

GROWTH OF THE CONNECTED HOME

The Home Platform Perspective

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THE CONNECTED HOME IS A RAPIDLY EMERGING MARKET AND PLATFORM FOR PRODUCTS AND INNOVATIONS

Whether you call it the connected home, smart home or home automation, it is a hub of activity for connectivity and sensor solutions. While mainstream adoption may still be years away, we know this market is poised for growth. It represents an important opportunity for consumer product manufacturers from devices to appliances, security and lighting, to deliver products that are differentiated with new functionality and connectivity.

As a sensor and connectivity component company, our interest in this market is significant. We proactively identify trends and innovate new product solutions to better serve our customers. Consumer needs are rapidly changing and new features and functionalities are being created that will forever change the idea of value. No one knows what products will be central to the connected home, but we do know you need to place multiple bets. Whether it's the refrigerator, TV or thermostat, TE Connectivity (TE) will work with our partners to develop product strategies that will enable multiple outcomes.

A Consumer View

Today's market is fragmented and standards differ. The killer application does not yet exist. Vendors are competing for mindshare with their own version of walled gardens or individual platform standards. What is clear is that there is no one approach or obvious leader today. The migration towards home automation is based on do-it-yourself product solutions versus an integrated home solution. Consumers are confused and the industry is not helping the situation.

The idea of a home hub, long held by the personal computing OEMs to be the future of the home pc, is now very much up for grabs. For now, the primary control device remains the smartphone or tablet. Yet, we see new products entering the market, including digital assistants like Apple's Siri and Amazon's Alexa, as well as familiar appliances reappearing with new features enabled by sensing and connectivity. All of these products are competing for a bigger share of mind and control in the home. Samsung is promoting both the smart refrigerator and smart TV as a family hub. The company is using technology from Smart Things, which it bought in 2014, to add home automation technology across their product line. In this example, the two products represent very different strategies and demonstrate both the uncertainty of the primary device, as well as the importance of placing early bets.

We are in a period we call "exploration". We do not know what the outcome will be from a lead device or must-have functionality, but we know that the market is changing rapidly and successful companies are proactively developing and testing new solutions to bring to market.



Consumer Purchase Intent



32% of online shoppers own at least one smart home device.



22% own connected smoke detectors, which was the highest among devices included in the survey. An additional 22% of respondents intend to purchase a connected smoke detector in the future.



While only 11% currently own connected lighting products, 26% intend to purchase them in the future. This ranked as the top smart home device consumers intended to purchase in the future.



Security was ranked as an important feature of a connected home device by 70% of the respondents, more than any other feature. 69% said price is one of the most important features, and 66% cited ease of installation.

Source: UPS Pulse of the Online Shopper, June 2016

“From coffeemakers at college hackathons to TVs at your local Best Buy, everything is smart these days.”

John Mannes, TechCrunch June 22, 2016

Smart connectivity is just a starting point. Connectivity enables the sharing of information and the ability to monitor and control. As artificial intelligence matures and proliferates devices will leverage complicated analysis in the cloud to deliver actionable insights back to users and systems within the connected home. Automation will eventually make routine tasks or chores easier and perhaps invisible. As new value propositions are shaped, we expect to see simplification, increased efficiencies (saving both time and money), and a level of service beyond what can be delivered today.

This will drive a virtuous cycle of increased demand for products which can be leveraged to improve data analysis. Understanding behavior and how to drive efficiencies is critical. These improved results will create a better experience for consumers who then demand more products—and the cycle continues.

Gartner predicts that by 2022, a typical family home could contain more than 500 smart devices.

Adoption and Challenges

Partnerships and touchpoints are critical as service providers, home security companies, retailers, consumer electronics and appliance OEMs bring a range of new hardware and services to market. The rapidly evolving role of mobile devices (tablets, smartphones, wearables) is adding another layer of complexity as management and control preferences are determined and new opportunities are created (such as in the healthcare monitoring space). While complexity continues to increase, the benefit will be unprecedented levels of functionality and service delivery.

Adoption in this space has been slowed down by the challenges around ease of use, installation and control. Add various and competing communication standards, and the proliferation of networking protocols, and you have an ecosystem that is fragmented and competitive. It's truly ironic that despite increased connectivity, smart devices are not connecting with each other.

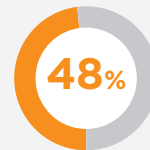
Companies are beginning to offer points of collaboration. Samsung has long supported the developer community and specifically supports developers of connected home products via its SmartThings platform. Even Apple is recognizing the importance of common technologies. For the first time at their Worldwide Developers Conference they announced two things which may help jump start smart home adoptions. First, they are releasing the Home app for iOS devices that will act as a central control point for HomeKit compatible smart home devices. Second, Apple opened up Siri to third-party developers, just as Amazon opened up its Alexa platform. This will allow app developers to have Siri act as their voice control.

In addition to technology, standards, and security concerns, it's also important to evaluate the consumer adoption mindset. Early adopters are intrigued by new products and functionalities and start purchasing, testing, and sharing information. Mainstream adoption may be years away, seeing the challenges as roadblocks threatening their desire to purchase. Yet the fact remains that people are testing the waters. Research demonstrates different interest levels and expectations. We see adoption curves differ depending on the product focus, geography and pain points. In some countries, utility companies and government regulations are driving adoption. We think the benefits of automation, remote management and servicing, and other customer friendly features will lead appliance

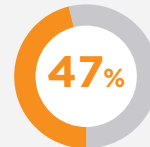
Icontrol's State of the Smart Home identifies top benefits:



say they are excited about the potential cost savings from energy efficiency and monitoring



say they are excited about the potential convenience in programming home settings and maintenance

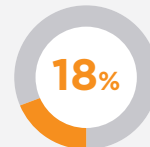


say they are excited about the potential to help the environment with greater energy efficiency*

Yet they also found other levels of interest:



want greater productivity and the ability to manage work-life balance



look to anticipate one's needs



site the ability to have more interactive features to help connect with the people in their lives

*Source: Icontrol 2015 State of the Smart Home Report

The inside of a modern thermostat is starting to look like the inside of a smartphone with new technology including TE's connectivity and sensor products.



manufacturers to compete to differentiate themselves. They may be the drivers of adoption as OEMs bring products that offer new levels of functionality to the market sooner than later.

