

Smart Homes Ignite the IoT

Ultra-Low Power, Low-Cost IEEE 802.15.4 and ZigBee® Chipsets



qorvo
all around you

The Smart Home Begins Now

Smart homes are becoming a reality. Residents are using applications for home monitoring, improved energy efficiency, light & access control, and lifestyle & family monitoring.

Service providers and utilities are launching smart home applications that can be managed through a set-top box or gateway, allowing subscribers to turn their homes into state-of-the-art environments and connect from anywhere in the world, via the cloud, on their smartphones.

Smart home devices require an ultra-low power network, using IEEE 802.15.4 wireless technology. Qorvo's chipsets can easily connect devices to a central home gateway with a safe and reliable, maintenance-free network.

Phase 1

- Remote control
- Internet gateway
- Set-top box/home control box

Phase 2

- Energy efficiency
- Thermostat
- HVAC control
- Light control
- Home monitoring and security
- Access control
- Motion sensor
- Door and window sensors

Phase 3

- Integrated environmental monitoring
- Senior and family lifestyle applications
- Data analytics



Phase 1: RF-based remote controls for set-top boxes and consumer electronics, including internet connectivity.

Phase 2: Wide variety of cloud-based applications enable tablets and smartphones to become the remote console of the smart home.

Phase 3: Arrival of the really smart home, when all devices and systems exchange information to work together.



Applications that Matter

Homeowners want smart homes. Do-it-yourselfers and early adopters are already using today's connected sensors and devices to monitor and manage smart home functions with their smartphones. But the majority of consumers are still waiting, with the expectation that a smart home should be a collection of services, not just a collection of connected devices.

To accelerate the growth of "smart" into the world, the next-generation smart home systems will have a wide range of connected sensor types, connectivity to a hub or gateway, and cloud intelligence that gathers and analyzes this input. These systems learn how families work and act as the Smart Home Butler, making lives safer, more efficient and more comfortable.



Qorvo's smart home applications are system-level reference designs for a complete end-to-end solution. This allows telecom operators, cable providers and insurance companies to complement their current business offerings with additional services.

Smart Home as a Service (SHaaS)

Qorvo has built an ecosystem with software and hardware companies that work together to deliver three complete SHaaS solutions that can be marketed and managed by operators, retailers or specialty solution providers.

1 Smart Home Butler™

2 Senior Lifestyle

3 Family@Home™



1

A **Smart Home Butler** becomes a reality when a smart home service recognizes what is happening in the home and provides the appropriate action. The application doesn't need to be programmed to open the door or turn on the lights, but takes action based on a self-learning behavior algorithm.

A Smart Home Butler starts with a network of sensors that measures and monitors the environment. It learns who is in the home, where they are in the home, what the "normal" activity is at that particular day and time. Then, by using intelligence and pattern recognition information, it makes a decision whether or not to open windows, turn on or off the heating, air conditioning, activate the security system, etc. If there is a leak in the water system, it turns off the water and notifies a repair person.

Smart Home Applications with Qorvo's IEEE 802.15.4 & ZigBee radio chips inside:

- Access control
 - Central locking
 - Remote door opening
- Home monitoring
 - Gas, smoke, fire and carbon monoxide detection
 - Alerting
 - Water leakage detection
- Remote controlled lighting
- Energy efficiency
 - Climate control
 - Light control
 - Energy consumption
- Appliance diagnostics



2

The **Senior Lifestyle** service children and elderly parents to privately share lifestyle information, helping seniors to feel safe and live longer independently at home.

This application utilizes the latest generation of sensors, communication technologies and smart cloud algorithms.



The Qorvo Senior Lifestyle application is currently being rolled out by the world's largest operators.

The Value of Senior Lifestyle Services

Senior behavior pattern recognition

When does grandma get up in the morning? When is she in the kitchen cooking? When is she watching TV? When does she leave and come back? Within a few weeks, the application learns what is "normal", and learns what is not expected. It will send an alert when something is wrong or when irregular behavior is detected.

