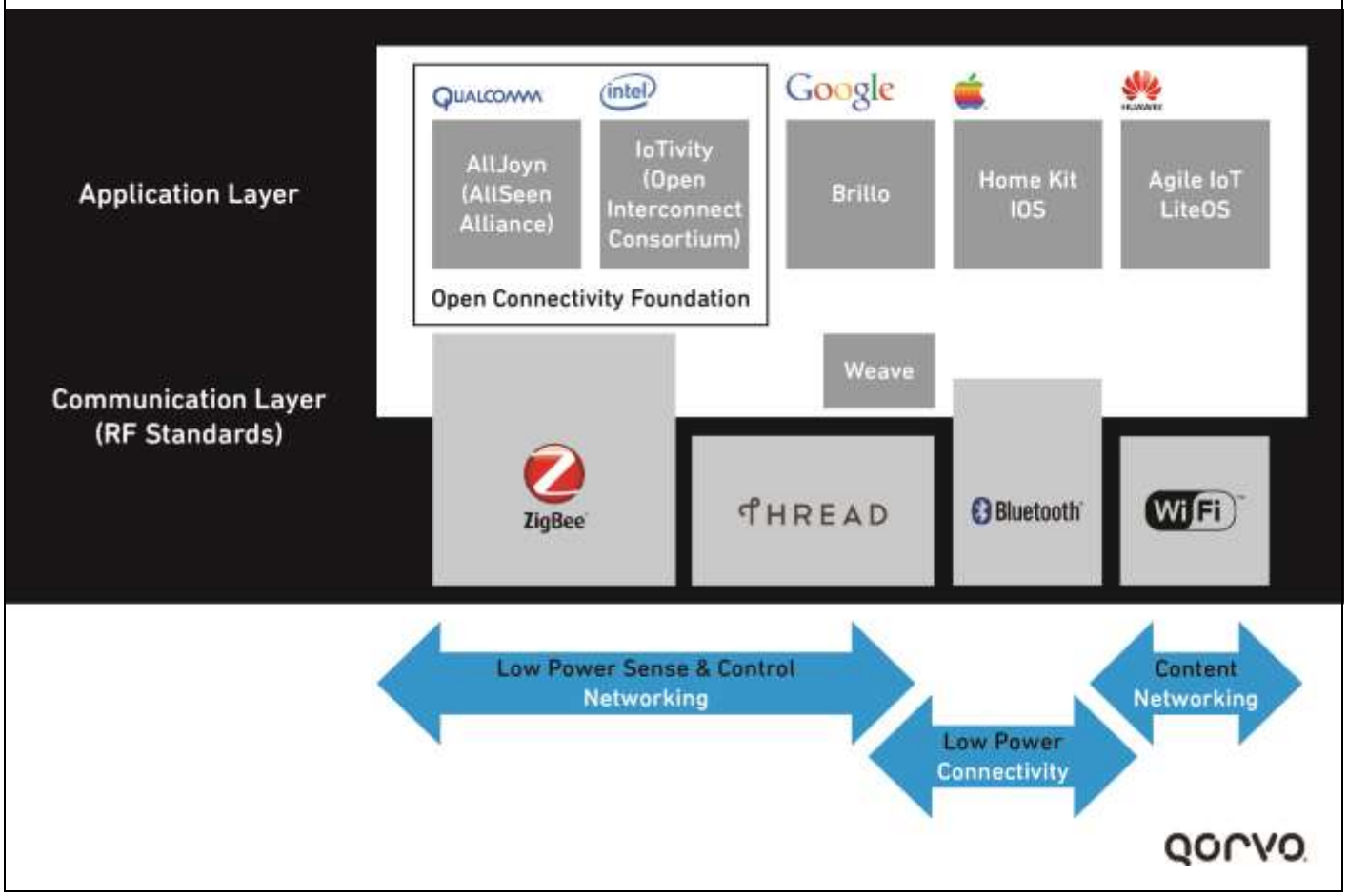
Three – all these functions need to be managed from a single application on a smart phone or any other web connected device such as a tablet. Currently, most connected devices and appliances offer their own app to manage and control operations. However, end users will not want to shuffle through a screen full of various apps in order to find out what is happening in their homes.

Many of us have cluttered our smart phone screens with pages and pages of apps. It will be painful to add, configure and manage a handful of additional apps that do not share a common user interface or even common commands and logic.

Unified and Less Expensive

Unified SHaaS solutions can be more affordable than a bunch of connected devices. A SHaaS ecosystem can eliminate the overall number of sensors required, reducing redundancy and maintenance. A single sensor could be used for a variety of applications. For instance, a motion sensor could be used in a security system, for controlling lighting, for managing the home environment, for controlling entertainment options, for family lifestyle, and maybe even for feeding the family pet.