Multiple adoption points increase the complexity of the market and companies' ability to predict when the connected home hits mainstream adoption. We have seen disruptive models and products enter the market completely changing expectations. The smartphone changed expectations around playing music, and the ultrabook changed expectations around the size and weight of notebooks. From a usage model, streaming video changed the idea of entertainment and content delivery. History proves there will be a new entrant that rapidly changes expectations and jump starts adoption.



Evolving Business Models

We cannot discuss opportunities and challenges without considering the potential impact on business models. The impact, particularly on appliance manufacturers, may be significant. Who will deliver the new functionality? Will the OEMs add it to their product offering or will a new, third party service provider emerge to offer the digital version of a service contract? Will remote maintenance and preventative service alerts turn the customer data into new, value-add service offerings? How will businesses articulate the value of the new "connectivity" features?

The role of brand partnerships may be redefined. Across the connected home market we see alliances and integration across previously separate vendors. Imagine the potential partnerships that may be created across appliance, security, lighting and more. As different standards and platforms emerge, we predict the partnership landscape will continue to evolve dramatically.

TE's Approach

TE has strong relationships with the major consumer electronics, appliance and device OEMs. We also work closely with our distribution partners to serve a range of customers and start-up players. Innovation is not about company size or location, it is a mindset around exceeding or anticipating the needs of the market. Our goal is to drive the most comprehensive, highest quality connectivity solutions in the market; and be the partner of choice across the ecosystem.

TE's customer relationships extend across many home product categories such as appliances, hubs, personal assistants, occupancy sensors, HVAC equipment, thermostats and more. TE's interconnect and switching technologies play a critical role in development of home automation systems. We enable power and signals internally and externally using electrical interconnects, and routing power and signal in these devices via switching components (for example, a power relay is needed in every wireless or wire-controlled connected AC wall outlet).

Our customers' devices are found in all products and sub-systems in the connected home, including:

- Large & small appliances
- Consumer devices
- Energy management
- Entertainment
- HVAC equipment and controls
- Lighting equipment and controls
- Safety equipment and controls
- Security equipment and controls



Designing in the right connector, switch, relay, or sensor for the device and its application is key to ensuring reliability and functionality. TE has a global team of product and development engineers, application and sales engineers, account managers, and technology experts. Their goal is to help customers make these important decisions early in the product development process, where optimization of a design is most important.

TE engineers can work with customers to develop a semi-custom or custom design that meets their requirements. The process is initiated by working with one of TE's sales or field application engineers. Innovating with our customers is one of our strengths that benefit our customers with differentiated solutions.

Our engineers are agile and use the latest metal and polymer materials to develop a perfect-fit product for custom applications. TE Engineers can leverage a wide range of manufacturing technologies. High-speed progressive stamping, injection molding, a variety of plating technologies, and automated assembly all help ensure long-term production volumes with a design optimized for manufacturing and the end customer's application.

Micro-sized connectors and switches

Through TE's vast product offering, we are able to provide micro-sized connectors and switches for the smallest sensor assemblies. Micro-sizing matters: Consumers want their home automation

devices to be as small and unobtrusive as possible. This means the internal components of these devices need to be proportionally small, which is further complicated by additional functionality packaged into these devices. For example, occupancy sensors may also contain ambient light level sensors, a microphone, and other sensing/monitoring elements.

High-current capability

TE provides high-current connectors, switches, and switching relays for HVAC equipment and appliances, enabling their connectivity and control in the automated home. Connected, electronic devices are inherently low voltage or low power, and they need to have relays to switch the higher voltage/higher power loads typical in the home. These loads can be anything from a coffee maker or toaster plugged into a connected wall outlet, to a boiler controller wired to a connected thermostat.

Breadth of choice for product designers

TE's product portfolio is comprehensive—allowing designers to find exactly what they need for their unique ideas and products. In almost every electronic design, connectors and sensors are needed to provide and route power and signals into or out of a circuit.

Wireless innovations

Remote and wireless communication as well as control and monitoring will be an integral part of connected home ecosystems. These connected capabilities drive value by saving time and money for consumers, and will be key to driving demand and mainstream consumer adoption.

Below is a high-level itemization of some of the TE Connectivity product families that find common use among all the sub-systems listed.

- Antennas
- Data I/O connectors
- Fine pitch & free height connectors
- Grounding & Shielding connectors
- High-performance labels
- Integration/value-add capabilities
- Point to point terminations (FASTON, PIDG, etc.)
- Rapid termination connectors
- Small format and power relays
- Passive PCB components
- Power connectors
- Switches
- Spring finger contacts
- Sensors
- Terminal blocks

The TE Advantage

TE is committed to meeting the needs of our customers. Not just delivering products for current design specifications, but also partnering to identify new opportunities.

We provide the broadest range of connectivity products available, suitable for a wide variety of applications and end products. We are uniquely positioned to help customers succeed in the connected home market.



The connected home represents tremendous opportunity for growth and innovation. Now is the time to get started.

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DATA AND DEVICES