Alerts on exceptions

When irregular behavior or exceptional situations are identified, family or friends are notified by an app on their smartphone or they can get messages via social media platforms like "WhatsApp" or "QQ". The system always keeps family members informed wherever they are.

Long-term trends

The Senior Lifestyle service also provides information about longer-term behavioral trends. For instance, the system will identify and report on sleep patterns. Or when a person gradually starts to move slower or eats less frequently.

Unobtrusive and respects privacy

Since it does not require people to wear devices and does not use cameras, the system is unobtrusive and ensures privacy.

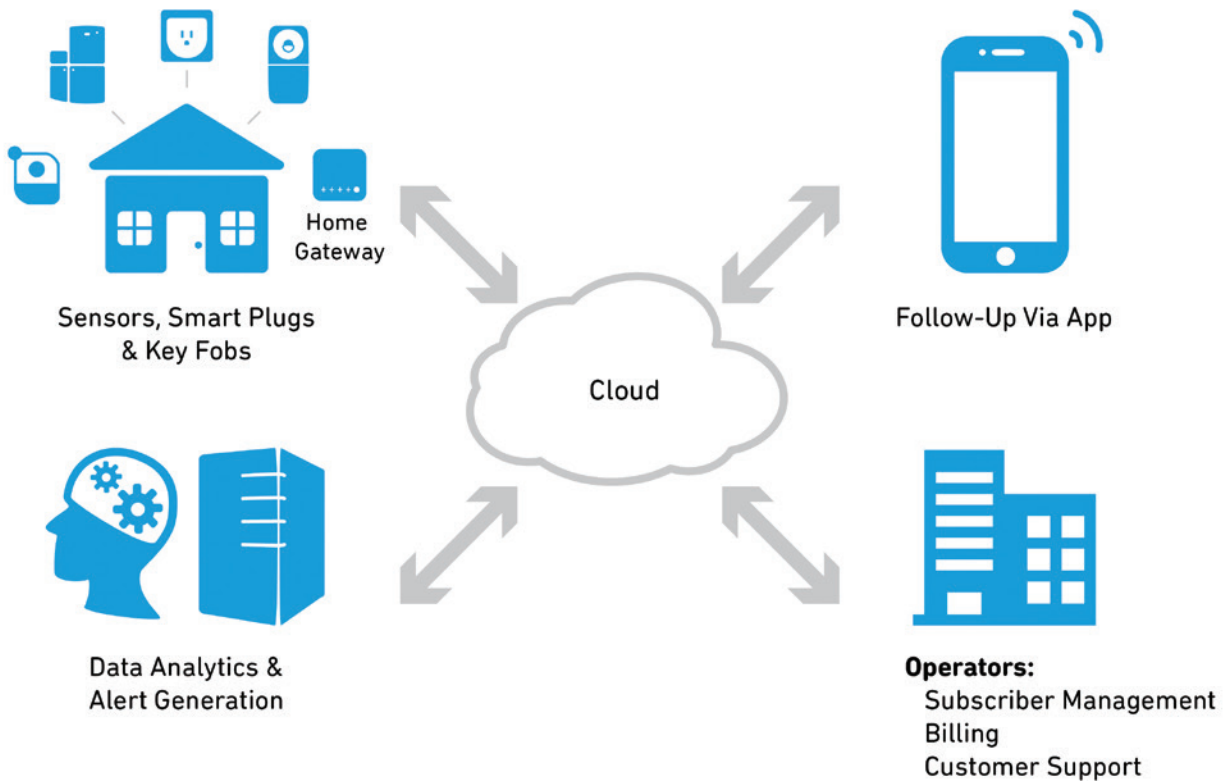


How it works.

Both Senior Lifestyle and Family@Home services are built around a set of wireless ZigBee sensor nodes located throughout the home. They connect via an internet gateway to a cloud-based self-learning algorithm with advanced behavior pattern recognition capabilities, that learns the normal day-to-day activities and behavior of people in their home. The system provides intelligent status updates in a dashboard app and generates alerts when something unexpected happens.