Figure 1. Overview of open and proprietary standard activities.
In addition to the available RF standards at the communication layer, there is a great deal of competition among the industry leaders at the application layer. This can make it challenging for service providers and device manufacturers to decide which wireless communications technology to adopt for smart home solutions.



So What is the Solution? SHaaS.

Instead of a consumer having to decide which hardware and software options to implement in their home, they can simply leave it up to the providers of home services. This includes the various operators who already provide Internet access and entertainment to consumers and businesses worldwide. These operators already have relationships with homeowners – their routers, modems and set-top boxes are already in the home, and the customers are already accustomed to paying a monthly bill for these services.

The market for providing SHaaS is not limited to just the service providers and operators. Numerous retail organizations like Walmart, Home Depot, Costco, etc. who already provide a certain amount of home services, could easily enter this market sector. Additionally, large security firms and integrators could market the entire suite of services to sell them as a unified package.

Insurance companies see the benefits of smart home applications, because early warnings of water leaks, heating system defects, fire, etc. could help save huge amounts of money for repair, renovation and replacement.

By opting for SHaaS, consumers avoid the major challenges outlined above. They don't need to be technology geniuses. By having one organization responsible for installation, set up and management, it makes it much faster to get the service up and running. In addition, if homeowners want to add additional services like family lifestyle or leak detection, they just need to contact their service provider. A service provider can ensure that all the controls and user interfaces are unified. All the SHaaS options can live within a single dashboard, with common commands and look & feel. Finally, by providing an entire range of services, consumers do not need to know or even care about the underlying wireless connectivity technology.

By providing an ecosystem of smart home services to millions of customers, service providers don't have to worry about which connectivity technology wins the marketing war.

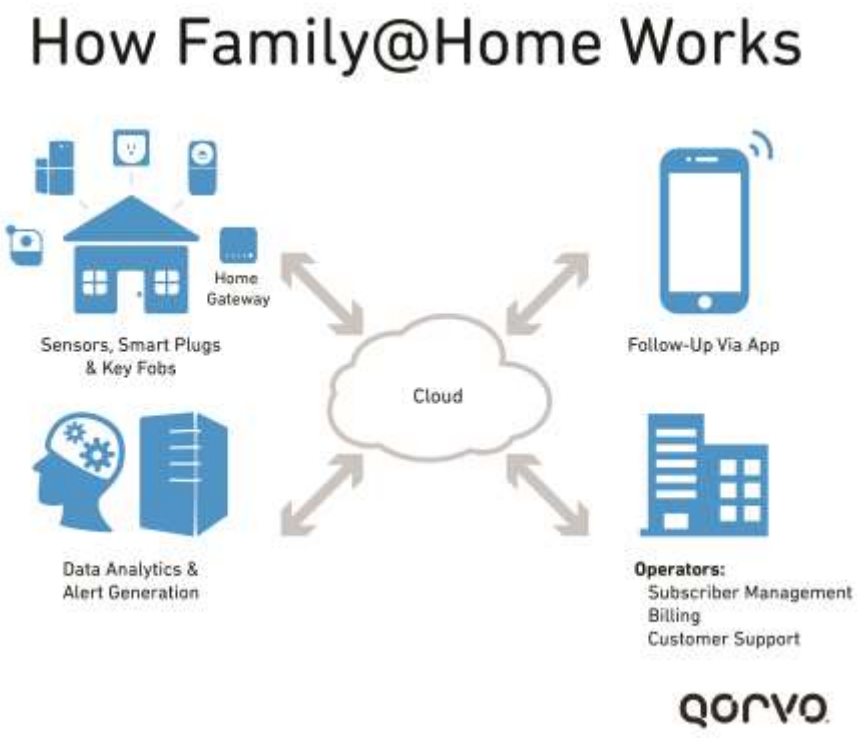
Finally, consumers want services. Numerous studies have indicated that aside from a few early innovators and hobbyists, most people want the benefits of a smart home without the challenge of actually investigating, purchasing, installing and maintaining a system of disparate connected devices. They want a system that simply works. You turn it on, you look at your smart phone's customized smart home management app, and you can control and manage all aspects of the home. All from one app – one dashboard, not a collection of apps scattered across your smart phone.

How Does a SHaaS Application Actually Work?

One very sophisticated SHaaS application is **family lifestyle monitoring**. GreenPeak (now part of Qorvo®) recently announced the Family@Home system that enables residents and parents to monitor what is happening in the house. However, it does a lot more. It is a smart system that can learn what is normal for households and can take action if something unexpected occurs, like the kids skipping school and coming home to have a party when the parents are not around.

SHaaS is like having **a butler in your house**, who can assist the family by turning off lights and the heating when nobody is in a room or locking forgotten back doors. It is a collection of services that analyzes input from the smart home sensors, learns how the family lives and how the home is used, and can make intelligent decisions to make homes more comfortable, safe and energy efficient.

Figure 2. How Family@Home works.
The family lifestyle system uses sensors, connected devices, cloud intelligence and social media to combine a variety of important services into a simple-to-use app that enables service providers to make their customers' lives easier and more secure.



Four Components in SHaaS

There are four basic components in a SHaaS application like Qorvo's Family@Home.

1 First is a **network of sensors** in the home. This can be as few as four, depending on the size of the house – mounted in bedroom and bathroom doorways, as well as in kitchens and near the front doors. Comprised of either position or motion sensors, they can be used to provide a general indication of when and where movement usually occurs in the home. Additional motion and position sensors can provide additional data (i.e. position sensors on doors and windows can indicate whether the house is secure or not). Temperature sensors can help manage the environmental conditions in the home. Leak detectors mounted on appliances can provide early warning of plumbing issues. In addition, individuals in the home can use key fobs to register entering or leaving the house and provide their exact location and movements. Similar fobs can even be used on the family's pets to keep track of their movements. Wearables with embedded sensors can be used to provide important information for monitoring health and safety issues.

2 The information derived from these sensors is then **wirelessly collected by a local hub (gateway, set-top box, etc.) and securely transmitted** to an intelligent cloud service that collects and analyzes the data and then is able to generate alerts to family members, caregivers and first responders. After the initial installation of the Family@Home sensors linked to the analytics, it only takes a week or two for the algorithm in the cloud to accumulate enough data for the application to "learn" how the family lives and to be able to send alerts when an unexpected event happens or something drastically changes.

Figure 3. The smart home butler.
The real smart IoT.

3 Another important component is a **central management app for the consumer**, which can be accessed via a smart phone or any web connected device. The important consideration is that all the various services need to be consolidated into a single user interface, into one easy-to-use dashboard where homeowners can monitor the state of their home as well as the people and pets inside.

4 The **service provider** is able to easily handle customer support, billing, subscriber management as well as software and service upgrades and changes.

These four components make SHaaS a reality. Not only is it easy to use, simple to manage, and effective in providing the residents with safety, security and comfort, it also serves as a valuable income generator for service providers.

Qorvo is working with leading global companies to offer the initial SHaaS solution now. Device and system developers need to continue to work together to develop hardware, software and web intelligence to make this complete dream come true. This evolution is slow moving as most homeowners do not consider major upgrades to their home technology until they decide to move into a new home, or experience a life-changing event. However, SHaaS is the inevitable result. It is what homeowners want. It is what service providers and retail businesses need to be successful in this new technology sector.

Two decades ago, automatic window control and door locking were expensive aftermarket add-ons in our cars. Nowadays, almost every car includes these features. A couple years ago, back-up cameras, radar and sensors were deluxe features, now almost every new car includes them. Decades from now, our children will look back at our “unintelligent, unconnected” homes, and wonder how we were able to live in such primitive conditions.

About the Author

Cees Links was the founder and CEO of GreenPeak Technologies, which is now part of Qorvo. Under his responsibility, the first wireless LANs were developed, ultimately becoming household technology integrated into PCs and notebooks. He also pioneered the development of access points, home networking routers, and hotspot base stations. He was involved in the establishment of the IEEE 802.11 standardization committee and the Wi-Fi Alliance. He was also instrumental in establishing the IEEE 802.15 standardization committee to become the basis for the ZigBee sense and control networking. Since GreenPeak was acquired by Qorvo, Cees has become the General Manager of the Low Power Wireless Business Unit in Qorvo.

For more information, please visit **www.greenpeak.com**.

About Qorvo

Qorvo (NASDAQ:QRVO) makes a better world possible by providing innovative RF solutions at the center of connectivity. We combine product and technology leadership, systems-level expertise and global manufacturing scale to quickly solve our customers' most complex technical challenges. Qorvo serves diverse high-growth segments of large global markets, including advanced wireless devices, wired and wireless networks and defense radar and communications. We also leverage our unique competitive strengths to advance 5G networks, cloud computing, the Internet of Things, and other emerging applications that expand the global framework interconnecting people, places and things. Visit **www.qorvo.com** to learn how we connect the world.