3

The **Family@Home** service helps to monitor your home and your loved ones, providing peace of mind, comfort and security for today's busy families. The system is a simple and inexpensive application that doesn't need programming. It consists of a collection of sensors that can easily be installed in the home, connected to the web via the home's internet connection and managed with a smartphone.



Peace of mind for today's busy families.
Worry less, care more.

The Value of Family@Home Services

Family behavior pattern recognition

Are the children home from school at the expected time? Did someone leave the back door open when you went to work? Is the family pet safely inside the house? Did someone leave the air conditioner on with the window open? Is the bath overflowing or is the washing machine leaking? Did you miss the weather forecast, and leave your windows open? These are the kinds of questions that the Family@Home lifestyle application proactively addresses.

Combined with smart home services

This new smart service combines sensors for monitoring family activities with a variety of automated home applications like temperature and climate control, home monitoring, lighting systems, appliance control, etc. One system does it all.

Incorporate sensing and geolocation technology

In addition, this solution incorporates sensing and geolocation technology from key fobs, door contacts, smartphones and occupancy sensors, to provide a larger understanding of where family members are, what they are doing and when they will be home.



ZigBee RF4CE has become the dominant standard and has been adopted by all the leading operators, set-top box and remote control makers in the USA. Worldwide, over a 100 million new set-top boxes and remote controls are already using ZigBee RF4CE and this number is growing rapidly.

Remote Controls and Set-Top Boxes

Qorvo offers ZigBee RF4CE chips with the two-way interactive wireless communication protocol, which enables interoperability between remote controls and a variety of TVs and set-top boxes, gateways, and other home networks and entertainment systems.

Key Features:

- No line of sight limitation, no point and click
- High speed, low latency
- Excellent range (signal goes through walls and floors), set-top box can be in cabinet
- Robust; prevents Wi-Fi or Bluetooth interference
- Lifetime battery
- Possibility to integrate with smart home services

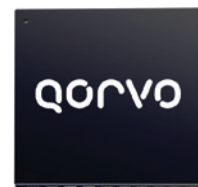


World Class IEEE 802.15.4 & ZigBee Radio Chips

Qorvo's wireless RF communication technology includes a wide range of innovative ultra-low power wireless data communication controller chips for use in smart home applications and the IoT.

Uniquely differentiated chipsets for low power RF networking

- ZigBee 3.0
- ZigBee PRO
- Thread
- ZigBee RF4CE
- ZigBee Green Power with energy harvesting
- Bluetooth low energy (BLE)



Qorvo's key RF chip differentiators



Multi Stack

Supporting simultaneous multiple protocols in a single radio for futureproof solutions.



Multi Channel

Multiple receivers allow simultaneous listening on different channels using a single radio for robust in-home communications.



Low Cost

High level of integration enables system level cost savings and lowest total BOM.



Quick Time-to-Market

Production-ready reference designs make integration simple for easy ZigBee certification of smart home products.



Ultra-Low Power

Sensor nodes and remote controls can run on a single battery for over 10 years, extending product life and maintenance-free operation.



Superior Range

Twice the range in crowded 2.4GHz environments for full home coverage.



Energy Harvesting

Supports energy harvesters in battery-free applications and self-powered devices. Energy is harvested from flipping a light switch or from solar cells.



Wi-Fi Interference Avoidance

Qorvo's radio chips with antenna diversity offer better interference against Wi-Fi, Bluetooth and other RF signals. Qorvo's patented antenna diversity design avoids indoor wave cancellation with other Wi-Fi devices.



Are your wireless products futureproof?

Many consumers worry that the smart home products they buy this year won't talk to next year's gadgets. Qorvo futureproofs your wireless products now, so your product volume can take off. Our protocol-agnostic IEEE 802.15.4 chips solve compatibility issues and support the multiple home networking standards of today and tomorrow.